THE PROGRESSIVE GUIDANCE OF VISUAL DESIGN TO POPULAR SCIENCE COGNITION OF ADOLESCENTLE

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งานวิจัยเกี่ยวกับวัฒนธรรม ที่มีลักษณะเฉพาะในภูมิภาคของเมืองคุนหลม ที่อยู่เบื้องหลังการออกแบบภาพของความรู้ทางวิทยาศาสตร์ ที่นิยม : การออกแบบวิทยาศาสตร์ ที่เป็น ที่นิยมของศูนย์การควบคุมโรคยุนนานเป็นตัวอย่าง

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THE PROGRESSIVE GUIDANCE OF VISUAL DESIGN TO POPULAR SCIENCE COGNITION OF ADOLESCENTLE

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HAS BEEN APPROVED BY THE GRADUATE SCHOOL IN PARTIAL FULFILLMENT
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This research is the study and development of Information Systems Management for Dissertation/thesis of Srinakarintarawirot Graduate University. Objective for managing work and dissertation writing, using material developed in the web-based application(Web Application) to evaluate the efficiency and effectiveness and to assess user satisfaction with information systems for the management of the dissertation and thesis on the development of the principle of development of the SDLC (System Development Life Cycle) is used to develop the system. And requirements gathering analysis of existing systems to new systems for use in the management of information and writing dissertations. This system is divided into 3 groups are user groups, including faculty, staff and students. The results of the study found newly developed information system effective levelby evaluating the performance of expert systems remained strong with an average of 4.10 and 0.59 of standard deviation. The satisfaction of the samples using the system remained good. The average was 4.43 and the standard deviation of 0.51. The system developed can be applied to practical and responsive to the needs of users.

Keyword : Information Systems

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Let culture become the "translator" of science.

Knowledge is no longer an obscure and profound theoretical discipline; Popular scientific design is not only a tool for knowledge dissemination, but also an innovative platform for regional cultural regeneration and community governance. The "Kunming case" in this study reveals that in an era dominated by technological rationality, regional culture is not the opposite of science but rather its support point - it has transformed radiation protection from a cold term into "the guardian of the armored and armored divine Army", and turned the medical warning of mushroom poisoning into "the survival rule of the martial arts world".

In the future, the mission of popular science might be to make every culture an interpretation of science, enabling everyone to find a balance between rational cognition and emotional identification at the intersection of tradition and innovation, and to open up new impetus for action for young people.

Here, I would like to express my most sincere gratitude to all the teachers, classmates, friends and family members who have guided, helped and supported me!

HAO ZHANG

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CHAPTER 1
RESEARCH BACKGROUND

1.1 Background

1.1.1 Overview and Research Significance of Culture and Art in Kunming City, Yunnan Province

This study primarily focuses on the in-depth exploration of the integration of culture, art, and popular science visual design in Kunming City, Yunnan Province, China, as well as the behavioral guidance that popular science design has provided to teenagers in the Kunming area. Therefore, this chapter first outlines the characteristic culture and art of Kunming City, Yunnan Province.

Location Advantage: As the capital of Yunnan Province and a regional central city, Kunming is situated on the Yunnan-Guizhou Plateau. It boasts three distinct spatial attributes: 1. Natural geographical center: The city enjoys a unique climate with a perpetual spring-like atmosphere and an annual temperature variation of less than 15°C, which has fostered its ecological image as the "Spring City and Flower Capital." 2. National border gateway: Kunming borders Guizhou and Guangxi to the east, Sichuan and Chongqing to the north, and shares borders with Myanmar, Laos, and Vietnam to the southwest. It has emerged as a core node of the China-Asean Free Trade Area and the starting point for international routes such as the China-Laos Railway. 3. Multicultural convergence zone: The Han Culture Corridor, the Southeast Asian cultural circle, and the cultures of 25 ethnic minorities converge in this area.

Ecological resource endowment: The Kunming region in Yunnan Province is celebrated for its ecological richness, often referred to as the "Kingdom of Animals" and the "Kingdom of Plants." It is home to 18,000 species of higher plants and 2,273 species of vertebrates, including rare species such as the Yunnan snub-nosed monkey, which serve as a significante pidemiology for biodiversity conservation. The Dai people's "Longlin" belief system dictates that logging in sacred forests is forbidden to preserve the tropical rainforest biological corridor. In the Xishuangbanna area, the diversity of tree species has been recorded at 187 per square kilometer, and the protected reserve

spans 36% of the region, as reported by the Xishuangbanna Botanical Garden of the Chinese Academy of Sciences.

Rich ethnic cultures: Yunnan hosts the Yi people's Torch Festival, the Dai people's Water-Splashing Festival, and the Miao people's Flower Pole Festival, among others. From the perspective of intangible cultural heritage, Yunnan also boasts the Bai ethnic group's Three-Course tea and the Hani people's Terraced field woodblock water distribution system. The collaborative innovation of multi-ethnic technologies has given rise to a metal casting chain, including the forging of Yi ethnic copper drums, the engraving of Bai ethnic silverware, and the quenching of Achang knives, thus forming the *Metal Craft Corridor in Western Yunnan*.

Cultural forms: Yunnan's multi-ethnic cultural forms have evolved over millennia to create a unique system of living heritage. This includes agricultural cycles such as the Hani's *Chi Zaza Festival*, recognized as part of the national Intangible Cultural Heritage, rice transplanting in the terraces during June, and the autumn grinding ceremony, symbolizing the exchange of energy between heaven and earth. The Wa people's *New Rice Festival* exemplifies ecological wisdom, utilizing ant egg sour juice to prevent insect damage. Additionally, there are examples of ecological conservation, *like* the Naxi ethnic group's Sanduo Festival. During the Yulong Snow Mountain Festival, traditional village regulations mandate the closure of the mountain for afforestation during the festival period, which has now expanded to include the protection of water sources.

Wild mushroom culture: The cultivation of wild mushrooms has evolved into a symbolic representation of the fusion between natural understanding and humanistic spirit in the Kunming region, thereby shaping a unique wild mushroom culture within the local community. The hallucinatory experience of "little people" following the consumption of wild mushrooms, along with the adage "Yunnan cuisine is not a feast without fungi," vividly capture the regional culture of Kunming. Among the scientific outreach cases to be explored in this study, several focus on the dietary, risk, and social

aspects of wild mushroom culture. The scientific content primarily highlights the most distinctive humanistic themes of the Kunming area.

In conclusion, by examining the framework of ethnic culture and art in Kunming City, Yunnan Province—including historical context, core characteristics, contemporary development, and cultural manifestations—it establishes a foundation for further research into the regional cultural features and values centered around Kunming City.

1.1.2 Research background of popular science visual design

From ancient times to the present, the research and dissemination of scientific knowledge have always been significant topics in human studies. Over the past three decades, modern popular science design has emphasized interdisciplinary collaboration, integrating knowledge from fields such as visual design, interaction design, psychology, and education to enhance the effectiveness and appeal of popular science. The advent of the Internet and digital media has greatly transformed the form of popular science design. This design has always been rooted in visual design. All future diversified evolutions stem from visual design. At the same time, popular science visual design itself encompasses specific fields such as local culture and art in terms of content and style, effectively enhancing the appeal and dissemination of popular science. Through rich content and multi-channel dissemination, it achieves the deep implantation and sustainable cognition of popular science knowledge among the general public, allowing concepts to guide imperceptibly. The historical research on popular science design can be traced back to the origin period of science. By examining several development processes of science, the following are several key stages and milestones in the historical research of popular science design:

In modern science popularization design, new technologies such as multimedia, virtual reality (VR), and augmented reality (AR) are widely applied. Interactive science popularization websites, science popularization apps, and online courses, like MOOCs, have become important channels for disseminating scientific

knowledge. Global science popularization activities and projects, such as TED talks and science expos, have promoted the innovation and development of science popularization design. In modern society, people have integrated diverse means into popular science design. For example, the popular science documentary "Cosmos: A Personal Voyage," hosted by Carl Sagan in 1980, makes complex cosmological knowledge accessible through visual effects and vivid narration. Interactive exhibitions in science museums are common; many adopt interactive designs. For instance, the interactive exhibition at the Science Museum in London allows visitors to personally participate in scientific experiments and explorations. Modern popular science animations, such as "Life: A Cosmic Story" and "The Secret World of Cells," utilize computer animation technology to present the complex phenomena of the microscopic world in a vivid manner.

Domestic research: A review of the historical development of popular science design in China reveals that this design discipline began to evolve in 1980. The Mass Science and Technology Daily, dated May 18, 2010, on page B02, featured an interview with Professor Ren Fujun, Director of the China Science Popularization Research Institute, titled "Looking Back on 30 Years of Science Popularization Research in China." Reporter Yin Chuanhong reported: "In 1980, at the suggestion of Mr. Gao Shiqi, a distinguished Chinese scientist and science popularization writer, and with the endorsement of The State Council, the China Science Popularization Research Institute was founded." Over the subsequent three decades, the institute has conducted extensive research in the field of popular science theory and has achieved significant results, fulfilling its mission to advance the development of popular science in our nation. During that period, the Science Popularization Press underwent reorganization, the China Association for Science Popularization Creation was established, and later, the China Association for Science and Education Film and Television was founded as well.

The progress and long-term development of society are inextricably linked to the advancement of human consciousness. Popular science knowledge has always played a guiding role in shaping human thought dynamics. The dissemination of popular

science knowledge is a crucial task for enhancing the scientific and cultural literacy of citizens and for promoting the overall progress of society. Through various forms of popular science activities, not only can people's scientific knowledge be expanded, but scientific thinking and the scientific spirit can be cultivated, thereby improving the overall scientific literacy of society. With the ongoing advancement of science and technology, the work of popularizing popular science knowledge has become increasingly vital. This is not only pertinent to a country's capacity for scientific and technological innovation but also to the quality of life of every citizen and the overall well-being of society.

1.1.3 The development history of popular science visual design of Yunnan Provincial Center for Disease Control and Prevention

It is particularly important to note that the full English name of the Yunnan Provincial Center for Disease Control and Prevention mentioned in this article is all expressed by the official English abbreviation YNCDC.

1. Foundation Period (1953-1977) : The initial stage of the border epidemic prevention system. In 1953, during the first Five-Year Plan of the People's Republic of China, with the assistance of Soviet experts, the Yunnan Provincial Health and Epidemic Prevention Station was established, located in Wuhua Mountain, Kunming City. It had three departments: Rodent Control, Malaria Control, and Laboratory Testing. Core mission: To prevent the cross-border spread of the three most rampant infectious diseases in history, namely the plague, cholera and smallpox. In the early days of the founding of the People's Republic of China, many institutions did not know how to use visual design to convey popular science knowledge, so popular science visual design had not yet been enlightened at that time.

2. Transition Period (1978-2001) : Renamed Yunnan Provincial Health and Epidemic Prevention General Station, and added the AIDS and Sexually Transmitted Disease Prevention and Control Center (one of the first in the country). In 1998, the Yunnan Provincial Institute for the Prevention and Control of Endemic Diseases

was established, specializing in the treatment of mountain diseases, Kashin-beck disease and other diseases. At this time, a new variant of "Yunnan Rabies Virus (YNV)" was isolated from bats in southern Yunnan, revealing that the virus can infect domestic animals across species (published in Virology). This is a milestone in virology research. In 1989, an outbreak of hepatitis A occurred in central Yunnan. The Center for Disease Control and Prevention used the Yi ethnic group's "Torch Festival" assembly network to urgently vaccinate 120,000 people, initiating an emergency mobilization model for ethnic festivals.

3. Integration Period (2002-2019) : In 2002, five institutions including the General Station for Epidemic Prevention and Control and the Institute for Occupational Disease Prevention and Control were integrated to officially establish the Yunnan Provincial Center for Disease Control and Prevention. The infrastructure was upgraded. The BSL-3 laboratory was completed in 2015 and is capable of handling high-risk pathogens such as Ebola. In 2018, the Yunnan Pathogenic Microorganism Resource Bank was put into use, preserving 36,000 local strains of bacteria and viruses. Prevention and control of emerging infectious diseases: In 2003, the first imported case of SARS (a Vietnamese merchant) was intercepted at Kunming Airport. The border dengue fever pandemic in 2011 A new type of "China-Myanmar recombinant dengue virus Type II" was discovered; During this period, the early warning map was designed for the first time using Dai ethnic patterns. During the SARS period in 2003, the design of science popularization posters in Yunnan was relatively traditional, with more textual explanations.

4. The Leap period (2020- present) : The key focus was on the prevention and control of the COVID-19 pandemic (2020-2022). During this period, the YNCDC began to shift its mindset, emphasizing the dissemination of scientific knowledge to the public through popular science visual design. In 2015, during the dengue fever epidemic, the Dai peacock pattern was incorporated. By the time of the COVID-19 pandemic, I was already proficient in using multi-ethnic symbols to create animations. For example, the transformation from paper flyers to short videos. In 2020,

the Hani terraced field pattern was incorporated into the hand-washing step diagram, which is both scientific and down-to-earth.

The author and the design studio began collaborating with the YNCDC in 2018. Since 2019, they have jointly created over 100 science popularization visual designs, covering various types such as IP character figurines, poster designs, graphic designs, picture book illustration designs, and cultural and creative derivative products. Among them, the popular science graphic and text designs on public health themes were released on public platforms and gained millions of followers. Many primary and secondary schools in Kunming, Yunnan Province, reposted these popular science designs to conduct popular science education for students, achieving the most effective way of dissemination. All the cases involved in this study are original designs by the author and the author's team. As a team that has grown together with the YNCDC , the author and the team have found through extensive previous practices that the communication effect of using a combination of storytelling and text in popular science visual design is far stronger than that of only using text for communication. It was also discovered that integrating the local characteristic cultural and artistic content into the popular science visual design is more easily accepted by the audience and achieves the effect of emotional connection.

1.1.4 The artistic value of the popular science design is integrated into the local cultural and artistic characteristics

Therefore, in the process of popular science creation and dissemination, the role of art should be fully utilized to present scientific knowledge to the public in a more vivid, interesting, and accessible manner. Integrating local cultural and artistic elements into popular science design not only enhances the appeal and relatability of the design but also deepens the public's understanding and memory of scientific knowledge, thereby promoting the inheritance and development of local culture. Moreover, the artistic value embedded in popular science design can increase the allure of scientific communication, enrich the depth and breadth of science education, foster the

integration of science and the humanities, and drive the innovation and evolution of popular science methodologies.

The augmentation of cultural identity can be achieved by incorporating local cultural and artistic elements into the design of popular science. This involves utilizing distinctive regional patterns, hues, symbols, or narratives. Such an approach serves to stimulate the audience's sense of cultural identity, rendering the popular science content more resonant with individuals' life experiences and emotional landscapes. Consequently, this enhances audience engagement and acceptance.

The fusion of innovation and tradition: Reinterpreting traditional art through modern design techniques not only preserves the core of culture but also infuses it with new vitality. This synthesis showcases the allure of traditional culture and embodies the spirit of innovation, encouraging a fresh perspective on the relationship between science and culture.

The blend of education and entertainment: Utilizing local cultural and artistic forms, such as folk tales, ballads, and dances, as vessels for science education can make the learning process more engaging and vivid. This approach reduces the complexity of scientific knowledge and boosts public interest and efficiency in learning.

The exhibition of diversity and inclusiveness: The unique characteristics of various regional cultures and arts, when integrated into science education design, help to highlight cultural diversity. This promotes understanding and respect among people from different cultural backgrounds, fostering a more inclusive and harmonious social environment.

The advancement of sustainable development: Emphasizing and demonstrating the close ties between local culture and art, the natural environment, and social history can deepen the public's appreciation of the significance of ecological and cultural heritage preservation. This, in turn, supports the dissemination and practice of sustainable development concepts.

The enhancement of artistic aesthetics: High-quality science education design is itself a form of artistic creation, which can elevate the public's aesthetic

sensibility, cultivate an appreciation for beauty, and add artistic allure to the popularization of science.

In summary, incorporating local cultural and artistic elements into science education design is not only a tribute to and continuation of traditional culture but also a vital method to enhance the effectiveness of science education, encourage cultural exchanges, and drive social progress.

1.2 Research Questions

This paper will mainly address the following three problems:

1. What are the regional artistic and cultural values of Kunming mainly reflected in the popular science design of YNCDC?

2. How does popular science design guide adolescent behavior in a progressive way through regional social culture?

3.How can a visual design system be developed to effectively communicate scientific knowledge at the YNCDC by integrating Art and Cultural elements of Kunming?

1.3 Research Objectives

1.To analyze the characteristic artistic value and social and cultural significance of the Kunming area reflected in the popular science design of the Yunnan Provincial Center for Disease Control and Prevention from 2018 to 2025.

2 To analyze shows that popular science visual design has a progressive guiding effect on the behavior of the adolescent group in Kunming.

3.To create a visual design system for scientific knowleage of the Yunnan Center for Disease Control and Prevention (YNCDC) through the integration of Art and Culture of Kunming, Yunnan, People's Republic of China

1.4 Research Methodology

The study employed a qualitative approach. Using the case study method, it analyzed the regional cultural characteristics embodied in the design of popular

science. A qualitative research method was utilized to assess the influence of popular science design on the behavior of young people in Kunming.

1.5 Scope of Research

This study aims to summarize the thinking and behavioral guidance embodied in the regional cultural and artistic values of Kunming City, Yunnan Province, China.

1.5.1 Content Scope

The focus of this study is to analyze the characteristic art and regional cultural values of popular science design from 2018 to 2025. The study discusses the visual laws in popular science design to explore the factors affecting these changes, including regional culture, traditional customs, social psychology, and adolescent ideology. Secondly, the study will examine the influence of social-cultural factors on popular science design, as well as the specific guidance popular science design provides to the behavior of teenagers.

1.5.2 Regional Scope

This study focused on Kunming City in Yunnan Province, China, encompassing Wuhua District, Guandu District, Chenggong District, Anning District, the High-tech Zone, Xishan District, and the surrounding areas of Yunnan Province.

1.5.3 Population and Sample

The term "adolescent" is broader in terms of age, generally referring to being in adolescence. However, the specific starting and ending points of age may vary due to individual differences and social and cultural backgrounds. Usually, it refers to the age range from 11 or 12 years old to 16 or 18 years old.Teenagers are the main beneficiary group of this thesis project because taking teenagers as the core audience and investing resources in high-quality visual design is a key strategy to enhance the effect of popular science, expand the influence of science, and cultivate future scientific talents. Teenagers (especially those in junior high school) are in a crucial period of development from concrete image thinking to abstract logical thinking. The overly

abstract theory of pure words is difficult for them to understand. Visual design (pictures, charts, infographics, animations, videos) can make abstract concepts (such as molecular motion, ecosystems, and the expansion of the universe) concrete and visual, greatly lowering the threshold for understanding.This study can be classified into level 3 target population categories.

The first level target group, students aged 10-16 in Kunming city, popular science design and questionnaire distributed to Kunming Shiqing International Junior High School.

The second level target group, Kunming students aged 17-19, popular science design and questionnaire distributed to Kunming Metallurgical College.

The third level target group is the 20-24 age group. This group is not the key research group, but the common concern is those who pay close attention to popular science and health knowledge. While designing and distributing public media platforms, questionnaires are also distributed.

1.6 Framework

The following is the framework diagram of the entire research. The research has three goals, which progressively present the characteristic artistic value of the Kunming region reflected in the popular science visual design, the behavioral guidance for teenagers, and the final formed popular science visual system diagram.

Figure 1 Framework diagram was produced byThe author Zhang Hao

1.7 Definition of Terms

The text contains four key terms: Art and Culture, The Visual Design System for Scientific Knowledge, The Yunnan Center for Disease Control and Prevention (YNCDC), and Aesthetics. The following paragraphs will explain each in turn.

1.7.1 Art and Culture

Kunming, the provincial capital of Yunnan, is a melting pot of various ethnic groups, including the Han, Yi, Bai, Hani, Dai, Miao, and others. Its culture and art vividly reflect the pattern of *diversity in unity*. The city's regional culture is characterized by its plant landscapes, dialects, architecture, cuisine, customs, and folk arts, which blend ethnic characteristics, regional features, and modern vibrancy. Representative arts such as Yi embroidery, Bai tie-dye, Dai peacock dance, and elephant foot drum dance showcase intricate patterns, colors, and designs that embody deep ethnic beliefs and symbolic meanings. Unique craftsmanship techniques, including silver jewelry forging, wood carving, and earthenware, contribute to the profound artistic heritage and cultural allure of Kunming. These diverse ethnic arts in Kunming interact, integrate, and

innovate, offering a rich source of local cultural elements for modern applications like scientific visual design.

1.7.2 Scientific Knowledge Visual Design System

The Scientific Knowledge Visual Design System is a collection of systems that convert abstract and complex scientific concepts, principles, data, or processes into intuitive, understandable, and explorable visual representations through systematic visual language, design specifications, and interaction strategies. It is not just a single infographic or visualization tool but a comprehensive framework that ensures the accuracy, consistency, appeal, and scalability of science communication.

1.7.3 Yunnan Provincial Center for Disease Control and Prevention (YNCDC)

The Yunnan Provincial Center for Disease Control and Prevention (YNCDC) is a core professional technical institution within the public health system of Yunnan Province and is affiliated with the Yunnan Provincial Health Commission. It is a public-benefit, professional, and authoritative health institution responsible for disease prevention and control, public health emergency response, monitoring and intervention of health hazard factors, and health education and promotion across the province. This article focuses on the cultural and artistic elements reflected in the popular science visual design conducted in collaboration with the YNCDC, as well as the social value and artistic principles that they engender.

1.7.4 Aesthetics

Aesthetics, whose philosophical essence originates from the Greek word aisthēsis, meaning perception, is the branch of philosophy that studies the nature of beauty, aesthetic experience, and artistic value. Aesthetics has both a subjective and an objective perspective. From a subjective standpoint, beauty is considered "purposeless purposefulness," relying on the emotional judgment of the individual. Conversely, the objective perspective holds that beauty is an eternal form in the realm of ideas, exemplified by the golden ratio. Perception in aesthetics includes sensory, perceptual,

cognitive, and emotional layers. This article explores aesthetics to further analyze and summarize the emotional experiences it brings to its audience. Aesthetics and design perception are two intertwined yet distinct concepts that together form the core foundation of human aesthetic experiences and creative endeavors towards the world.

CHAPTER 2
LITERATURE REVIEW

This article examines the regional characteristic culture of Kunming City, as depicted in the popular science design of the YNCDC from 2018 to 2025, and the artistic value and socio-cultural significance it imparts to its primary audience group—teenagers.

2.1 The characteristic culture and art of Kunming area

2.2 The Origin and Development of Popular Science Design

2.3 Main Forms of Popular Science Design

2.4 Overview of Science Popularization Design in Yunnan Province

2.5 Popular science visual design and style fully demonstrate the theoretical concept of regional culture

2.6 Cultural research theory

2.7. Psychological influence of regional cultural elements on teenagers accept popular science knowledge

2.8. Progressive behavior guidance of regional cultural identity in popular science

2.9. Literature review in other related fields

These influences are diverse, encompassing information visualization, cognitive patterns, emotional experiences, symbol and information adaptation, interdisciplinary research, innovative approaches, and functional diversity, among others. Innovative approaches aim to promote the upgrading and efficient transmission of scientific knowledge among teenagers. Designers must continually explore new design methods and strategies, which include innovations in content production, communication strategies, and value guidance. Functional diversity implies that popular science visual design not only enhances communication efficiency but also fulfills roles in public education and artistic aesthetics. Popular science visual design is itself an interdisciplinary field, involving communication psychology and design art. This chapter delves into the unique culture and art of the Kunming area, focusing on the origin and development of popular science design, and analyzing its forms of expression. This interdisciplinary research approach facilitates a more comprehensive analysis of the behaviors and needs of teenagers, indicating that design should not only convey knowledge but also cultivate teenagers' aesthetic abilities, cultural confidence, and social behaviors.

This chapter thoroughly illustrates the theoretical concepts of regional culture within the realm of popular science visual design and style. It elaborates on the psychological process through which teenagers assimilate popular science knowledge influenced by regional cultural elements. Additionally, it details the progressive behavioral guidance that regional cultural identity provides in the context of popular science.

2.1 The characteristic culture and art of Kunming area

Kunming, situated in the heart of Yunnan Province, is the most developed provincial capital city in the region. This research paper focuses on the culture and art of Kunming as its primary subject of study. The city enjoys a temperate climate, with mild winters and no extreme heat in summer, creating a year-round spring-like atmosphere adorned with blossoming flowers. For Chinese people, Kunming is synonymous with its

abundant tourism resources. Yunnan Province, home to Kunming, is located in the southwest of China. To its east, it borders Guizhou and Guangxi; to its north, it faces Sichuan across the Yangtze River; to its west, it shares a boundary with Myanmar, a Southeast Asian nation; and to its south, it is contiguous with Laos and Vietnam (Figure 1). As a leading position and significant gateway to South and Southeast Asia, Kunming benefits from its strategic location, facilitating both internal connectivity and external communication. The origins of the China-Laos, China-Thailand, and China-Vietnam railways are all in Kunming, establishing a solid foundation for economic cooperation between China and Southeast Asian countries. This has also contributed to Yunnan Province becoming a province where culture and art are deeply integrated. The region is abundant in natural resources, including plentiful water resources, minerals, and a diverse array of flora and fauna. It is the province with the highest biodiversity in China, earning it the nickname "Kingdom of Animals" and "Kingdom of Plants." Among its many national protected animals are the Yunnan snub-nosed monkey (Figure 2), wild elephants (Figure 4), wild oxen, red pandas (Figure 3), and pythons. Moreover, Yunnan Province is home to the largest number of ethnic minorities in China, with a total of 25. Each ethnic minority boasts its own unique culture and customs. For example, the Torch Festival of the Yi people is a distinctive celebration of folk revelry. The "Three Tea" ceremony of the Bai people (Figure 5) is a unique aspect of ethnic tea culture. The terraced field culture of the Hani people exemplifies the essence of agricultural civilization (Figure 6). The Water-Splashing Festival of the Dai people embodies friendly and joyful interactions through the act of splashing water on each other (Figure 7). The wild mushroom culture in Kunming is particularly unique, with the consumption of wild mushrooms being a local tradition rich in cultural and humanistic significance, as well as in cultural customs. Initially, there is the significant role of wild mushrooms in the local food culture. Indeed, "Yunnan cuisine is incomplete without mushrooms." Following that, there are specific ways to enjoy them, such as the renowned mushroom hot pot; there are also related dietary taboos. Annually, there are news reports of mushroom poisoning. Despite the risk, people in Kunming continue to consume mushrooms. In folk

tales, there is a peculiar phenomenon of seeing "little people" after mushroom poisoning. Focusing on the impact of wild mushrooms on local social life, trading markets and festival activities related to wild mushrooms have become essential cultural events for the people of Kunming. This not only enriches the cultural life of Kunming and Yunnan Province but also establishes a regional cultural characteristic of Kunming (Figures 8, 9, 10).

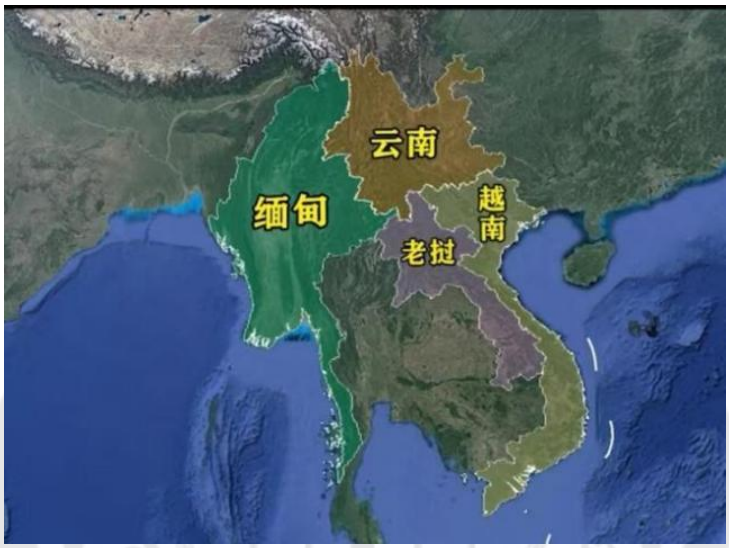

Figure 2 Geographical location map of the surrounding areas of Yunnan

Image source: https://www.360kuai.com/pc/95737788fc0604f38?cota=3&kuai_so=1

Figure 3 Unique wild animal in Yunnan: Yunnan snub-nosed Monkey

Image source: https://image.so.com/i?q=%E6%BB%87%E9%87%91%E4%B8%9D%E7%8C%B4&src=tab_www&inact=

Figure 4 Unique wild animal in Yunnan: Red panda

Image source: https://image.so.com/i?q=%E5%B0%8F%E7%86%8A%E7%8C%AB&src=tab_www&inact=00

Figure 5 Wild elephants unique to Yunnan

Image source:

https://image.so.com/i?q=%E4%BA%91%E5%8D%97%E8%A5%BF%E5%8F%8C%E7%89%88%E7%BA%B3%E9%87%8E%E8%B1%A1&src=tab_www&inact=0

Figure 6 The "Three Kinds of Tea" of the Bai Ethnic Group

Image source:

https://image.so.com/i?src=360pic_normal&z=1&i=0&cmg=15484592.151231519318175600.1728309181862.5713&q=%E7%99%BD%E6%97%8F %E4%B8%89%E9%81%93%E8%8C%B6

Figure 7 Yuanyang Terraced Fields

Image source: https://image.so.com/i?q=%E5%85%83%E9%98%B3%E6%A2%AF%E7%94%B0&src=360pic_normal&inac

Figure 8 Dai Water-Splashing Festival

Image source: https://image.so.com/view?q=%E5%82%A3%E6%97%8F%E6%B3%BC%E6%B0%B4%E8%8A%82%E5%9B%BE%E7%89%87&src=&inact

Figure 9 show various wild fungi

Image source: http://sbaijiahao.baidu.comsid=1590490447909818753

Figure 10 show various wild fungi

Image source: http://simage.so.comailargeviewend

Figure 11 show various wild fungi

Image source: http://www.sohu.coma247584071_391598

Kunming places significant emphasis on "the harmonious development of humans and nature" as well as "the inheritance and innovation of ethnic traditional culture." Consequently, the distinctive culture of the Kunming region is characterized by the coexistence of modern development and natural landscapes. This city seamlessly blends natural beauty with historical ancient civilization relics. Culture and art encompass the following aspects:

Characteristic folk arts: including Dian Opera (Figure 11), lanterns (Figure 12), batik, Jia Ma (Figure 13), etc.

Regional characteristic folk activities: The cultures of various ethnic groups are rich and diverse, with a strong sense of festival culture. Regional characteristic folk activities include the "Torch Festival" of the Yi people (Figure 14), the "Stepping on the Flower Mountain" of the Miao people (Figures 15), and the Xishan Tune Festival of the Han people, etc.

Regional characteristic historical buildings: There are numerous regional characteristic buildings in Kunming, such as the Jinma Bijiafang (Figure 16) located in the city center of Kunming and the Golden Hall of Kunming Taihe Palace (Figure 17), etc.

Modern folk cultural activities in Kunming include visiting the flower market. Known as the international "back garden," Kunming is home to a variety of rare and exotic plants and flowers. The Dounan Flower Trading Market, the largest fresh-cut flower trading market in Asia (see Figure 18), serves as the world's primary flower trading and distribution hub. Daily, 300 tons of fresh-cut flowers are shipped from here to over 40 countries and regions worldwide. Additionally, Jacaranda Street on Jiaochang Road in Kunming's urban area has emerged as a popular meeting spot for the city's artistic youth (see Figure 19).

Figure 12 Kunming Dian Opera

Photo source: http://www.sohu.com

Kunming Dian Opera, Yunnanone of the Han operas in the province, was introduced to Yunnan successively from the late Ming Dynasty to the Qianlong period of the Qing Dynasty. It gradually absorbed local folk art and formed a Han opera with its own characteristics, which became popular in the vast areas of more than 90 counties and cities in YunnanSichuan. GuizhouSome regions are China's second batch of national intangible cultural heritage. Its performing arts have inherited and absorbed elements from Hui, Han, Qin Opera, and other operas. Yunnan, a multi-ethnic province known as the "ocean of national art," has seen its opera develop over time, often performed on rural stages, absorbing folk art and exhibiting the characteristics of ethnic lands. The performance of Dian Opera excels at depicting characters and is full of life atmosphere. For instance, in "Niu Gao," the characters Niu Gao and Lu Wenliang, and in "The Fire Down the Mountain," the characters Ni Jun and Yin Bilian, both showcase the process of character development and reflect the thoughts and feelings of the

characters through actions rich in life content. Another characteristic is its vivid language, which is popular and fluent, bearing the style of Han folk songs.

Figure 13 Yunnan Lantern Drama Cloud:

Photo source ： www.sohu.com

Lantern opera is a popular art form among the Han Chinese. It is characterized by its unique combination of fan movements, singing, and dancing, where the singing and dancing are closely intertwined. This form of opera originated from folk lantern songs and dances, evolving into a local opera genre during the late Qing Dynasty and early Republic of China.

Figure 14 Yunnan horse prints

Source ：
https://image.so.com/view?q=%E4%BA%91%E5%8D%97%E7%94%B2%E9%A9%AC&src=&inact=0&correct=%E4%BA%91%E5%8D%97%E7%94%B2%E9%A9%AC&ancestor=list&cmsid=

Yunnan Jia horse print is a paper print used for folk sacrifice, which was introduced to Yunnan from the Central Plains around the Ming Dynasty. Up to now, the customs of production and use in many villages are mainly distributed in Kunming, Yuxi, Qujing, Dali, Baoshan, Lijiang and other prefectures.

Figure 15 The Torch Festival of the Yi nationality

Source ：Photosourcehttps://image.so.com/i?q=%E5%BD%9D%E6%97%8F%E7%81%AB%E6%8A%8A%E8%8A%82&src=tab_www

The Torch Festival of the Yi People: The Torch Festival of the Yi people is celebrated over three days, known as fire sacrifice, fire transmission, and fire sending. Torch Day 1: Offering fire. On this day, everyone dons their favorite attire, exuding happiness. Villages will slaughter cattle and sheep, setting elaborate banquets with various meats and sweet, fragrant wine. The aroma of these offerings fills the air as they worship the gods, who are praised abundantly. As night approaches, villagers from nearby settlements will construct an altar at a location selected by the elders. They will ignite the fire using stones in the traditional manner and light the flame while the bimo (Yi folk priest) chants sutras and venerates the fire. Subsequently, each family, both adults and children, will receive a torch from the bimo and walk to the edge of the fields, following the legend of AshMo to repel insects with fire.

The Torch Day on the second day: Spreading the fire. On this day, every family assembles beneath the altar's flame to engage in various traditional festival activities. The boys participate in horse racing, wrestling, singing, bullfighting, and cockfighting, emulating the legendary Athilaba. The girls, inspired by the legend of Ashima, dress in beautiful attire, hold butter umbrellas, and sing "Doroho" while dancing. This day's most significant event is the Yi family beauty pageant, where the elderly select the year's most handsome men and beautiful women from the youth, following the virtues of Arabba's

diligence, bravery, and Ama's kindness, intelligence, beauty, and generosity. As evening falls, pairs of men and women gather in the mountains and by the streams, under yellow oil umbrellas, playing the moon harp, the mouth strings, and sharing stories of acacia. Hence, some refer to the Liangshan Yi International Torch Festival as the "Oriental Valentine's Day."

The Torch Festival day three: Sending fire. This is the culmination of the entire Liangshan Yi International Torch Festival. When night descends on this day, everyone will grasp a torch and race in a run. In the end, people will gather their torches together, creating a massive bonfire. The joyful people will then gather around the bonfire to sing and dance, creating a scene of spectacular grandeur. For this reason, they also refer to it as the "Oriental Carnival Night."

Figure 16 Lusheng blowing activity, The flower pole climbing activity of the Miao Flower pole Festival

source: https://image.so.com

The Huashan Festival, also known as "Stepping on Huashan," the Miao nationalityis a traditional celebration. From the second to the seventh day of the first lunar month, the Miao people in Pingbian, Mengzi, and Hekou in Yunnan province celebrate their annual "Stepping on Huashan" festival. The "Flower Pole" is an important symbol of the Huashan Festival, typically a straight and tall pine or cypress tree adorned with flowers and colorful flags. The people of Dinghua Village are renowned for their kindness. On the first morning of the festival, before the sun rises above the mountains,

the men must erect the Flower Pole. The festival's activities are rich and well-organizeda bull-fight, featuring Fighting Thrush, blowing the lusheng, and climbing the Flower Pole, which draw in the crowds. Climbing the Flower Pole is a unique form of entertainment for the Miao people. At the Huashan field, there is a Flower Pole over 10 meters tall, decorated to resemble green leaves, earning it the nickname "flowers and trees." Originally, the Flower Pole was a means for the Miao people to pray for children, but it later evolved into the most captivating central activity of the festival. Under the Flower Pole, many young men and women gather, chatting and laughing as they watch the performances.

Golden Horse and Blue Chicken Square in Kunming

Figure 17 Golden Hall of Taihe Palace in Kunming

source:https://image.so.com/i?q=%E6%98%86%E6%98%8E%E9%87%91%E9%A9%AC%E7%A2%A7%E9%B8%A1%E5%9D%8A&src=tab_www&inact=1

https://image.so.com/i?q=%E6%98%86%E6%98%8E%E5%A4%AA%E5%92%8C%E5%AE%AB%E9%87%91%E6%AE%BF&src=tab_www&inact=1

Figure 17, Jinma Biji Square: located at the junction of Sanshi Street and Jinbi Road in the center of Kunming city, it is 12 meters high and 18 meters wide, with exquisite carved beams and painted buildings. Dongfang is near Jinma Mountain and named Jinma Square, and Xifang is named Biji Square, which is the symbol of Kunming.

Jinma Bi Chicken Square was first built in the Xuande period of the Ming Dynasty, and has a history of nearly 400 years. Figure 14. Good omen: In ancient times, the appearance of the golden horse and green chicken was regarded as an auspicious sign, indicating a good harvest, prosperity and good luck. It is believed that the golden horse and green chickens can bring welfare and good luck, so they are widely used in various celebrations and sacrifices for auspicious signs: in ancient times, the appearance of the golden horse and green chickens was regarded as an auspicious sign, indicating a good harvest, prosperity and good luck. It is believed that the golden horse and green chickens can bring welfare and good luck, so they are widely used in various celebrations and sacrificial activities

The Golden Hall of Taihe Palace in Kunming: a bronze hall made by 250 tons of pure copper in the tenth year of Emperor Kangxi of the Qing Dynasty (1671).Figure 18

Figure 18 A Jacaranda street in downtown Kunming has become a gathering place for local literary and artistic youth

source:https://image.so.com/i?q=%E8%93%9D%E8%8A%B1%E6%A5%B9%E4%B8%80%E6%9D%A1%E8%A1%97&src=tab_www&inact=1

Figure 19 Dounan Flower Trading Market

source:https://image.so.com/i?q=%E6%96%97%E5%8D%97%E8%8A%B1%E5%8D%89%E4%BA%A4%E6%98%93%E5%B8%82%E5%9C%BA&src=tab_www&inact=1

2.2 The Origin and Development of Popular Science Design

This chapter delves into the origins of popular science visual design and the cultural research domains it encompasses. It also examines the psychological literature pertinent to progressive guiding behavior. The paper will integrate relevant theoretical research to analyze and identify the progressive relationship between visual design and behavior from the perspective of local regional culture.

2.2.1 Foreign popular science books

The origin of foreign popular science books can be traced back to the 17th century, when the scientists of the association mistakenly spread scientific knowledge to the public through publication. In 1665, the British Royal Society founded the Philosophical Journal, which is one of the earliest popular science books (Figure 20). With the rise of the Industrial Revolution in the 18th century, popular science books began to focus on natural science and engineering technology. The content of popular science books in the 19th century is more rich in biology, physics, chemistry and other fields. Since the 20th century, popular science books have developed rapidly all over the world, especially in the Soviet Union, the National Geographic magazine (Figure 21)

and the Knowledge is Power magazine of the Soviet Union are all famous popular science books.

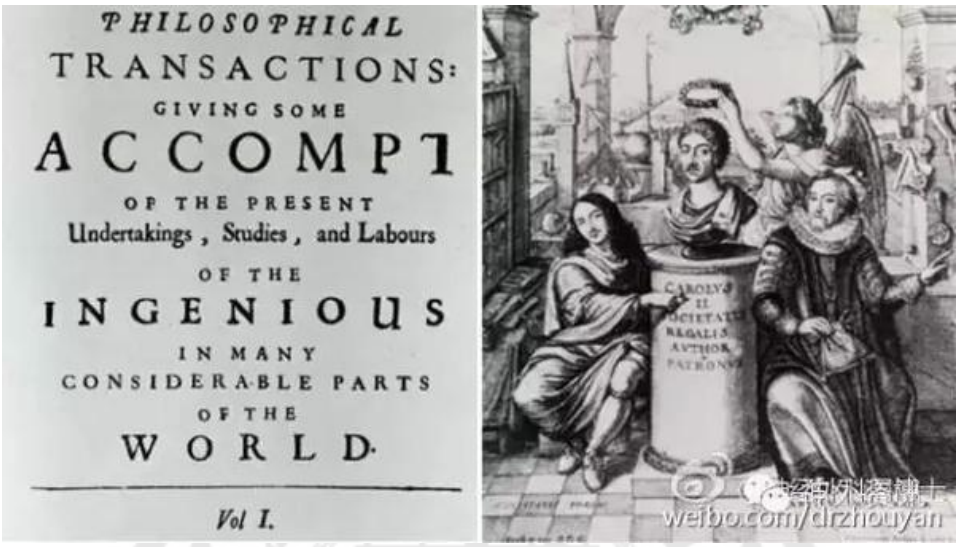

Figure 20 Philosophical Transactions organized by the British Royal Society

Source： https://group.medlive.cn/topic/62139, published by the Royal Society,

founded in 1665, is the worlds first specialized journal in scientific research and the worlds first peer-reviewed journal. The Philosophical journal has been published since 1665. The term "philosophy" was retained in the title because the articles published in early publications were aspects of "natural philosophy", "which has now been changed to" science ".

Figure 21 National Geographic magazine

Source ： Photo source: https://baike.so.com/doc/6371672-6585315.html

National Geographic magazineThe American National Geographic SocietyIt was published nine months after the National Geographic Society was founded in 1888. Now National Geographic magazine has become the most widely known magazine in the world. The bright yellow border and the laurel pattern on the coverpatternHas becomesymbolize, The signs are also available for National Geographic magazineregistered trademark.

2.2.2 Chinese popular science reading materials

The earliest popular science journal in China is Science Illustrated, founded by the Chinese Science Society in August 1933. It is one of the longest-running and most popular science journals in China. (Figures 22, 23) At its inception, the journal was led by the Chinese Science SocietyYang xiaoshu, with Mr. Cao Huiqun as the editor-in-chief and the renowned scientists Zhou Ren and Bingzhi, along with Zhu Kezhen,Lu in the way serving as executive editors and Ren HongjunZhao YuanrenQiu WeiyuWang Hu zhenWu XianwenLiu outlinecontributing writers.

At that time, in the "Review and Research" magazine hosted by the China Science Popularization Research Institute, from its inception in 1982 to its rebranding as "Science Popularization Research" in 1987, over 70% of the articles published in this magazine pertained to science popularization creation. Many of these once academic ideas continue to be vibrant today, such as the "Children's Science Popularization Creation Album" from June 1985 and the "Science Comics Album" from June 1987. Many of their perspectives remain relevant, and some are even prescient. Professor Ren Fujun stated in an article: "In the past decade of the revival of the cause, the primary accomplishments of the science popularization research efforts, represented by the China Science Popularization Research Institute, have been concentrated in the realm of science popularization creation."

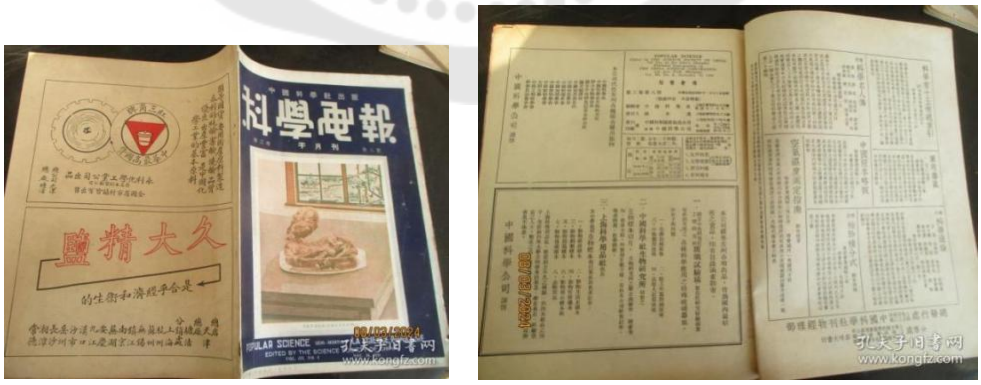

Figure 22 Science Illustrated, a popular science journal of the Republic of China

Photo source: http://www.kongfz.cn/74477194/

In November 1924,1 thick volume (volume 3, No.8), published by China Science Society, 16 open

Figure 23 Science Illustrated, a popular science journal of the Republic of China

Photo source: Ren Shaoyang 1, Li Yinan 1 *, Xuan Jiaqi 2, September 2024, Volume 45, Phase 18 Packaging Project PACKAGING ENGINEERING "Visual Design Problems and Enlightenment of Childrens Popular Science Books in the Republic of China"

2.3 Main Forms of Popular Science Design

2.3.1 Modern Popular Science Books

Popular science design has gradually expanded from traditional graphic and text design to a broader visual space, including relatively traditional IP image design, original illustration design, cultural and creative product design, and more. All these elements are closely related to local art and cultural content. The explanation of popular science knowledge is always accompanied by familiar cultural and artistic

traditional customs, conveyed in a gentle and smooth manner, and is received with great interest by the audience. The forms of modern popular science visual design encompass the following directions:

1. Information Visualization

Data Visualization: Transforming complex data and statistical information into easily understandable charts, diagrams, and graphs, such as bar charts, pie charts, and other visual aids.

Infographic Integration: Utilizing infographics to integrate and present a large amount of information, enabling the audience to quickly grasp the key content.

Narrative Structure: Through systematic thinking and narrative structure, data and information are retrieved, analyzed, and edited to achieve efficient visual communication.

2. Planning and Design of Science Popularization Exhibitions

Spatial Design: Concentrate on the spatial arrangement and flow line design of science exhibitions to create an engaging display environment.

Service Design: Enhance the visitor experience at science venues, encompassing wayfinding systems and interactive displays.

Exhibition Engineering: Develop and execute innovative science exhibitions by incorporating new materials and technologies.

3. Innovative Popular Science Product Design

Display Products: Develop tangible science popularization display products, such as models and experimental devices.

Digital Content Products: Design intangible digital content products, including virtual reality (VR) experiences and augmented reality (AR) applications.

Application of Interaction Technology: Utilize interaction technology to enhance the interactivity and user experience of products.

4. Popular science visual Communication design

Visual Language Exploration: Research and application of visual languages, including graphics, symbols, and colors, to enhance the communication effect of information.

Brand Culture Strategy: Establishing a unified brand image and visual identity system for science popularization projects or institutions.

Multimedia Information Presentation: Enriching the presentation forms of popular science content by integrating various media forms such as videos, animations, and web design.

5. Popular Science Information and Interaction Design

Cross-media Information Presentation: Design engaging science communication methods tailored for various media and platforms, including online platforms and mobile applications.

Information Structure Pattern: Establish a clear and user-friendly information structure to facilitate quick access to the desired content by users.

Interaction Experience Design: Focus on improving the user's interaction experience, incorporating features such as touch screen interactions and gamified learning.

The modern field of popular science visual design is interdisciplinary, requiring designers to possess a range of skills including artistic aesthetics, technological innovation, and media strategies. Through these design methodologies, the appeal and dissemination efficiency of science content can be significantly improved, thereby promoting the popularization of scientific knowledge and the advancement of the scientific spirit.

2.3.2 Contemporary Popular Science Books

The rapid development of modern technology has led to a wide variety of cross-border forms in modern popular science design. The aim is to enhance the public's interest and understanding of scientific knowledge through innovative and

interactive means. Science popularization design has expanded into a broader visual space beyond traditional graphic and text design, encompassing interactive science popularization games, interactive science popularization experiences, and science popularization videos, among others. However, all these contents remain closely related to local art and cultural content. The transmission of popular science knowledge places a greater emphasis on interaction and behavioral guidance.

1.Interactive Exhibition: By employing multimedia technology, including virtual reality (VR), augmented reality (AR), and other such technologies, an immersive science popularization experience is crafted. For example, visitors can use VR glasses to explore the universe or the deep-sea world, or they can use touchscreen interactive displays to gain a deeper understanding of complex scientific concepts.

2. Digital content: Develop science popularization websites, applications and social media platforms, and publish easy-to-understand scientific articles, videos, animations and games to make science popularization information more accessible and shareable. These digital tools can also provide personalized learning paths based on users' interests and learning progress.

3. Science popularization games: Design interesting and educational video games, integrating scientific principles into gameplay, allowing players to learn scientific knowledge while having fun. This "education through entertainment" approach is particularly suitable for the teenage group.

4. Science Experiment Box: It provides a kit containing experimental materials and instruction manuals, encouraging families and individuals to conduct simple scientific experiments at home, verify scientific principles by hand, and cultivate the spirit of exploration and practical ability.

5. Popular Science Lectures and Workshops: Organize a combination of online and offline popular science lectures, seminars and workshops, inviting scientists and experts to have face-to-face exchanges with the public, answer questions and stimulate curiosity and enthusiasm for science.

6. Popular science media publications: Publish popular science books, magazines and comics that are rich in pictures and text and easy to understand, covering readers of different age groups and interest fields, making scientific knowledge more accessible and approachable.

7. Integration of scientific installations and art: By presenting scientific themes through artistic works such as sculptures, paintings, and photographs, or by holding exhibitions that combine science and art, the beauty of science is showcased from a novel and unique perspective, attracting a broader audience.

8. Citizen Science Projects: Encourage the public to participate in scientific research activities, such as data collection and species observation, to enhance scientific literacy through practical participation, and also contribute to scientific research with the strength of the people.

9. Science popularization short videos and live streaming: Utilize short video and live streaming platforms such as Douyin, Kuaishou, and Bilibili to create concise, vivid and interesting science popularization content, quickly disseminate scientific knowledge, and adapt to the fast-paced lifestyle of modern people.

These modern popular science design forms not only enhance the appeal and participation of popular science activities, but also promote the dissemination of scientific culture and the improvement of the public's scientific literacy.

2.4 Overview of Science Popularization Design in Yunnan Province

2.4.1 Popular Science Visual Design of Yunnan Provincial Center for Disease Control and Prevention

The Yunnan Provincial Center for Disease Control and Prevention was established on December 18, 2001. It was formed by the merger of the former Yunnan Provincial Health and Epidemic Prevention Station, Yunnan Provincial Institute of Dermatology Prevention and Treatment, Yunnan Provincial Institute of Tuberculosis Prevention and Treatment, and Yunnan Provincial Institute of Occupational Disease Prevention and Treatment. It is a public welfare institution sponsored by the Yunnan

Provincial People's Government for the implementation of disease prevention and control and public health technology management and services. Under the leadership of the provincial health department, it specifically implements the government's functions in disease prevention and control as well as health supervision and law enforcement techniques, and serves as the provincial technical guidance center for disease prevention and control and public health. To ensure the life safety and physical health of the people throughout the province, promote economic development and maintain social stability, with the attention and support of the provincial government and the provincial health department, the center has initially established a provincial disease prevention and control technical guidance center with complete specialties, advanced equipment, excellent technology and strong comprehensive health and disease prevention capabilities. At present, the center is at the national advanced level in multiple specialties or fields such as AIDS, cholera, severe acute respiratory syndrome (SARS), influenza, handling of public health emergencies, hygiene inspection of health food and cosmetics, disinfection management and vector control.

Regarding the development history of popular science visual design, it is not long. The Yunnan Provincial Center for Disease Control and Prevention began to gradually pay attention to popular science visual publicity as early as 2013 (Figure 24). It can be seen from the picture that it already had the meaning of popular science publicity. The originality began to be gradually emphasized in 2018.

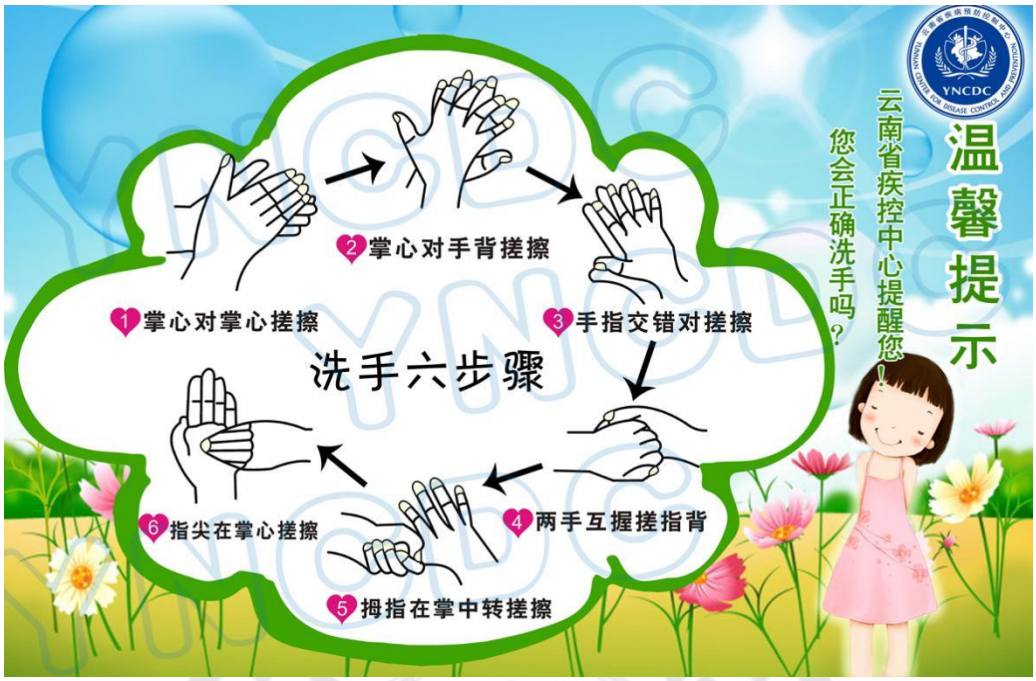

Figure 24 Popular Science Publicity of YNCDC in 2013.

Figure Title：Do you know how to wash your hands properly? Six Steps to Handwashing

source: Internal materials

The emphasis and development of popular science design by the YNCDC commenced in 2018 when the author's team began collaborating with the enterprise. It is evident from the official website of the YNCDC that the earliest popular science design was released in January 2020. The vigorous development and growth of the popular science design of the YNCDC commenced from January 2020. The popular science design cases cited in this paper are all published on the official website of the YNCDC and are authentic, having social effects.

2.4.2 Research on Popular Science Visual Design Practice

The author's previous research on this subject was grounded in a multitude of popular science practice designs. Since late 2019, an unknown virus has rapidly spread across the globe. In the face of this viral invasion, people worldwide

experienced a period of panic. In the quest to understand this novel virus, humanity has shown immense ingenuity. During this time, the author led their design team in collaboration with the YNCDC to create a series of educational materials, including pictures and texts, aimed at combating viruses. Once released, these materials helped many people acquire significant professional knowledge about disease prevention. As the public's understanding of the virus increased through these educational resources, their fear of unknown viruses began to diminish. Human fear often stems from the unknown. To eradicate this fear, it is essential to gain a comprehensive understanding of the unknown. Seizing this opportunity, the author recognized the importance of popular science knowledge. Drawing on a vast array of original practical popular science visual designs, the author explored the cultural meanings embedded within them and endeavored to examine the connection between visual design and the distinctive humanistic traits of the Kunming region through case studies of these designs.

The author has collaborated with the Yunnan Provincial Center for Disease Control and Prevention from 2018 to 2025, jointly completing over 100 public health-themed popular science designs. These have been released on public platforms and have garnered millions of followers. Many primary and secondary schools in Kunming, Yunnan Province, have reposted these designs to educate students, proving to be the most effective method of dissemination. All cases in this study are original designs by the author and their team, including the public welfare IP image design of the YNCDC - Mobamoya, IP image figurines, poster design, graphic design, picture book illustration design, and cultural and creative derivative products, among others.

The popular science visual design of YNCDC is presented through three major design paths, namely online digital design, offline physical derivation, and offline experience activities.

(1) Online digital design form

IP image design is the cornerstone of popular science visual design. IP and its extended images are primarily utilized online, such as the dissemination of text and images on WeChat official accounts, the use of emoticons in online chat

terminals, and the involvement and participation of image ambassadors in short videos, among other uses. The reuse of IP characters can be psychologically well-received by the public. Teenagers, in particular, are more inclined to love a certain cartoon character and subsequently accept the information it conveys due to their affection for it. In August 2019, Zhang Hao and his studio team crafted an IP image that was designated as the official public welfare IP image by the YNCDC. The prototype design concept originated from the unique species of the Yunnan region, the white-browed gibbon (Figure 25). Yunnan, situated in the southwestern border of China, is characterized by its multi-ethnic, multicultural, and biodiverse landscape. Gaoligong Mountain in Yunnan Province serves as the habitat for the white-browed gibbon. The Yunnan Provincial Center for Disease Control and Prevention selected the white-browed gibbon, a highly representative regional species, as the central character of the IP image. Building on this concept, the center adopted original illustrations with a distinctive design style to establish the IP image for disease prevention in Yunnan Province, thereby enhancing public recognition and the appeal of popular science content. The character Moba exudes the aura of an elder, donning a blue T-shirt with eyes that reflect a composed and wise light, symbolizing the disease control workers in Yunnan Province who possess solid professional knowledge and extensive practical experience. Moya, a female white-browed gibbon, is dressed in a blue dress and white T-shirt. With a bright gaze and a capable posture, she represents the ambitious, studious, and progressive disease control workers in Yunnan. The names "Moba" and "Moya" originate from specific terms used by ethnic minorities to refer to doctors. For example, in the Dai culture, doctors are called "Moya Dai," where "Moya" in the Dai language means doctor. Thus, "Moya Dai" translates to a doctor of the Dai people. This signifies that both characters have Q-style designs, which are trendy yet cute and highly recognizable. The ability to change clothing for various occasions is suitable for role transitions in different scenarios, facilitating the public's evaluation and recognition of the brand.

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Figure 25 Shows the public welfare IP image of YNCDC

Figure Title ： MO BA , MO YA

The design was created by author Zhang Hao and his studio team in JunJe 2020

The online digital form has also extended to multiple character images that fit different environments, scenarios, and identities. The lively and cute pet emoticons help people promote good hygiene habits on the zero-cost wechat chat platform. They are convenient, easy to use, and easy to understand, thus being popular among netizens . A large number of illustration designs are arranged on the official websites of electronic terminals and print advertisements (Figures 26 and 27). From the prevention and treatment of common infectious diseases in daily life, self-protection of social hygiene and safety, to garbage classification and disposal, public environment maintenance, and even the popularization of the latest knowledge on nuclear pollution and nuclear radiation (Figure 28), and even health and hygiene reminders for returning home during the Spring Festival travel rush... It is full of vitality and tells the story in a

gentle and smooth way. Readers can feel the most warm stories of Kunming here(Figure 29). The bright and clear pictures are presented in an interesting way with both pictures and text, catering to the cultural fast food model of the local people in Kunming in the era of reading pictures. It interprets the abstract and obscure scientific vocabulary in an interesting way to readers of different age groups. The exquisite and clear picture scenes are more in line with the aesthetic tendencies of teenagers. It has deepened the impression of disease control science popularization knowledge and gained the love of the public .

Figure 26 Derivative designs of emoticons from the IP characters of Moba and Moya

Figure Title：Avoid gathering, eat cooked food, wear masks and drink boiled water, avoid smoking and drinking alcohol, do more exercise, be polite when coughing or sneezing, refuse wild animals, frequently ventilate, wash hands frequently, don't spit randomly, maintain a balanced diet.

In June 2020, Zhang Hao and his studio team designed for the YNCDC

Figure 27 shows the poster design of the Moba IP image

Figure Title：Vaccination.One vaccination, one peace of mind Promoting Vaccination for Charity

In September 2022, Zhang Hao and his studio team designed for the YNCDC

Figure 28 Advertising design,In June 2021, Zhang Hao and his studio team designed for the YNCDC

Figure Title : Eating wild game by oneself, Scientific Fitness , Balanced diet

Drink more hot water

Figure 29 shows a long image of popular science knowledge released by the official account YNCDC

Figure Title : Science Popularization Mini-Theater: What to Do if the Hepatitis C virus antibody test is positive? Make preparations for returning home in advance.Is the discharge from Japan nuclear wastewater or nuclear sewage?

From September 2022 to July 2024, Zhang Hao and his studio team designed the "Science Popularization Mini-Theater: What to Do If the Hepatitis C Virus Antibody Test Is Positive?" for the YNCDC. "Get Ready for Your Return Home in Advance", "Is What Japan Discharges Nuclear wastewater or Nuclear sewage?

As the popular science design for disease control in Yunnan continues to evolve, visual designs highlighting the regional humanistic characteristics of Kunming have been featured on the official website (Figures 30 and 31). Figure 30 depicts the primary image advertisement of the Yunnan Center for Disease Control and Prevention, which adopts the 24 solar terms, rich in Chinese cultural significance, as its thematic content. The design encapsulates the theme of disease control science popularization, imbued with the strong local customs and traditions of Kunming, resonating with the audience and bridging the emotional gap between the enterprise's philosophy and its public. Figure 31 illustrates an advertisement created for the official website during the traditional Chinese Dragon Boat Festival. The Dragon Boat Festival is a significant folk celebration that merges the worship of gods and ancestors, prayers for blessings and protection against evil spirits, festivities, and dining. Key customs encompass dragon boat racing, dragon worship, herb gathering, visiting the medicine market, hanging mugwort and calamus, midday water fetching, herbal washing, midday talisman pasting, worshipping gods and ancestors, dragon boat water soaking, consuming dragon boat rice, and zongzi making. The image features ethnic minority individuals racing dragon boats and holding zongzi, a must-eat during the festival, reflecting the unique spiritual perspective of Kunming's ethnic minority youth.

Figure 30 The main image advertisement of the official website of Yunnan Center for Disease Control and Prevention

Figure Title : The winter , snow of the Major Cold is not late, falling all over the world. The Major Cold welcomes the New Year, bringing joy and reunion.

Image source : https://www.yncdc.cn/

In December 2024, Zhang Hao and his studio team designed for the YNCDC

Figure 31 The main image advertisement of the official website of YNCDC

Figure Title : Happy Dragon Boat Festival! Dragon Boat blessings for a carefree Dragon Boat Festival

Image source: https://www.yncdc.cn/

In January 2025, Zhang Hao and his studio team designed for the Yunnan Provincial Center for Disease Control and Prevention

(2) Offline physical derivative forms

Offline physical derivative forms include IP image figurine product design, cultural and creative product design, creative print media design, as well as the design of promotional materials necessary for offline science popularization and interactive activities, such as promotional brochures, masks, handbooks, and eco-friendly handbags. The IP image is endorsed by the YNCDC, effectively spreading the concepts of disease prevention and healthy living. Since 2020, the visual design of science popularization has placed more emphasis on reflecting the unique cultural and artistic characteristics of the Kunming area in the design and production of various science popularization publicity peripheral products (Figures 32 and 33). Cultural and creative products are distributed as small gifts at science popularization activities. These visual designs with strong local cultural characteristics visualize popular science knowledge, making it more vivid and lively. They integrate into popular science and take root in people's hearts, making the audience's love for scientific concepts proportional to their acceptance of textual information and remaining popular for a long time. Original designed publications start with picture books for teenagers and accurately convey public health science popularization knowledge in a timely manner (Figure 34). That is to say, people tend to readily accept the information conveyed by a culture because of their sense of identity with it.

Figure 32 shows a figurine product of the core character of the IP image made offline

In January 2020, Zhang Hao and his studio team designed for the YNCDC

Figure 33 shows some offline cultural and creative products of the IP character - promotional brochures, masks, handbooks, eco-friendly handbags, etc

In May 2020, Zhang Hao and his studio team designed for the YNCDC

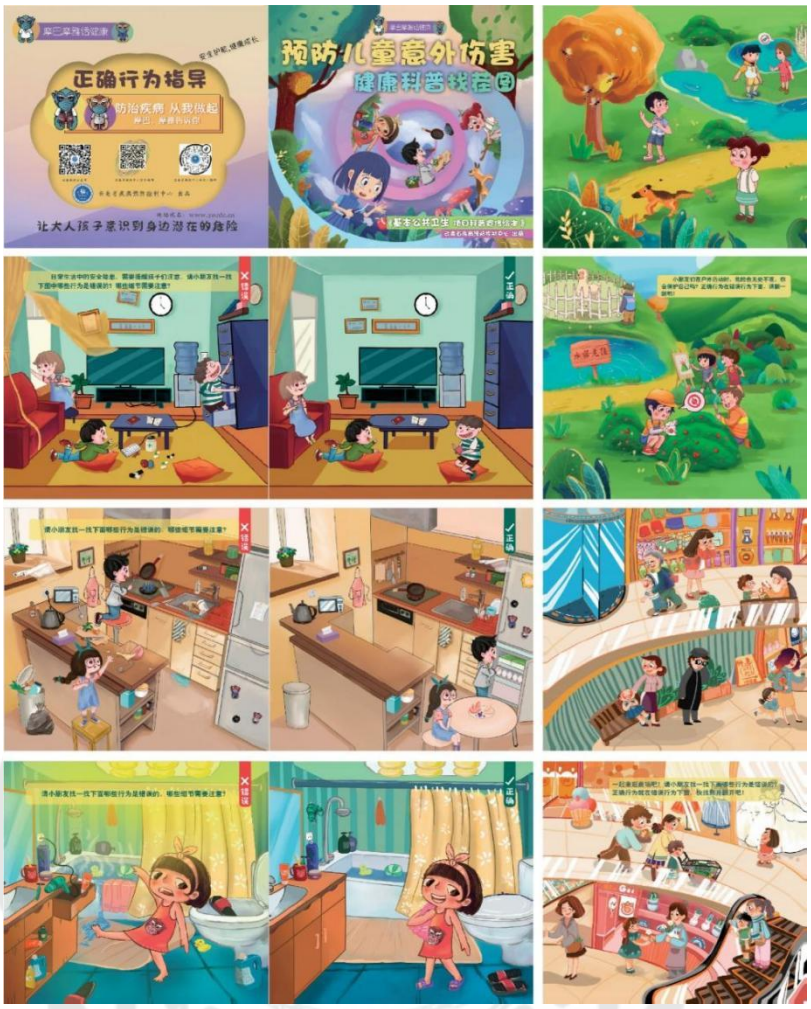

Figure 34 Children's Picture Book "Health Science Popularization on Preventing Accidental Injuries in Children and Identifying Differences"

Figure Title : Health science popularization for preventing accidental injuries to children: Spot the Difference

In May 2021, Zhang Hao and his studio team designed for the YNCDC.

(3) Forms of offline experience activities

Offline experience activities are interactive experience forms that further enhance publicity, including press conferences for the two IP character characters, Moba and Moya. A human-computer interaction experience of puzzle mini-games featuring the two IP characters, Moba and Moya; Utilize various derivative products on site in conjunction with large-scale science popularization day promotional activities to encourage audience participation (Figures 35, 36, 37, 38;) The YNCDC has established an offline experience hall that is open to the public all year round. It mainly focuses on digital interactive experiences of popular science knowledge and distributes derivative products in various popular ways such as raffles or blind boxes. This is expected to enhance the promotion effect of the IP image and achieve the maximum attention to popular science knowledge. The innovative devices and VR virtual reality augmented design in the science popularization exhibition hall will enable the audience to experience the wonderful influence of science popularization as if they were there, appreciate the secrets and fun within, and may even become a guide for people's survival behaviors.

Figure 35 shows the scene of the science popularization and publicity activity carried out by the Yunnan Provincial Center for Disease Control and Prevention

in Jingkang Village, Lincang City. In November 2024, Zhang Hao and his studio team organized for the YNCDC.

Figure 36 shows the scene of a free medical consultation event for ethnic minority villagers conducted by the Yunnan Provincial Center for Disease Control and Prevention in Jingkang Village, Lincang City

In November 2024, entrusted by the YNCDC, Zhang Hao and his studio team undertook the event

Figure 37 Answer sheet of the interactive lottery event held by the Yunnan Provincial Center for Disease Control and Prevention in Jingkang Village, Lincang City

In November 2024, Zhang Hao and his studio team designed for the YNCDC.

Figure 38 shows the Yunnan Provincial Center for Disease Control and Prevention presenting interactive small gifts in Jingkang Village, Lincang City

In November 2024, Zhang Hao and his studio team designed for the YNCDC.

2.5 Popular science visual design and style fully demonstrate the theoretical concept of regional culture

2.5.1 Definition and importance of regional culture

Definition: Regional culture refers to the unique and common cultural phenomena that have developed over a long period of historical accumulation within a specific geographical area. It encompasses both material culture, such as architecture, clothing, and food, and non-material culture, including language, customs, and beliefs.

Importance: Regional culture is an integral part of national identity, reflecting the characteristics and spiritual outlook of a nation or region. By showcasing regional culture, people's pride and sense of belonging to their local culture can be strengthened, thereby promoting cultural inheritance and development.

This study, conducted by the popular science class in visual design and analysis, summarizes the connection between visual design and regional cultural values. It traces the evolution from practical applications to theoretical research, focusing on popular science design since 2021. The study highlights the characteristics of Yunnan's minority ecological culture brand and the development of its derivatives. It examines the fusion of the local human cultural background with the analysis of popular science knowledge in humanities, art, and scientific knowledge. The study also explores the psychological aspects of teenagers, communication angles, and behavioral perspectives to understand how popular science design comprehensively influences teenagers. The results indicate that since July 2021, designs with strong regional characteristics have seen a sharp increase in the number of fans. Official account background statistics show that by the early half of March 2024, user attention data had grown from 20,000 fans in January 2020, during the early stages of the pandemic, to 1.5 million fans over three years (Figure 39). By the early part of December 2024, user attention data had reached 2 million.

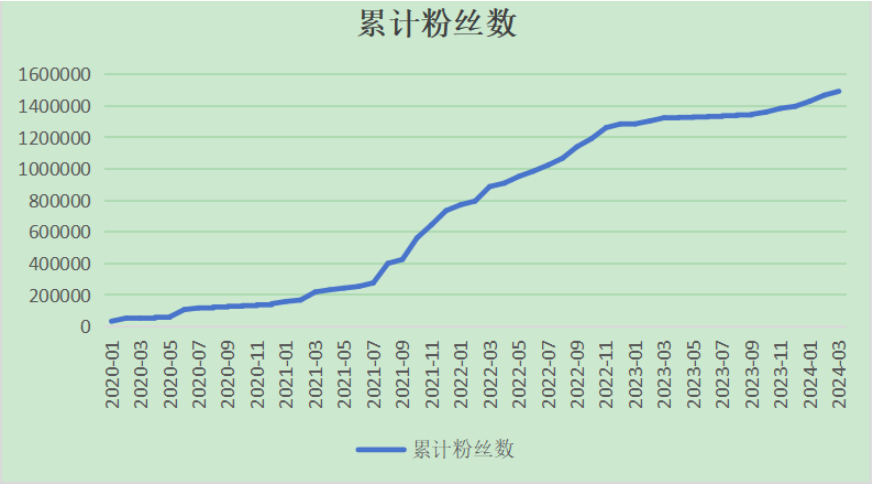

Figure 39 Trend number of Yunnan Center for Disease Control and Prevention from 2020 to 2024

Figure Title : Cumulative number of fans
Photo source: Yunnan Center of Disease Control

2.5.2 Summary of the close connection between popular science visual design and regional culture

Regional Culture and Visual Symbol Design: Written by Li Dongmei and Wang Jiamin. The book discusses the important role of regional cultural characteristics in visual symbol design, analyzes and analyzes the interactive relationship between visual symbol design and regional cultural elements, and establishes a unique visual image. The authors main point in the book is: " The uniqueness of regional culture: regional culture has the characteristics of uniqueness, tradition, locality, plurality and so on. It is not only the scene and the object itself, but also points to the inherent connotation, information, secrets and meaning behind the scene. The meaning of visual symbols: Visual symbols are the intermediary between things and perception, and they are the materialized form and communication carrier of regional cultural concepts. Visual symbols with characteristics and personality can convey a certain regional culture. Design principle: Visual information symbols should not only follow certain aesthetic principles, but also express specific cultural connotations, so that design

becomes a metaphor or symbol of a certain cultural system. Opportunities and challenges of national design: The regional culture in research design is the demand of international competition situation and national development. Only the local art with substantial content can enter the international public space. Media of cross-cultural communication: visual symbols can transcend the distance of time and space, cross the regional boundaries, so that human beings have a common language. Network of multimedia, broadband access Tao and virtual technology have opened up a broad way for the visualization and diversification of contemporary cultural communication modes. Visual symbol design elements: Visual symbol design elements mainly come from the excavation of surface elements and deep elements from the perspective of regional culture. The surface elements are concrete, morphological and material, such as historical sites, natural geography and folk customs; the deep elements are abstract, recessive and spiritual, embodied in local spirit, values and knowledge. Methods of shaping symbols: shaping symbols needs to use the design means such as decomposition and transformation, scattered reconstruction, replacement and composition, alien and isomorphism to create distinctive visual symbols and strengthen the effect and memory points of visual symbols. Identification and experience of meaning: Visual design itself is a way of expression of symbols, through which symbols convey the information and characteristics of the subject to the audience, so that the audience can understand the information and thoughts and feelings that the designer wants to convey according to their own experience."The author mentioned in the article" the opportunities and challenges of the national design: the regional culture in the research design is the demand of the international competition situation and the national development. The view that only local art with substantial content can enter the international public space " is also the theoretical basis to be explored in this paper.

Cultural Perspectives on Science Communication (Brossard & Nisbet, 2007): This review article explores the understanding and attitudes towards science communication in different cultural contexts. Author Denis Brossard and Matthew Nisbet suggests that cultural values and beliefs play an important role in shaping individual

perception and response to scientific information. For example, a culture of high trust in authority may be more likely to accept scientific discoveries from trusted sources Brossard and Nisbet emphasize: " Effective science communication must consider the cultural context of the audience. Adjusting the information according to cultural norms and values can improve the understanding and acceptance of scientific concepts."Science communication is not universal; it must be adjusted to the cultural context of different audiences. Trust in authoritative figures can significantly influence the way in which scientific information is accepted and accepted in a culture. In globalized societies, science communicators face the challenge of overcoming cultural differences to ensure the accurate and effective dissemination of scientific knowledge."

A Brief Analysis of the Influence of Regional Culture on Visual Communication Design: This article discusses the application of regional cultural elements in visual communication design, emphasizing the importance of integrating regional culture into visual communication design, and the role of this integration in improving the cultural connotation and recognition of design works. In the book, author Wu Qian puts forward some key points, and cites several cases to support her argument, deeply discusses the influence of regional culture on visual communication design, and puts forward the views and methods of organically combining regional culture with modern visual communication design."Colors are the first and direct part of humans vision. Therefore, from the color visualization to the design, the atmosphere characteristics produced directly depend on the formation of experience at the level of visual perception of the audience. In China, the application habits of visual space and visual color combination are different in different regions, which also reflects the different aesthetic standards in different regional cultures. For example, Kunming in China has a unique subtropical climate and a variety of flowers all the year round, resulting in the color of flowers everywhere and a strong artistic color. Therefore, the original picture book of *Toxic Plant Poisoning* written by YNCDC (Figure 40) has fresh colors and colorful flowers. Whether from the popular science contentIn terms of topic selection, it

is close to Peoples Daily life, and it also shows the cultural characteristic elements and artistic atmosphere of Kunming from the design color collocation.

Figure 40 Original picture book of Toxic Plant Poisonin

Figure Title : Distinguishing between poisonous and non-poisonous plants

In November 2023, Zhang Hao and his studio team designed it for the Yunnan Provincial Center for Disease Control and Prevention

In 2022, the year of the Rabbit enterprise publicity animation made for the YNCDC reflects the content of the regional and cultural characteristics of Kunming City, Yunnan Province from the topic selection strategy. Propaganda animation, the centers

for disease control and prevention of the two IP hero Moses in a paper plane, flew the Kunming landmark ancient golden horse blue chicken fang (figure 41), flew over the world famous Dali three towers (figure 42), through the Xishuangbanna meng but big Buddha temple and lum meng huan silver tower (figure 43, figure 44), a boat across Yunnan black tourist scenic spot (figure 45), Yuxi hongta and maitreya east charm, and the meaning of the center for disease control and prevention in YNCDC work covers every corner of Yunnan province. YNCDC science animation closely combined with Yunnan regional unique architectural elements and representative cultural characteristics of topics and style, and using modern design techniques and technology for innovative transformation and presentation, can effectively show the charm of regional culture and characteristics (Figure46), promote the inheritance and development of culture, the visual design of science topic selection and style in showing the theoretical concept of regional culture plays a vital role.

Figure 41 Jinma and Biji Square are the symbols of Kunming. Jinma Square in the east and ji Square in the west were built in the Xuande Period of the Ming Dynasty and have a history of nearly 600 years.

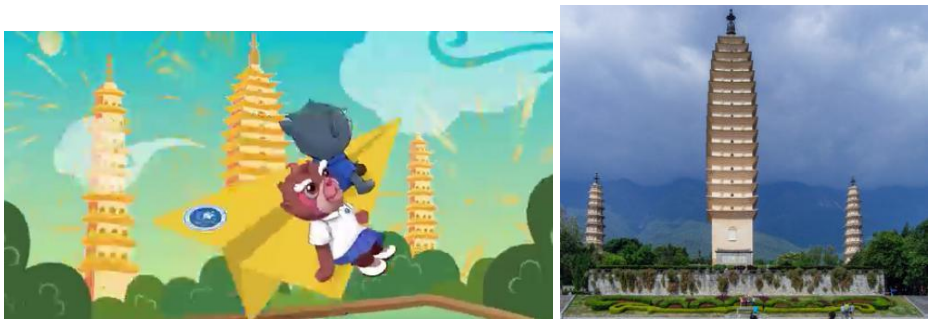

Figure 42 The Three Towers of Dali is one of the landmark buildings of Dali,

with a long history and profound cultural deposits. The three towers include one main tower and two companion towers. The main tower is named Qianxun Tower, which is 69.13 meters high and a square 16-story eaves tower. It is a typical building in the Tang Dynasty. The companion tower is located on the east and west sides of the main tower, both are octagonal 10-level dense eaves brick tower, with a height of about 42.19 meters. The three towers have a unique architectural style, showing the superb skills and wisdom of the ancient craftsmen.

Figure 43 Meng Le Big Buddha Temple in Xishuangbanna is restored and rebuilt on the original site of the royal temple "Jingpiao Buddha Temple".

"Jingpiao Buddha Temple" was built by a Dai king named Long in the history of the Dai people to commemorate the princess who died of illness. The princess believed in Buddhism all her life, so every festival, the Dai king visited the temple and held a large Dharma meeting to commemorate the beloved concubine and carry forward the Dharma. According to historical records, "Jingpo Buddha Temple" was built in the Ming Dynasty, is one of the iconic buildings of the Southern Buddhism, is also an important place for Banna Buddhist activities.

Figure 44 Mangshi Menghuan Silver Tower, Menghuan Golden Tower is located at the top of the mountain at —— Peacock Lake,

Dehong Dai Jingpo Autonomous Prefecture, Yunnan Province. Menghuan Golden Tower belongs to the architectural style of the South Asian Dai Palace, with profound ethnic cultural connotation. The pagoda can be called the first pagoda of Buddhism in the southern part of China. It is a very striking landmark building in China and Mangshi area. It is a bridge to enhance good-neighborly friendship and pk-phaw friendship between China and Myanmar.

Figure 45 Puzhehei in Yunnan, "Puzhehei" is yi language, which means a place with many fish and shrimp.

Here there are lonely peak, clear stream, secluded cave, strange stone spirit show, and small bridge, water, peoples simple charm.312 isolated dotted, 83 caves, 54 lakes connected, 40000 mu of wild lotus graceful, 60 square kilometers water clear, 60000 mu of plateau karst wetland breathtaking, strong, miao, yi and other ethnic customs colorful, by the ministry of construction experts as "the world is rare, domestic

unique landscape pastoral scenery". The first is a magical and magnificent karst landform plateau lake group.

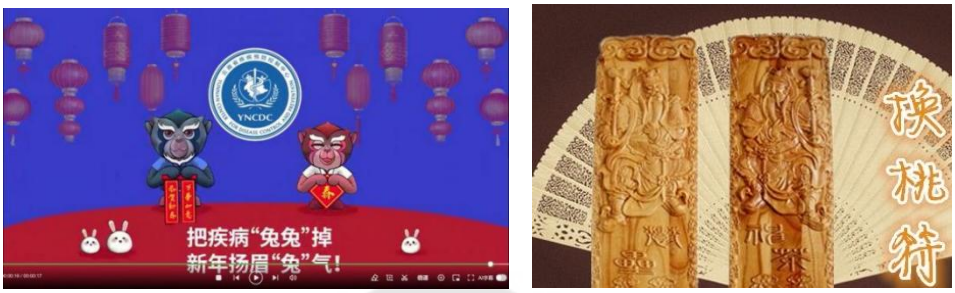

Figure 46 Yunnan animation for the Year of the Rabbit,

originally produced by Zhang Hao and his design team in 2023. In Chinas biggest and most solemn traditional festival is the Spring Festival, the Spring Festival refers to the traditional lunar New Year, commonly known as "festival", in ancient times, is in the gate, and the time is very long, as early as the song dynasty have poetry to describe the peach character is Chinas most grand, the most lively, the most important an ancient traditional festival, with rich national characteristics. The custom of changing peach characters has evolved into modern times. People usually hang Spring Festival couplets on both sides of the gate to replace peach characters to express their summary of the year or their expectation for the New Year. In the final picture of the animation, the Moya holds the Spring Festival couplets to express the YNCDC with the most traditional way of blessing in China to you.

These review articles and case analysis provide a comprehensive understanding of popular science visual design and human culture research. Through these documents, we can have a deeper understanding of how cultural factors influence the visual design and dissemination of popular science information, and how to design effective popular science information dissemination strategies according to different cultural backgrounds.

2.6 Cultural research theory

2.6.1 Social semiotics

Cultural semiotics is a subject that studies culture as a symbol or symbolic system. It not only focuses on the symbolism in culture, but also explores how these symbols are generated, disseminated and interpreted in different cultural and social contexts. Cultural semiotics is a subject that studies culture as a symbol or symbolic system. It not only focuses on the symbolism in culture, but also explores how these symbols are generated, disseminated and interpreted in different cultural and social contexts.

Definition and origin of cultural semiotics: Cultural semiotics regards culture as a symbol or symbolic system. This study of visual symbol or symbol system with suspended meaning is not only an academic perspective of perspective on culture, but more importantly, it involves the definition of the essential characteristics of culture. Its core theory is the core theory of cultural semiotics, including Lottmans cultural semiotics theory, which emphasizes that cultural symbols are a second-order stereotyped system formed on the basis of natural language.

From the Angle of Semiotics: Written by Gou Zhixiao and Chen Chuangsheng, published by Guangdong Peoples Publishing House. Based on the research of regional culture, the special concept of "regional cultural symbol" is extended, and its connotation and application value are explained. But such research usually involves the close connection between visual design and regional culture. Article mentioned about the nature of symbolic survival, "from the point of view of symbol: a kind of social cultural phenomenon of symbolic interpretation through research tools, architecture, identity, currency, totem, folk custom, fashion and digital survival of human life and survival practice of the symbol phenomenon, to explore the symbolic survival nature of the human society". The passages with a semiotic analysis of social and cultural phenomena, especially those that explore how tools, architecture, identities, etc., as symbols reflect the structure and values of human society.

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The IP image design of YNCDC takes the unique white-eyebrow gibbon as the cultural symbol of Yunnan disease control in a visual form. One blue and one red two gibbon symbolize the unique minority culture of Yunnan and the local regional characteristics of biodiversity. Maya, the two white-eyebrow gibons with the identity of ethnic minority doctors, have typical symbolic images, especially consistent with the values of the local people. The design image is deeply rooted in the hearts of the people and is particularly accepted by the masses(Figure 47). The two monkeys in the centers for disease control and prevention workers appeared, in the future in the countryside as organizers, in Kunming teenagers group appeared, appeared in the multimedia animation as tourists, some in the traditional Chinese martial arts tai chi, have a plenty of medical workers, these image will represent the Yunnan center for disease control and prevention unique symbol of deep in the heart of the masses.

Figure 47 Extension from the design prototype white-eyebrow gibbon to the kaleidoscope IP image of Momoa

In 2022, Zhang Hao and his design team made the original production

2.6.2 Visual psychology

Visual psychology is a discipline that studies how humans perceive, understand, and process information through the visual system. Visual psychology is a discipline for studying visual information processing and cognitive processes, exploring the interactions and influences between visual perception, cognition, and behavior. The origin of visual psychology can be traced back to the ancient philosophers thinking on

human visual phenomena. With the development of science, especially the rise of psychology and neuroscience, visual psychology has gradually formed an independent discipline system.

Visual thinking (aesthetic intuition psychology), the author of Rudolf Arnheim, is the leader in the field of visual perception, he mentioned in the article: "the so-called visual perception, visual thinking": this sentence directly to the core view of Arnheim, the vision is not only a sensory activity, but also a kind of thinking process."Visual image is no longer the physical existence of the world, it has a meaning ": this sentence emphasizes the importance of visual image in the thinking process, visual image is not only the reproduction of the physical world, but also the transmission and understanding of meaning."Art seems to be in danger of being strangled by the rampant bearish theory": this sentence reflects Arnheims concern that the art world relied too much on theory over practice, and the emphasis he placed on visual thinking. Arnheim emphasizes the rational function of vision in sensing the outside object. He believes that vision itself has the ability to actively explore, select, extract, separate, complement, correct, compare and combine, which proves that vision itself has the thinking ability to explore, select and solve problems. Visual perception and thinking are intertwined and integrated in visual activities. Perceptual activity contains thinking components, and vision is not only a simple sensory reception, but also involves a complex thinking process.skillArt creation is a process of visual thinking. Artists express their thoughts and emotions through visual images. This process is not only perceptual, but also contains a lot of rational thinking and decision-making.

From 2022, the author led the team to focus on the design of advertising posters and cultural and creative derivatives with strong festival characteristics (Figure 48). The design product was well received by the experts of Yunnan Science Association, and the publics attention to the popular science design of Yunnan Center for Disease Control began to rise sharply. Our study of visual psychology is an attempt to analyze how the popular science visual design affects the audience psychology and how to guide the audience behavior step by step from the perspective of local culture and art in Kunming. Further, by emphasizing the local cultural and artistic characteristics, increase the audience and popular science design.

Visual psychology includes the following aspects, visual perception: This is an important field in visual psychology, studying how humans get information from the outside world and explain it. Visual perception involves not only the perception of object shape, color, and motion, but also the perception of spatial properties such as depth, size, and distance. Visual perception: Focus on how humans translate visual information into cognition of objects, scenes, and situations. Visual perception takes into account the influence of various factors, including perception, cognition and emotion, on visual information processing. Visual attention: the ability to selectively attend to and process certain stimuli while processing visual information. Through the regulation of visual attention, people are able to process a large amount of visual information more effectively and make accurate decisions more quickly. Visual memory: it refers to the process in which people store, maintain and reproduce visual information in the brain. Visual memory plays a crucial role in everyday life, such as the ability to recognize familiar faces, things, or scenes.

Figure 48 The picture with great Chinese beauty conveys the cultural confidence of Kunming. Stimulate the audiences storage of information in the brain from the perspective of direct visual perception. The design of the book reflects the folk activities of putting sky lanterns and lantern lanterns. The pictures illustrated in the following illustrations are not only the cultural characteristics of the Kunming area, but also the traditional customs and activities of the whole Chinese people. Kongming lantern, also known as the sky lamp, commonly known as the wishing lamp, the sky lamp, is an ancient Han handicraft, Kongming lamp in ancient times, more military use, modern people put the Kongming lantern, more for blessing. Yuanxiao lanterns, the fifteenth day of the first month of Yuanxiao, will continue from the New Years Eve celebration to another climax. Yuanxiao night, the streets and alleys decorated, people enjoy the lights, guessriddles written on lanterns, Eat yuanxiao, become generations alongcustom. This topic is the use of visual

perception to emphasize peoples vision of praying for the future.

Figure 48 Handheld account book with great Chinese beauty

Figure Title : YNCDC,Health is more important than wealth.

In November 2022, Zhang Hao and his studio team designed it for the Yunnan Provincial Center for Disease Control and Prevention

Figure 49 is in January 2022, on the eve of the Spring Festival center for disease control of the spring poster design, figure 49 to the first to the seventh all folk activities, a day seven, with folk content, the IP image, main characters with a symbol of evil cap, holding the Spring Festival couplets, hands bowing, like a move with Chinese characteristics, the design put three folk activity content, the first worship year, the second day of the home, fifth to meet the god of wealth, artistic creation is a process of visual thinking. The artist expresses his thoughts and emotions through visual images, reflecting the local spirit, values and knowledge.

Figure 50 is the poster design of the Year of the Year of the Rabbit. These three groups of pictures, in the topic of the picture style, the style of lanterns, New Year pictures, paper-cut elements focus on the cultural characteristics of Kunming,

Figure 51 is in January 2024, on the eve of the Spring Festival in Yunnan province center for disease control released the year of the dragon spring poster design, the two group figure, using the Chinese knot elements and lion dance elements, as the public popular science design, on the one hand can enhance the audience of the culture,

enhance the popular science knowledge, such a combination of boxing, striking color, unique graphics or striking image to attract the attention of the audience, distinct information structure, help the audience gradually further understanding the popular science content. And then it promotes the occurrence of behavior. The design of behavior call is also withdrawn in the picture: in the final stage of the science popularization activities, the visual design should include a clear call of behavior (CTA) to encourage the audience to take specific actions, such as health is higher than wealth, and returning home safely.

Figure 49 Yunnan Center for Disease Control in 2022

Figure Title : Bai Danian, returning to his parents' home, welcoming the God of Wealth

In January 2022, Zhang Hao and his studio team designed for Yunnan Center for Disease Control and Prevention

Figure 50 Year of the Rabbit poster by Yunnan Center for Disease Control during the Spring Festival of 2023

Figure Title : On New Year's Eve, Ping'an returned home safely.

In January 2023, Zhang Hao and his studio team designed it for the Yunnan Provincial Center for Disease Control and Prevention

Figure 51 Year of the Dragon poster by Yunnan Center for Disease Control during the Spring Festival of 2024

Figure Title : In the Year of the Dragon, may every household enjoy peace and happiness, and may health and harmony bring prosperity to each year.

In January 2024, Zhang Hao and his studio team designed for Yunnan Center for Disease Control and Prevention

Visual psychology is widely used in advertising design, through attracting attention and triggering the purchase intention, to realize the promotion and sales of products. At the same time, visual psychology provides artists with inspiration and theoretical support for their creation, helping them to better express their thoughts and emotions. In the field of education, visual psychology helps teachers understand students learning styles and needs, improve teaching effects and students interest in learning. Visual psychology is an interdisciplinary field of research involving the knowledge and methods of multiple disciplines including psychology, neuroscience,

and computer science. With the continuous development of science and technology, the research of visual psychology will be more thorough and extensive, bringing more convenience and well-being to human life and development.

2.7. Psychological influence of regional cultural elements on teenagers accept popular science knowledge

Regional cultural elements play a vital role in the psychological process of teenagers receiving popular science knowledge. In order to better promote the improvement of their scientific literacy, the influence of these factors should be fully considered and corresponding design strategies should be adopted.

1. Regional cultural identity establishes emotional connection: teenagers usually have a strong sense of identity with the culture of their own region, and this sense of identity can become the emotional basis for them to learn popular science knowledge. When popular science content is combined with regional culture, teenagers will more actively participate in learning because of their pride and sense of belonging in their regional culture. In March 2024, he wrote an article for the YNCDC entitled *Allergy?catch a cold? Spring troubles* of the original science long figure (figure 52), popular science on the content of the topic, fully considering the characteristics of Kunming region, Kunming known as the "Flower City", the local cultural activities is the custom of the spring outing flowers, so every Kunming citizens more or less rhinitis disease, rhinitis patients in 2019 as high as 37.4%, many Kunming citizens do not clear what is an allergy or cold. Aiming at this common phenomenon, our original illustration long figure chose this theme, at the same time picture style chose the 3, April Kunming, this paper also especially for the local pear blossom, peach blossom, rape, color of selection also has unique to Kunming spring flowers, green, collocation extremely character recognition of Moses, and illustrated to allergies and coldThe symptoms are different, and the picture design is clear at a glance, which is not only close to the daily life of the audience, but also helps them to solve practical problems, and has been forwarded by many schools and praised by the masses. Popular science design is so that everyone love their own city, have the fate, together.

Figure 52 Allergy?catch a cold? Spring flower troubles of the original science long picture

Figure Title : Allergy? Have a cold? Can't tell the difference. The troubles of spring's warm weather and blooming flowers

In April 2024, Zhang Hao and his studio team designed for Yunnan Center for Disease Control and Prevention

2. Cognitive style differences: Teenagers from various regions may be accustomed to different information processing methods. Some are more inclined to use intuitive and specific learning materials, whereas others excel at dealing with abstract concepts.

3. Thinking mode:The regional cultural background influences teenagers' thinking modes. For instance, Eastern culture tends to favor holistic thinking, whereas Western culture tends to favor analytical thinking.

4. Motivation and Interest: Inner Motivation: The incorporation of regional cultural elements can ignite the intrinsic learning motivation in teenagers, enabling them to delve into relevant knowledge out of curiosity and interest. External Incentives: The expectations from family and society can also act as external motivational factors influencing teenagers' reception of popular science knowledge.

5.Social Environment Influence: Peer Effect ,The interaction among peers influences teenagers' receptiveness to popular science knowledge, and the collectivist or individualist tendencies inherent in regional cultures also play a role. The distribution of educational resources and the disparities in these resources across different regions may result in unequal access to popular science knowledge for teenagers, further affecting their learning outcomes.

6.Values and belief systems: Moral concepts and values inherent in regional cultures can shape teenagers' perspectives on certain scientific matters, including environmental protection and bioethics. Religious beliefs: In certain regions, religious beliefs may clash with scientific viewpoints, necessitating the use of appropriate educational strategies to achieve harmony.

Cultural Perspectives on Visual Communication (Pauwels, 2012): In this review article, Pauwels, the author of "Cultural Perspectives on Visual Communication," explores the influence of culture on visual communication. He synthesizes research findings on the interpretation and preferences of visual imagery across various cultural groups, highlighting the universality and specificity of cultural symbols. While some visual symbols, such as hearts or smiling faces, carry universally recognized emotional connotations, others may have distinct meanings across different cultures. For instance, certain gestures might be considered polite in some cultures but offensive in others. Pauwels also underscores the context-dependent nature of visual communication, emphasizing that the interpretation of visual information is largely contingent on its

context. The same image can convey entirely different messages depending on the cultural or situational context. Designers must consider the cultural milieu of their intended audience and the anticipated reception environment. This presents a challenge in cross-cultural design and an ethical imperative in visual communication. Designers should be mindful of the potential social ramifications of their creations. They should avoid imagery that could provoke controversy or misinterpretation and ensure that their designs are respectful and sensitive to all cultural groups. In the era of globalization, the challenge for designers is to craft visual works that are globally appealing while preserving local nuances. This necessitates not only creativity but also a profound comprehension and respect for diverse cultures. Pauwels's research offers a deeper insight into how cultural factors shape visual design and the dissemination of popular science, as well as how to devise effective strategies for popular science information dissemination that are culturally attuned.

As illustrated in Figure 53, "The Radiation Picture Book Around Us" was conceived and completed by Zhang Hao and his team in June 2023. The design aesthetic perpetuates the distinctive cultural art of "Jia Ma" from Yunnan, which resonates with the daily lives of the working class and has been swiftly embraced by the public. In the realm of popular science design, it is imperative to focus on the innovation of cultural integration. The diversity of cultures offers a wealth of inspiration for visual design. Through the clever amalgamation of various cultural elements, designers can produce novel and distinctive visual creations, thereby fostering communication and understanding between different cultures.

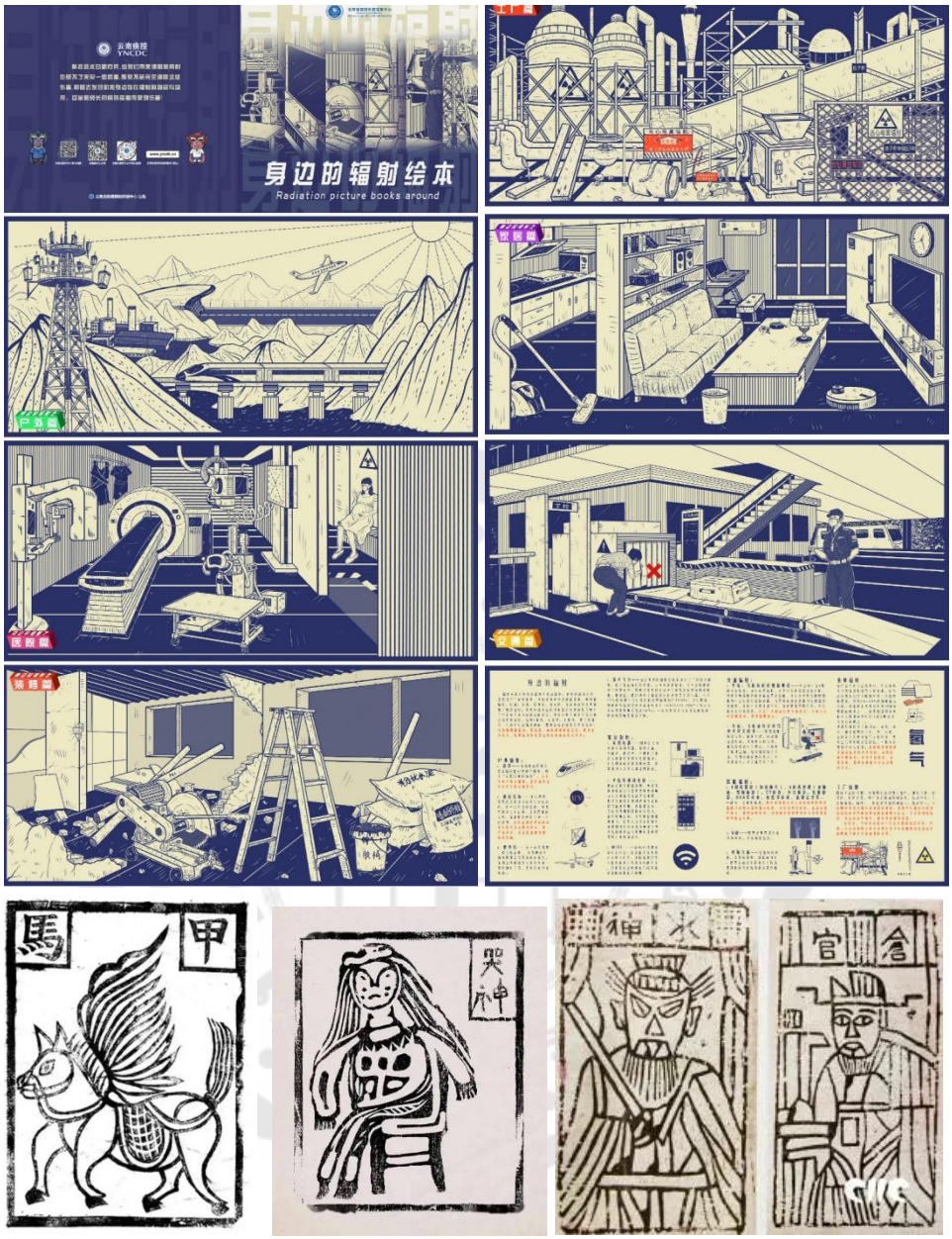

Figure 53 The design of Radiation Picture Book Around was completed by Zhang Hao and his team in June 2023.

Figure Title : The radiation around us.

Its design style continues the unique culture and art of Yunnan "Jia horse" skills, which is closer to the daily life of the working people, and is quickly accepted by the masses.

7. Language and Communication Modes: Minority Languages and Putonghua. In China and other multilingual countries, Yunnan is a province with a significant population of ethnic minorities. The use of these various ethnic languages can impact the efficiency of information transmission, particularly in rural areas. Non-verbal Communication: Beyond language, body language, facial expressions, and other non-verbal communication methods are also crucial for information transmission. The Yunnan Disabled Persons' Federation (YDPF) will also focus on bilingual posters to assist local ethnic minorities in reading.

2.8. Progressive behavior guidance of regional cultural identity in popular science

The progressive behavior guidance of visual design in popular science is a complex yet crucial process. It involves how to effectively generate cultural identity through visual elements, attract the audience's attention, stimulate interest, transmit information, and ultimately promote the occurrence of behavior.

1. Attract attention

The utilization of visual elements, such as eye-catching colors, unique graphics, or striking images, is essential for capturing the initial attention of the audience. For instance, incorporating image elements related to the topic and using question sentence titles in the cover or title of popular science videos can markedly enhance the users' click-through rate. Furthermore, the layout and composition are crucial for attracting attention. Designers must place important information in a prominent position, adhering to the visual flow law of the audience, such as at the center of gravity of the layout or the natural landing point of the line of sight.

A blend of content and form: Once you've captured the audience's attention, you must sustain their interest with engaging and informative content. This necessitates a close integration of topic selection and visual design style with regional cultural characteristics, harmonizing with popular science content. It involves presenting complex scientific concepts through vivid illustrations, animations, or charts.

2. Enhanced interactivity: Increasing the interactivity of visual design is also an effective means to stimulate interest. For instance, incorporating interactive elements in popular science exhibitions or digital media enables the audience to actively explore and learn, thereby enhancing their level of participation and interest. Transfer information: Clear and easy-to-understand visual expression is essential for popular science, as its purpose is to make scientific knowledge accessible to the public. Therefore, visual design must ensure the clarity and readability of information. This involves the use of concise diagrams, flowcharts, and illustrations to explain complex concepts while avoiding overly technical or obscure terminology. Clear-structured information structure: By employing a reasonable hierarchy and organizing information effectively, the audience can gradually understand the content of popular science. For example, a simple overview can introduce a topic, followed by a detailed explanation that gradually unfolds, and finally, a summary of the main points or questions for further reflection can be presented.

3. Promote behavior occurrence

Behavior Call Design: In the final stage of science popularization activities, the visual design should include a clear behavior call (CTA) to encourage the audience to take specific actions. This could involve visiting an exhibition, viewing the full video, participating in online testing, or sharing with friends, among other activities.

Social Impact and Feedback Mechanism: Utilizing social media and other platforms to display the participation and feedback of others can enhance the audience's motivation to engage. Additionally, providing convenient feedback channels allows the audience to express their opinions and feelings, which also helps to establish a positive interactive atmosphere.

2.9. Literature review in other related fields

The following is a review of the qualitative research literature on the professional guidelines for popular science image design.

"Visualizing Science: Illustration and Beyond" by Felice Frankel and Angela H. DePace explores the significance of scientific visualization and effective methods for

conveying scientific concepts. Frankel and DePace emphasize that effective visualizations not only clearly communicate complex scientific ideas but also pique the interest and curiosity of the audience. Through numerous examples, the authors demonstrate how tools such as charts, illustrations, and animations can be utilized. They provide a series of design principles, including simplicity, accuracy, and aesthetics, along with practical activities to guide readers on applying these principles to create impactful scientific visual works.

Frankel and DePace also authored "Visual Strategies: A Practical Guide to Graphics for Scientists and Engineers." This book concentrates on the use of graphics and images to convey scientific concepts, ranging from foundational principles to advanced techniques. The authors underscore the crucial role of scientific visualization in communicating complex ideas. Effective visualizations assist scientists and engineers in presenting data more clearly and promoting interdisciplinary communication and public understanding. The book offers a practical set of design principles, such as clear data presentation, the selection and use of charts, and best practices for color and layout. These principles aim to help readers produce data visualizations that are both aesthetically pleasing and functional. Case studies illustrate how to apply these theories to real-world projects, spanning various fields from basic scientific research to engineering applications, offering readers valuable practical experience in preliminary research.

"Information Visualization: Perception for Design" by Colin Ware. "Information Visualization: Perceptual Design" this book explores the psychology and perceptual principles of information visualization, and is very useful for the design of influential popular science graphics. Ware explores the use of color in information visualization, including how to use color contrast to highlight important information and avoid confusion by using too similar colors. He also discussed the needs of color-blind users, emphasizing the importance of inclusive design. The author also points out the role of animation and interactive elements in enhancing the visual understanding of information. Ware believes that timely animation can help explain complex processes or data

changes, while interactive elements can make the user experience more personalized and deeper.

"Data Points: Visualization That Means Something" by Nathan Yau. The book describes how to effectively use data visualization to communicate information, which is very practical for designing popular science graphics.

"Visual Explanations: Images and Quantities, Evidence and Narrative" by Edward R. Tufte. Tuftes book has long been known for its unique insight into information graphic design, which focuses on how to explain complex concepts through graphics.

In visual design, progressive guidance refers to improving the user experience and understanding by gradually guiding users to complete a certain operation or to understand a certain information. Here are some references on progressive guidance in the field of visual design:

"Dont Make Me Think" by Steve Krug is a classic book written by Steve Krug about user experience design. Since being first published in 2000, the book has become one of the important reference books in the field of user experience design. These include the concept of progressive guidance. Core point: Usability first: Krug emphasizes that the most basic principle of design is to "dont let users think."This means that designers should try to make the product or website intuitive and easy to use, and users can complete the operation without too much thought. User behavior analysis: By analyzing the behavior of users when using the product, he helps designers understand how to improve the usability of the product through the correct design. Be clear: every page or screen should be self-evident, just like the good lighting in a store to make everything look better."If something looks like it takes a lot of time researching —— or if it looks like this, it probably wont be used."This sentence emphasizes the importance of the intuitive design for user use. Steve Krug The progressive guidance proposed in Dont Make Me Think provides professional practical guidance for this study:

1. The three laws of usability: Krug's three laws of usability, which are: do not make me think, minimize the number of clicks, and ensure each click is a clear choice. Remove half of the text on each page, and then halve the remaining text.

Collectively, these laws form the basis of progressive disclosure, emphasizing that design should reduce the cognitive load on users, making each step of the operation intuitive.

2. Clear visual hierarchy: To establish a clear visual hierarchy on each page, the more important the content, the more prominent it should be. Logically related parts should also be visually related, and logically included parts should be visually nested. This visual hierarchy aids users in quickly understanding the page structure, making it easier to locate the required information or complete tasks.

3. Clear navigation system: The design of the navigation system is crucial for progressive disclosure. It should inform users "how to proceed" and "where they are," ensuring they do not get lost on the site. This involves the proper layout and use of elements such as site identity, column lists, current page navigation, and search boxes.

4. Simplified operation process: Krug emphasizes that the design should simplify the user's operation process as much as possible. For instance, a text box that displays different interaction states can help users understand which step of the task they are on. This gradual guidance assists users in completing tasks smoothly, without confusion or frustration.

5. Continuous usability testing: Usability testing is a critical step to ensure the effectiveness of progressive disclosure. Through testing, users can identify the smoothness and issues in the usage process, allowing for timely adjustments and optimization of the design. This iterative process aids in continuously improving the user experience of the product.

The progressive guidance advocated in "Don't Make Me Think" underscores the importance of designing with a user-centric approach and enhancing the user experience by minimizing cognitive load, establishing clear visual hierarchies, offering intuitive navigation systems, streamlining operational processes, and conducting ongoing usability testing.

"The Elements of User Onboarding" by Samuel Hulick — This book concentrates on user guidance and experience, offering a plethora of practical advice and case studies on crafting and implementing progressive guidance.

"Designing Interface Animation" by Val Head — The book delves into the use of animation to guide users within interface design, encompassing progressive guidance and the impact of animation on the user experience.

"Hooked: How to Build Habit-Forming Products" by Nir Eyal - The book explores the creation of products that captivate users and become habitual. While it primarily concentrates on product design, it also encompasses several progressive design principles.

"Interaction Design: Beyond Human-Computer Interaction" by Yvonne Rogers, Helen Sharp, and Jenny Preece - This book offers a thorough exploration of interaction design theory and practice, encompassing topics such as user guidance and user experience design, including progressive guidance.

"Lean UX: Designing Great Products with Agile Teams" by Jeff Gothelf and Josh Seiden - This book presents a method for integrating agile development with user experience design, detailing how to enhance product design and user experience through iterative design and progressive guidance.

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CHAPTER 3
RESEARCH METHODOLOGY

The progressive behavioral guidance of visual design in popular science is a complex yet crucial process. It encompasses how to effectively create cultural identity using visual elements, capture the audience's attention, pique their interest, convey information, and ultimately encourage the occurrence of behavior. The research methodologies presented in this chapter include interviews, bibliographic analysis, on-site investigations, mind mapping, case comparison analysis, and quantitative methods, among others. These methodologies are varied and serve to analyze the psychological processes involved in the reception of popular science knowledge, the formation of emotional bonds through regional cultural identity, differences in cognitive styles and modes of thinking, motivations and interests, the impact of the social environment, values and belief systems, language, and communication methods. Progressive behavior guidance encompasses: capturing attention, the application of visual elements, stimulating interest, enhancing interactivity, transmitting information, ensuring a clear hierarchical information structure, promoting behavior, designing calls to action, social influence, and feedback mechanisms. This chapter will utilize these various research methodologies to further explore how popular science design progressively guides the thinking and behavior of local teenagers in Yunnan from the perspective of regional cultural identity.

3.10 Research Methodology Framework Diagram

3.1 Research Methods

3.1.1 Quantitative Research Methods

Quantitative research: Generally, quantitative research can obtain data through the following three methods.

1. By conducting surveys to obtain data
2. By conducting experiments to obtain data
3. By using secondary data to obtain data.

This study samples from a large number of practical designs from 2018 to 2025 and collects data from the Yunnan Provincial Center for Disease Control and Prevention, conducts questionnaire surveys among the main youth groups, distributes questionnaires to the designers involved in the visual design of science popularization, and distributes questionnaires to the relevant professional institutions of YNDC for science popularization design. The data results are analyzed.

3.1.2 Qualitative Research Methods

Qualitative research: Compared with quantitative research, qualitative research methods are usually more flexible and subjective. The key is to reflect on the methods used and explain the choices made. Generally, qualitative research can adopt the following methods.

1. Use interviews or group discussions to describe the time, place, and method of the interview,

2. Use participatory observation to describe the location, time, and method of observation. In this study, the author analyzed the actual situation of science popularization visual design in Yunnan Provincial Center for Disease Control and Prevention, studied Yunnan's characteristic regional culture, conducted interviews with experts, and we can explain the guiding role of culture on people's behavior, the importance of cultural confidence in ethnic groups, and the acceptance degree of scientific popularization knowledge. Through the sorting and analysis of more than 10

types of scientific popularization visual forms and over 100 graphic and textual scientific popularization designs, this study explores the regional characteristic culture behind the visual design of scientific popularization knowledge and the progressive behavioral guidance for the target audience.

3. Use existing data to explain how to select case study materials, such as text or images, as the focus of analysis, that is, the case study method. This article selects the science popularization design case with in-depth cooperation with the Yunnan Provincial Center for Disease Prevention and Control, 5 years of diversified science popularization visual design, and the number of followers of the official account has increased from single digits to 1.5 million. This article uses a combined qualitative and quantitative analysis method for four stages of research. Through interviews with the audience of science popularization design, as the author, the designer, through the social cultural connotations reflected by science popularization design, analyze the influence of regional cultural art on the behavior of the target audience. This includes the influence of the designer's design concept and behavioral analysis. Finally, the interview data will be sorted.

3.1.3 Data Analysis of the Investigation

The methods for processing and analyzing data are divided into quantitative methods and qualitative methods.

Quantitative methods: Data analysis is generally based on numerical data. The contents include: 1. How to process the data before analysis, such as checking for missing data, eliminating outliers, and converting variables. 2. Data analysis software. In this study, the Qianlixing APP tool was used to design and create the questionnaire. 3. Statistical testing methods, using bar charts and tables to conduct statistics. 4. What is the sample size and response rate? This survey produced 130 questionnaires, 98 of which were responded to, with a response rate of 75.4%.

Qualitative methods: Based on observation results and language, some form of textual analysis is conducted: 1. Content analysis: Classifying and discussing

the meanings of words, phrases, and sentences. 2. Thematic analysis: Coding the data, carefully checking to identify broad themes and patterns. 3. Discourse analysis: Studying communication and meaning related to social environments.

3.1.4 Bibliographic Analysis Method, Practice Design Method

In this study, the author placed the science popularization design in different regions, and conducted in-depth investigations into the science popularization visual design and behavioral guidance at the Graphic Text Studio of the Art Design College of Kunming Metallurgical Higher Vocational College. In this stage, the main method used was image classification: studying information-based visual design, analyzing the design methods, styles, and guiding psychological approaches in visual design, and summarizing the effective design process. Audience interviews, data collection, statistical methods, etc. were also used. This study was completed using a mixed qualitative and quantitative method. Based on the practical science popularization theme design cases, combined with the unique regional cultural attributes, an analysis and summary were conducted, and a unique visual guidance rule was summarized, as shown in Table 2. The design was invested in the education market, and the research analysis method, audience interview method, etc. were used to verify whether the visual rules could correctly guide the behavior and manners of teenagers. The purpose was to combine the unique regional cultural attributes and implant the visual progressive design method, integrating scientific knowledge into it. Science popularization design integrates unique visual language, playing a more accurate emotional expression and information transmission role in the dissemination of information and the guidance of behavior. Then, the acceptance degree of local human and cultural differences was discussed, as well as the integration and development of visual visualization of science popularization knowledge.

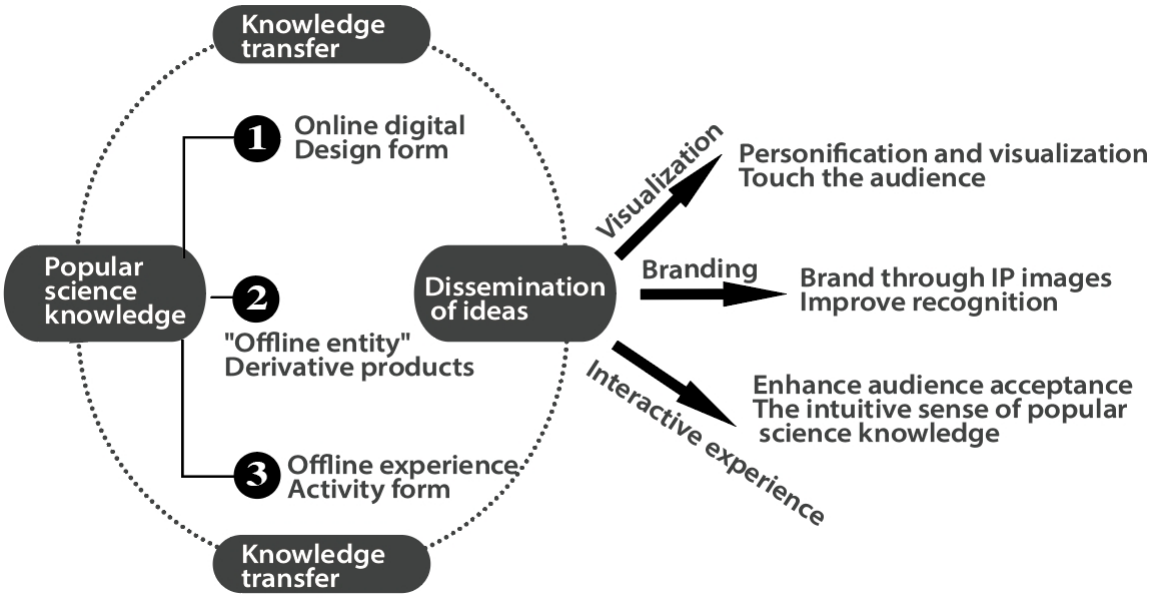


Figure 54 the behavior guidance process of visual design in popular science is expressed in a progressive way Research Mind Map

Sourse: s produced by author Zhang Hao in Sep 2024

3.2 Aesthetics of Perception of Design

Aesthetics and design perception comprise four levels.

The first level addresses the three components of emotions and feelings: subjective experience, external expression, and physiological arousal.

The second level explores the manifestation of purposeful emotions, dynamic functions, and perceptual functions.

The third level concentrates on the three levels of design emotions: the sensory level, the efficacy level, and the understanding level.

The fourth section complements the definition of emotional design strategies, particularly encompassing four key points: self-expression, comprehension and reflection, narrative interpretation, and symbolic signs. This thesis concentrates on research from the design level and design strategies, examining the emotional narrative of popular science design, the integration of the symbolization of local culture and art in

popular science design, and also investigates the aspect of emotional intervention behavior.(Table3)

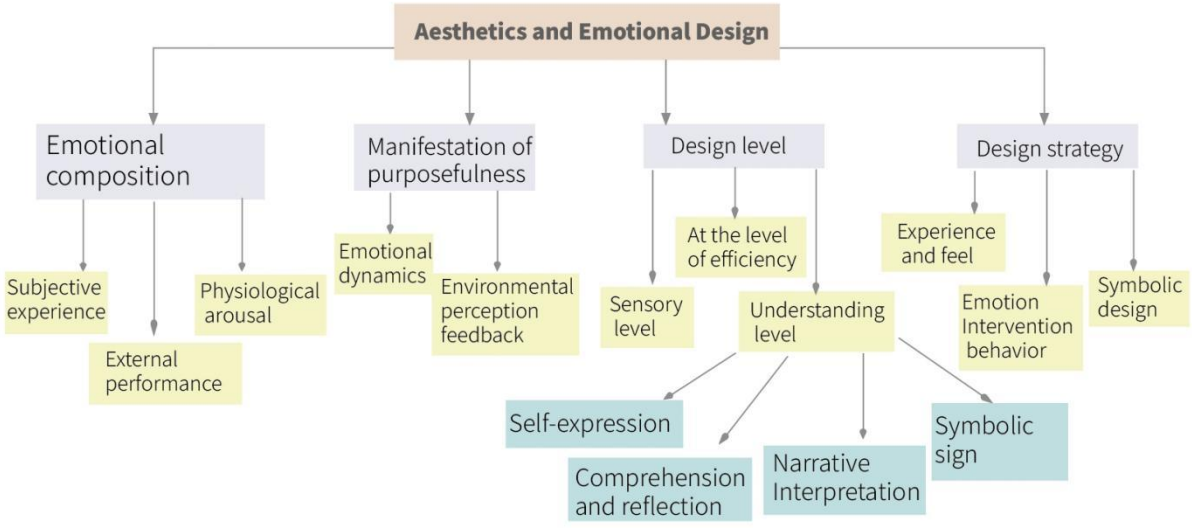


Figure 55 Aesthetics of Perception of Design process

Source: Drawn by the Author Zhang Hao in March 2025

3.3 The list of the audience groups of the survey questionnaire

This study can be divided into three levels of target population categories.

The first-level target audience is students aged 10 to 16 in Kunming. The science popularization design and questionnaire distribution will be conducted at KUNMING WORLD YOUTH ACADEMY.

Table 1 The list of the audience groups of the survey questionnaire （1）

name	age	grade
Student a, Grade 6	10	KUNMING WORLD YOUTH ACADEMY
Student b, Grade 6	11	KUNMING WORLD YOUTH ACADEMY
Student c, Grade 6	10	KUNMING WORLD YOUTH ACADEMY
Student d, Grade 7	12	KUNMING WORLD YOUTH ACADEMY
Student e, Grade 7	11	KUNMING WORLD YOUTH ACADEMY
Student f, Grade 8	13	KUNMING WORLD YOUTH ACADEMY
Student g, Grade9	14	KUNMING WORLD YOUTH ACADEMY
Student h, Grade 10	15	KUNMING WORLD YOUTH ACADEMY
Student i, Grade 10	16	KUNMING WORLD YOUTH ACADEMY

Source: Drawn by the Author Zhang Hao in March 2025

The second-level target population is students aged 17 to 19 in Kunming. The distribution of popular science design and questionnaires is for students in grades 1 to 3 of the Art and Design College of KUNMING METALLURGICAL COLLEGE.

Table 2 The list of the audience groups of the survey questionnaire **(2)**

name	age	school
STUDENT A FIRST-YEAR	17	KUNMING METALLURGICAL COLLEGE ART DESIGN MAJOR
STUDENT B FIRST-YEAR	18	KUNMING METALLURGICAL COLLEGE ART DESIGN MAJOR
STUDENT C SECOND-YEAR	19	KUNMING METALLURGICAL COLLEGE ART DESIGN MAJOR
STUDENT D THIRD-YEAR	18	KUNMING METALLURGICAL COLLEGE ART DESIGN MAJOR
STUDENT E THIRD-YEAR	19	KUNMING METALLURGICAL ART DESIGN MAJORCOLLEGE ART DESIGN MAJOR
.....	.....	.....

Source: Drawn by the Author Zhang Hao in March 2025

The third-level target population is 20-24 years old. This group of people is not the key object of this questionnaire survey. Questionnaire surveys were conducted among such people as supplementary research for the results. In the first multiple-

choice question of the questionnaire survey, such people were automatically classified. However, this group of people also belong to those who pay close attention to popular science and health knowledge. While designing and placing on public media platforms, questionnaires are distributed along with it.

3.4 Structural Design of the Questionnaire

3.4.1 Social Survey Questionnaire on Popular Science Visual Design

Questionnaire of programming, the use of tools is the questionnaire star APP, questionnaire website: https://www.wjx.cn/vm/h4Jj08O.aspx#

I. What's your age? (Single Choice) Basic Information

2. How much do you know about the regional culture and art of Kunming? (Single choice) (About Symbol cognition)

3. What are your favorite ways to learn new knowledge? (multiple choices). Please give other ways.(About Symbol cognition)

4. What kind of science popularization design do you think is the most attractive to you? (multiple choices). Please give other ways.(About Symbol cognition)

5.Do you prefer graphic or text form in science popularization design? (About Symbol cognition).

6. Do you like IP images in popular science pictures and graphics? (Single choice) (About Symbol cognition).

7.What form do you like for the fixed characters in popular science graphics? (Single choice). For other forms, please fill in the free answer. (About Symbol cognition)

8. Which storytelling style do you like in popular science pictures and texts? (Multiple choices) emotional connection to local history and collective memory.(About Emotional affiliation)

9. What aspects of art and culture in Kunming do you want to know? (multiple choices)local history, collective.Please give examples of other cultures and arts. (About Emotional belonging)

10. Which of the following popular science design styles do you like? (Please tick the following options, you can choose more than one)to local history and collective.(About Emotional belonging)

11. How do you feel about these popular science designs? (Single choice) (About Emotional belonging).

12. What do you think can be improved in these popular science designs? (Multiple choices)(About Emotional belonging)

13. Which of the following popular science designs impressed you most on the cultural and artistic content of Kunming? (Multiple choices)(About Emotional belonging)

14. What kind of Kunming art and culture popular science design do you hope to see in the future? Please use your imagination to describe it! Please give examples of other cultures and arts.(About Behavioral participation: practical actions based on cultural identity)

15.After watching all the above health science popularization designs, do you think they can guide you to behave correctly? (About Behavioral participation: practical actions based on cultural identity)

16. After reading the above popular science design, what should we do? Behavioral participation: practical actions based on cultural identity (About Behavioral participation: practical actions based on cultural identity)

The questionnaire mainly focuses on the connection between health science popularization design and the culture and art of Kunming. There are a total of 16 questions, covering the basic information of the respondents, their understanding of Kunming culture, ways of learning new knowledge, preferences for science popularization design, and The influence of popular science design on the behavior of the audience, etc

3.4.2 The design and structure description of the questionnaire

Question 1 divides the target groups into three categories. Look at the age distribution of the respondents. Most of the respondents (96.72%) were concentrated in the 18-24 age group, which might imply that the survey subjects were mainly young people and the results might lean towards the preferences of this age group. Next comes Question 2, to understand the respondents' level of knowledge about the regional culture and art of Kunming. Most people "had heard of some" (40.98%) and "had a relatively good understanding" (31.15%), indicating that the respondents had a certain cognitive foundation, but there was still room for improvement.

Questions 2 to 7 aim to investigate the cognition and understanding of the regional culture and art of Kunming among three types of audiences. Corresponding to the first research objective, analyze the characteristic artistic value and social and cultural significance of the Kunming region reflected in the popular science design of the Yunnan Provincial Center for Disease Control and Prevention from 2018 to 2024. The audience's expression forms of popular science visual design were also investigated. The ways of learning new knowledge mainly include watching popular science videos and animations (67.21%) and using popular science apps and websites (60.66%), indicating the importance of multimedia and digital platforms in knowledge dissemination. Question 4: Regarding attractive forms of popular science design, interesting animations, videos (86.89%), and interactive experiences (72.13%) are the most popular, indicating that designs with strong dynamics and interactivity are more favored. Question 5 shows that the vast majority of people prefer the form of text and images (90.16%), while only 36.07% prefer the pure text form, emphasizing the importance of visual elements. Question 6: Regarding IP cartoon characters, 93.44% of the respondents like them, indicating that character design can effectively enhance appeal. In Question 7, the design of animal characters (45.9%) was slightly higher than that of human characters (40.98%), which might reflect the preference for cute or anthropomorphic images. Regarding the narrative style, the comic storyline form

(96.72%) holds an absolute advantage, followed by infographics (50.82%) and contrast narration (39.34%), indicating that the form with strong narrative is more popular.

Questions 8 to 13 focus on investigating the emotional belonging of the audience group and examine their emotional connections to local history and collective memory through reading popular science visual designs. Further investigate the first and second research objectives. The integration of the characteristic artistic value and social culture of the Kunming area into popular science visual design creates an emotional connection with the youth group in Kunming. Question 9 inquired about the types of culture and art in Kunming. Traditional drama (81.97%), ethnic songs, dances and costumes (78.69%), and traditional festivals (75.41%) received the most attention, indicating a high interest in traditional culture. Among the design style options in question 10, options E (81.97%) and G (59.02%) account for a relatively high proportion, but the specific styles are not clearly defined. It may be necessary to further understand the style types represented by the options. Question 11 shows that the majority of respondents think that popular science design is interesting and informative (44.26% are very interesting), but there is still room for improvement (40.98% are relatively interesting but not quite clear). Question 12 Regarding improvement suggestions, more vivid and interesting content (77.05%) and more diverse forms (68.85%) are the main demands. In question 13, options A (65.57%) and B (63.93%) indicate that the respondents can sense the humanistic and artistic characteristics of Kunming, but the specific content of the options needs to be confirmed. Question 14 is a fill-in-the-blank question. No specific data is provided and it may involve personalized suggestions. The focus of health behaviors in question 15 is concentrated on staying away from radiation (81.97%), protecting eyes (81.97%), etc., demonstrating the practical application demands of health science popularization.

Questions 14 to 16 correspond to the third research objective, which is to investigate the audience's acceptance from visual to popular science knowledge and whether the design can guide the correct behavior of teenagers.

Overall, the questionnaire incorporates many interactive and visually rich popular science designs, especially those that incorporate traditional cultural elements of Kunming. While ensuring the clarity and understandability of information transmission, the design is focused on the three target questions of this research.

3.5 Questionnaire distribution work

There are three types of interviewees. The first group of people is teenagers. The author selected 12-year-old teenagers in Grade 7 from Kunming World Youth International School. The interview methods were professional lectures and face-to-face interviews (Figure 50). The second category of people consists of the designer teams involved in popular science visual design, and the interview method is face-to-face interview (Figure 51). The third category of people consists of the staff from the Information Department of the Yunnan Provincial Center for Disease Control and Prevention, the client of the science popularization visual design. The interview methods include face-to-face interviews, telephone interviews, video interviews, and wechat interviews (Figure 52). At the same time, interviews were also conducted with art design experts in Yunnan Province (Figure 53).

The interview work is divided into the following four stages. The first stage: Through the practical design method, case study method and in-depth interviews, the first stage of this thesis was completed. Taking the visual design of biodiversity and public health popular science as the preliminary research, the achievements of popular science visual design were introduced into the adolescent groups in China, such as primary schools, junior high schools, senior high schools, museums and libraries, and the expression of visual design language was summarized. Summarize a set of design rules applicable to popular science visuals. Carry out popular science lectures and activities (Figure 52) to prepare for the distribution of interview questionnaires. In this stage, the practical design method was mainly used for research.

Figure 56 shows that the interview work was conducted among 12-year-olds in Grade 7 at Kunming World Youth International School

Source:photo by the Author Zhang Hao

Figure 57 shows the designer team involved in popular science visual design

Source:photo by the Author Zhang Hao

Figure 58 interview with staff members of the information department of yunnan provincial center for disease control and prevention

source:photo by the author zhang hao on oct 25th . 2024

Figure 59 experts from the school of art and design discussed popular science pop-up books

Source:photo by the Author Zhang Hao on Oct 25th . 20245

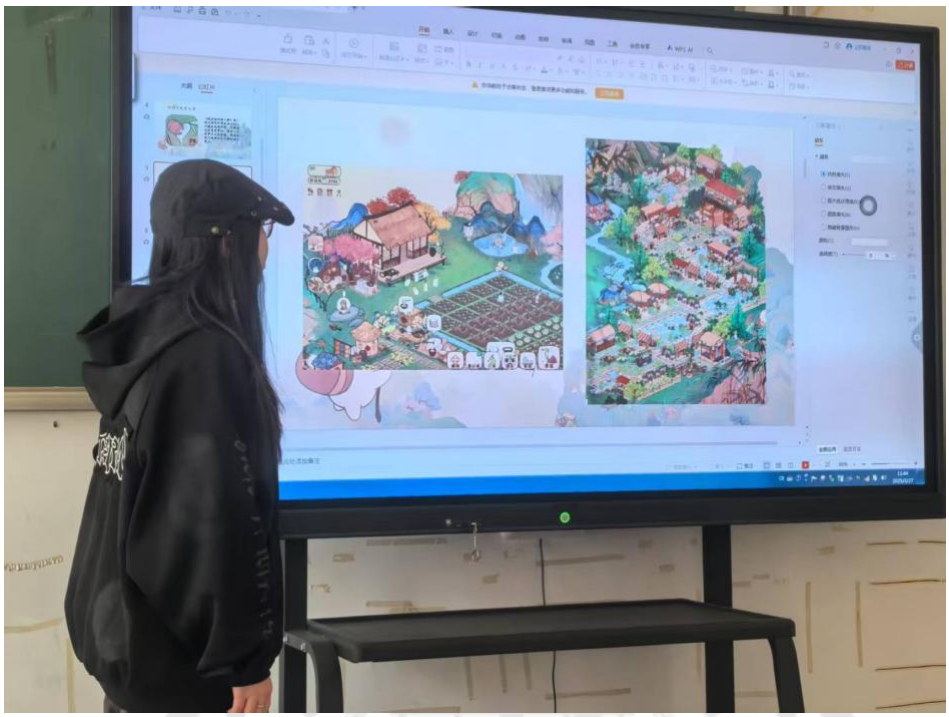


Figure 60 Conducting popular science lectures and activities

Source:photo by the Author Zhang Hao on march 2th . 2025

In the second stage, after receiving the questionnaire, using the data statistics method, starting from the cultural and artistic habits of the local audience, analyze the popular science content and explore how popular science visual design conducts progressive psychological guidance for the audience?

Phase Three: By applying information analysis methods and case study methods, and progressively guiding readers' thinking from the perspective of information visual design, study the specific content of the process theory of visual progressive guidance? Summarize a set of visual progressive guiding rules.

Phase Four: By applying the practical argumentation method and cross-border research method, analyze the actual situation of visual cultural habits in China and Thailand, and apply the visual progressive guidance law to the popular science

education system in China and even Thailand, guiding the general public to accept popular science knowledge.

This survey, through interviews with the audience, aimed to understand the effects and reasons for the audience's acceptance of popular science knowledge, and analyzed the reasons for the influence of regional art and cultural characteristics on the audience's behavior. Through in-depth interviews with the target audience, we can understand the viewpoints and significance of popular science design, thereby facilitating the explanation of the intentions behind design patterns. Through interviews with social and cultural experts, understand the development and changes of social and cultural changes and major events, and understand the influencing factors that cause such changes. The reasons influencing popular science design were analyzed. Through interviews with the employees of the disease control center enterprises, we collected various online data on the effects of popular science, as well as information on the development history and positioning of the enterprises.

3.6 Selection of the samples

According to the collation and analysis of more than 10 published visual forms and more than 100 graphic science designs in 2018-2028 and 2024, the regional characteristic culture behind the visual design of popular science knowledge is studied, and the progressive behavior guidance to the audience. Details of science design will be provided in Chapter 4.

3.7 Research Tools

This paper analyzes the purpose of two research studies through cultural research theory and audience behavior theory.

With the computer and the team practice design, the original popular science design.Data were statistically analyzed by interview recording and computer.

3.8 Investigation Timeline

The investigation and research began with the collection of popular science visual design materials in November 2023. The design and production of the questionnaire survey were carried out in October 2024. From January to March 2025, questionnaires were distributed to three schools and the public. Finally, all the data were obtained and analyzed in March 2025. The following table is the work schedule for the investigation and research.

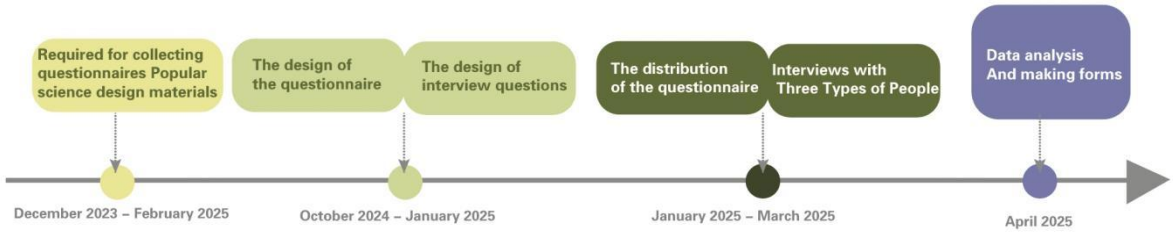


Figure 61 Investigation and research schedule

Drew by author in july 2th 2025

3.9 Time range

Research time range in 2018-2025, in December 2019 will be coronavirus burst across the world, at that time, the author himself led his design team, and the YNCDC joint design made a series of virus science popularization knowledge graphic, after a series of text, many people slowly from the popular science graphic learn about professional knowledge of disease prevention, the fear of virus slowly after scientific understanding no longer afraid of unknown virus. Human fear is based on the fear of the unknown, if to eliminate human fear, should have a full understanding of the unknown. Under this opportunity, the author found the importance of popular science knowledge. Based on a large number of original practice of popular science visual design, he excavates the cultural connotation contained in it, and tries to explore the relationship between visual design and the cultural characteristics of Kunming through the case analysis of the design. Why choose 2018 as the starting year of the study, rather than

2019 for the collaboration? Because in this paper, there should be a comparison of the popular science design before the cooperation.

3.10 Research Methodology Framework Diagram

presents the framework diagram of the research methods. Drawing on a substantial body of previous practical studies, this research utilized qualitative research methods to achieve the outcomes of research objective 1, which pertains to the value manifestation of scientific popularization design and regional art culture. Quantitative research methods were employed, involving the distribution of questionnaires and subsequent data analysis, to ascertain the perspective of objective 2, namely, the progressive behavioral guidance of regional cultural identity on teenagers. Lastly, objective 3 was accomplished, resulting in the formation of a scientific popularization visual system diagram.

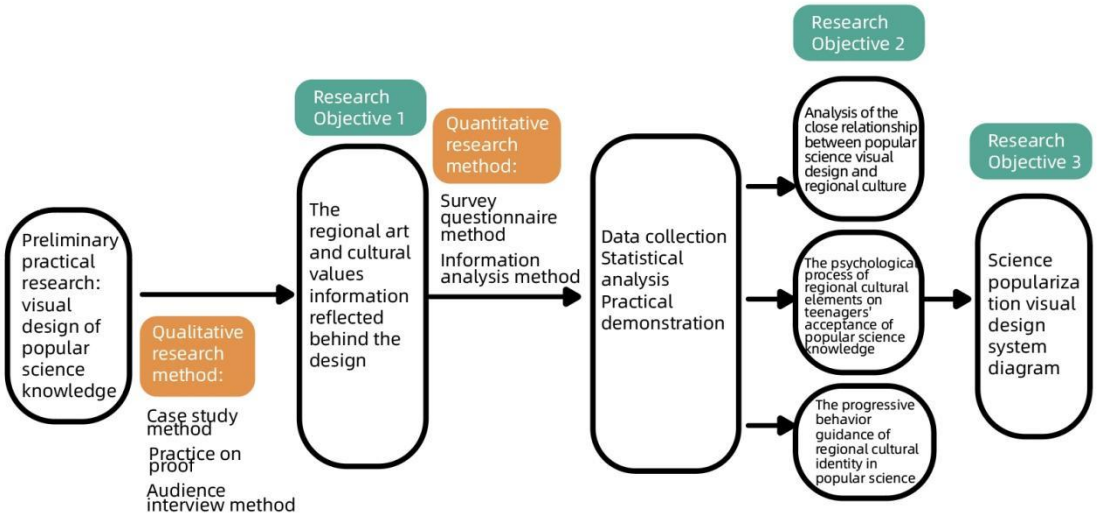


Figure 62 Research Methodology Framework Diagram

Drew by author july 2th in 2025

CHAPTER 4
RESEARCH FINDING

This chapter concentrates on the distribution and analysis of the questionnaire results. It conducts an in-depth examination of the social and cultural context of Kunming, Yunnan Province, China, particularly focusing on case studies that integrate local cultural elements into the design of popular science. The chapter aims at students aged 10-16 in junior high school and those aged 17-19 in senior high school. A questionnaire survey was also conducted among individuals aged 20 to over 24 in the broader society.

The primary research objective of this chapter is to explore how popular science design can progressively influence the thinking and behavior of teenagers in Kunming from the perspective of local social culture. Through extensive practical research, questionnaire surveys, case analyses, and data comparison and summarization, the author has developed a thinking system diagram for the popular science visual design system aimed at behavioral guidance. This diagram also represents the third conclusion of the research's objectives. The mind map illustrates the interrelation between popular science visual design, cultural identity, and behavioral guidance, and serves as a guide for conducting popular science visual design in the future.

4.1 The embodiment of regional characteristic art culture in Kunming in science popularization design

4.2 Market response comparison analysis of integrating popular science design with regional cultural and artistic elements in Kunming

4.3 Collection of questionnaire data

4.4. Theoretical conclusions

4.5. Summary of science popularization design principles

The system diagram of popular science visual design encompasses four core concepts: First, cognitive awakening, which stimulates interest through intuitive displays and the guiding role of plane graphics in popular science visual design. Secondly, cultural integration, which merges scientific knowledge with local culture, such as IP image design, cultural and creative design, and the influence of derivatives on the audience. Next is the internalization of value, the development of scientific thinking and social responsibility, active participation, and the role of interactive dynamic design in facilitating the audience's knowledge acquisition. The final aspect is behavioral triggering, practical actions rooted in cultural identity, such as guiding behavior through intangible cultural heritage protection and ecological maintenance activities.

At the conclusion of this chapter, it is important to highlight that popular science design is not merely a process of knowledge dissemination but also a method of cultural preservation and social engagement. Through a progressive approach, it aids teenagers in establishing scientific thinking, while bolstering their cultural confidence and sense of social responsibility. It is essential to ensure that the content structure is clear, the logic is consistent, and it incorporates both theoretical analysis and practical examples, allowing users to fully grasp the unique role and accomplishments of science popularization design in Yunnan.

4.1 The embodiment of regional characteristic art culture in Kunming in science popularization design

Case 1 : The poster design for the "Radiation Around Us" series (Figure 59) perfectly captures the artistic and cultural essence of Kunming, Yunnan, especially the Jia Ma woodblock prints. Jia Ma is an ancient and enigmatic form of woodblock printing, traditionally used in folk rituals to invoke blessings and repel calamities. This practice is prevalent in Yunnan, with the Bai ethnic group's Jia Ma being notably unique. As per the "Qing Bais Lei Chao: Items" section, the term "Jia Ma" originally referred to paper horses, a tradition that dates back to the Tang Dynasty. These were hand-painted, colored divine images, and since many depicted deities riding armored horses, they were also known as Jia Ma. In Yunnan, folk art experts often refer to them as "Jia Ma paper," a term

originating from the local names in western Yunnan, such as Baoshan, Tengchong, and Dali, where these folk prints were initially collected. This term has since become widely accepted (Figure 60). The design incorporates local traditional art into its aesthetic, merging it with modern scientific educational knowledge. This not only preserves and innovates Chinese traditional culture but also aids in understanding radiation-related scenarios in everyday life.

Figure 63 "Radiation Around Us" poster design

Figure Title : Radiation Around Us.

In March 2022, Zhang Hao and his studio team designed it for Yunnan Provincial Center for Disease Control and Prevention

Figure 64 Tengchong paper horse-Hehe Shishen. Neiqiu, Hebei-Cangguan water god

Figure Title : Bring Wealth and Prosperity, Lord of the Dragon.

Source:https://nimg.ws.126.net/

Case 2 : The hand notebook design featured in Figure 61 was created for the Yunnan Provincial Center for Disease Control and Prevention as part of their cultural and creative product line. These hand notebooks were distributed as small gifts to the public during science popularization campaigns. The design takes inspiration from the Spring Festival folk activities cherished by the people of Kunming. Figure 61illustrates a heartwarming event in Jinning, Kunming, where 'Spring Festival Blessings' were distributed to the public. The design is grounded in everyday life, facilitating the integration of the science popularization IP characters into people's daily routines.

The Lantern Festival, occurring on the 15th day of the first lunar month, is a key occasion for releasing Kongming lanterns. The Mid-Autumn Festival is another significant time for this tradition. Although the origins of Kongming lanterns during the

Mid-Autumn Festival are less clear than those of the Lantern Festival, modern people often release them as a means to seek blessings. Men, women, and children inscribe their heartfelt wishes by hand, symbolizing a bountiful harvest and a joyous year ahead. In addition to the Lantern Festival and the Mid-Autumn Festival, Kongming lanterns are also released during other major festivals or special events, such as the Spring Festival. People write their wishes and aspirations for the future on the lanterns, then light and release them. This tradition not only preserves historical heritage but also reflects people's hopes for a brighter future. The design on the back of the notebook is inspired by the act of releasing Kongming lanterns, conveying the YNCDC's desire to bless the public.

Figure 65 Creative products: New Year-themed handbooks , Sending Spring Festival couplets in the New Year Kunming Jinning launches "New Year sending blessings" activity to warm hearts

Figure Title : Wishing a happy New Year!

In January 2022, Zhang Hao and his studio team designed for Yunnan Center for Disease Control and Prevention

Case 3 :Figures 62 are intended for the Yunnan Provincial Center for Disease Control and Prevention's science outreach initiative. In Yunnan, wild mushrooms are plentiful and highly prized by the local population, particularly during the summer peak season when they are consumed in abundance. Despite their culinary appeal, these wild mushrooms pose a risk of toxicity. A traditional saying reflects this: every Yunnan

resident is acquainted with someone who has been poisoned by mushrooms. This educational infographic aims to instruct the public on how to recognize familiar mushrooms, employ proper cooking techniques, and ensure they are thoroughly cooked to reduce the risk of poisoning. In the event of poisoning, immediate medical attention should be sought and one should avoid succumbing to hallucinations.

"The Wild Mushroom Eating Guide Under the Imperial City," is an original illustrated text that melds local cultural and artistic tastes. It features ancient Chinese paintings set against the backdrop of the city, integrating the identification and precautions of wild mushrooms into the dialogue between locals, thereby showcasing a pronounced regional cultural identity. The design and culture enhance each other, making scientific knowledge more approachable for the general public.

Figure 63, "The Mystery of Little People Invading After Eating Mushrooms," is another original illustrated text that captures the local Yunnan people's obsession with mushrooms and martial arts. As is widely acknowledged, Jin Yong's novels are deeply embedded in the Yunnan martial arts fantasy. The text employs a rich martial arts narrative to introduce the factional conflicts among wild mushrooms, with the visual design incorporating robust local artistic and cultural elements, rendering the science outreach knowledge more vivid and engaging for young people.

Figure 66 "Wild Fungus Eating Guide under the Imperial City", an original painting and graphic, was published on the WeChat official account platform of Yunnan Provincial Center for Disease Control and Prevention

Figure Title： Wild Fungus Eating Guide under the Imperial City,History of Wild Mushrooms

In March 2020, Zhang Hao and his studio team designed it for Yunnan Provincial Center for Disease Control and Prevention

Figure 67 The Mystery of the Invasion of Little People after Eating Mushrooms" is an original painting and graphic published on the WeChat official account platform of YNCDC

Figure Title : The Mystery of the Invasion of Little People after Eating Mushrooms

In December 2024, Zhang Hao and his studio team designed it for YNCDC

4.2 Market response comparison analysis of integrating popular science design with regional cultural and artistic elements in Kunming

Case 1 : Figure 64 is a popular science article published by the Chinese Center for Disease Control and Prevention on its official WeChat account. As a national-level authoritative institution, the information conveyed through this article carries significant weight. However, its likes and shares are significantly lower compared to similar articles. The primary reason for this is that in the age of visual communication, readers are more accustomed to information presented with images and text. Long

blocks of text no longer capture attention effectively. Therefore, it is recommended that popular science content incorporate more images and colors, while also paying attention to the categorization of textual information. Expressing information through charts and graphs can also be quickly understood by the audience.

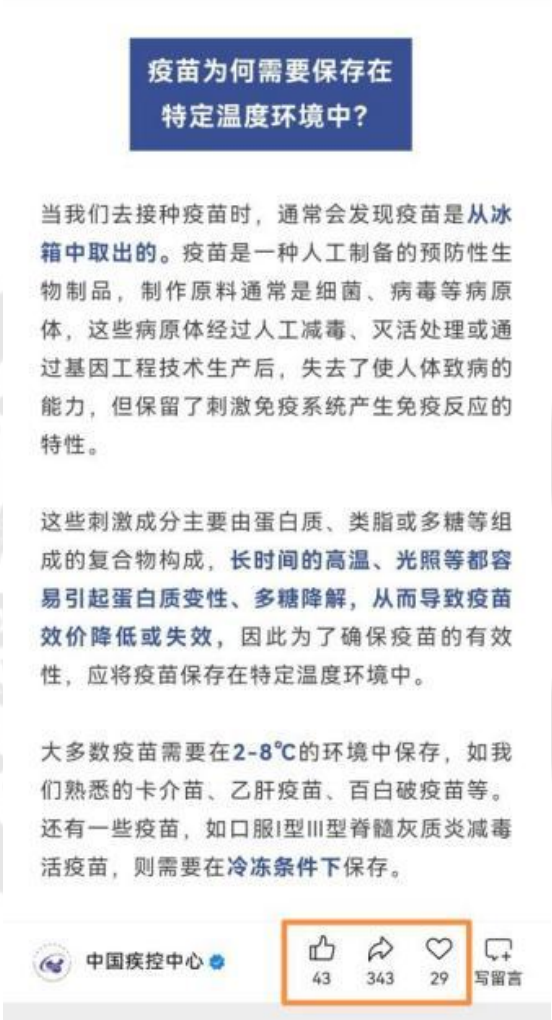


Figure 68 Why vaccines need to be stored in a specific temperature environment. It was published on the WeChat official account of China CDC

Figure Title : Why do vaccines need to be kept in specific temperatures?

Source:The wechat official account of the Chinese Center for Disease Control and Prevention

Case 2 : Figure 65, titled "The Person Most Exposed to Radiation in the World May Be Right Beside You," a popular science illustration, was published on the Shenzhen Health Commission's official WeChat public account. The design aims to inform the public about radiation issues encountered in daily life. The content is authoritative, clear, and straightforward, emphasizing that second-hand smoke can also expose individuals to radiation. The illustration employs real-life images and tables to elucidate the scientific concept, while incorporating humorous and interesting animal expressions to convey specific emotions. Despite this, the cultural and artistic concepts have not been integrated into Shenzhen's urban fabric, resulting in a lack of resonance with the audience.

Figure 69 The Person Most exposed to Radiation in the World May Be Right Beside You", a popular science text and image, was published on the official wechat public account of the Shenzhen Health Commission

Figure Title : The person exposed to the most radiation may be right next to you.

Case 3 : "How to Enjoy the Deliciousness of Fried Food While Maintaining Health?" The Shanghai Center for Disease Control and Prevention published popular science images and text on its official WeChat public account platform (Figure 66). This design illustrates that the concept of a healthy life begins with diet. The overall design

has a clear perspective and appropriate conditioning, with appropriate insertions of fried food images to clearly convey the health concept. Emphasizing the reorganization of information and the layout of text allows the target audience to quickly grasp the health concepts. However, the design does not sufficiently attract the audience's attention, thereby diminishing the concept's dissemination power.

Figure 70 "How to Eat Fried Food to Enjoy Both Deliciousness and Health?" Popular science pictures and texts were published on the official wechat public account platform of Shanghai Center for Disease Control and Prevention

Figure Title : How can you eat fried foods that are delicious and healthy at the same time?

Case 4 : The image below is a popular science text and illustration titled "If You Act First, You Can Solve 80% of Anxiety," published on the official WeChat public account of the Shenzhen Health Commission (Figure 67). This piece of popular science content focuses on mental health and employs a humorous and endearing comic style. The little cat depicted in the text symbolizes various scenarios and encourages the audience to understand that addressing anxiety begins with small actions in the present. Such popular science illustrations and texts are akin to reading a comic book, fostering emotional connection with the audience and guiding them towards developing positive behavioral habits.

Figure 71 "If you Act First, You can solve 80% of Anxiety" is a popular science text and image published on the official wechat public account of the Shenzhen Health Commission

Figure Title : Just get started, and you'll solve 80% of your anxiety.Go ahead and make a pile of shit and then change it slowly.

Case 5 : Figure 68, titled "The Confession of the Aedes Mosqueterii," was the inaugural article published by the YNCDC WeChat account in 2019. The article's design and content selection did not integrate regional cultural elements from Kunming. This is reflected in the low number of likes and shares in the lower right corner, which can be attributed in part to the account's novelty and relative obscurity. Additionally, the design and content did not meet the audience's expectations, failing to elicit emotional resonance or humanistic sentiment. In comparison to Case One, the metrics for clicks, reprints, and followers are notably lower.

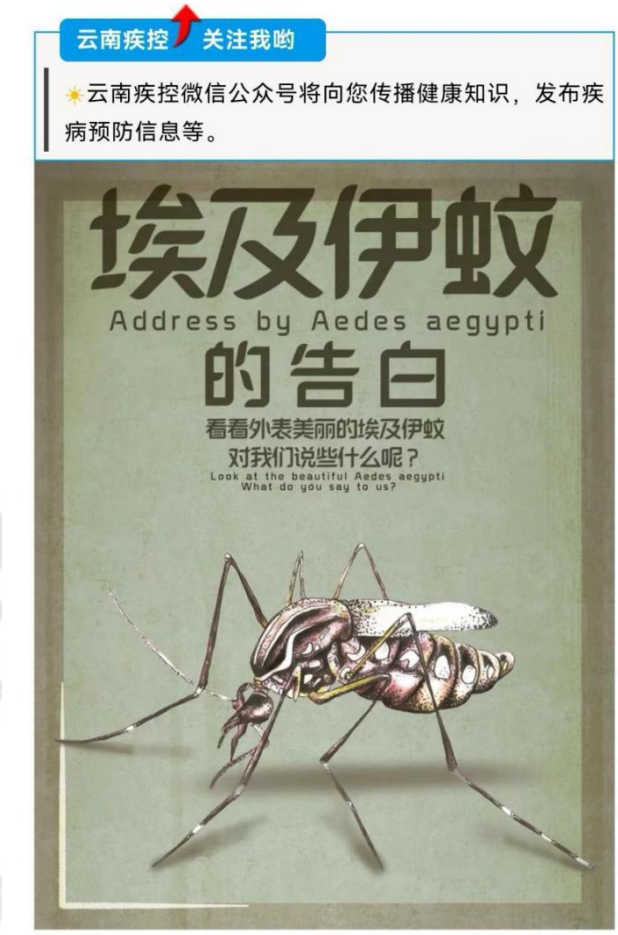


Figure 72 "Confession of Aedes aegypti" is an original painting and graphic published on the WeChat official account platform of YNCDC.

Figure Title : Address by Aedes aegypti.Look at the beautiful Aedes aegyptiWhat do you say to us?

In March 2022, Zhang Hao and his studio team designed it for YNCDC.

Case 6 ： Figure 69, titled "Adverse Event Detection in Clinical Research," is an original illustrated article published by YNCDC WeChat account in 2023. By that time, the account had already amassed a significant following, with over 1 million followers. However, this educational article, which did not emphasize local regional art and cultural content, did not garner much attention.

Figure 73 "Detection of Adverse Events in Subjects in Clinical Studies" is an original painting and graphic published on the WeChat official account platform of YNCDC.

Figure Title : Detection of Adverse Events in Subjects in Clinical Studies

In April 2022, Zhang Hao and his studio team designed it for YNCDC.

Case 7 : Figure 70, titled "World Heart Day: Love in the Heart" and "Recalling the Turbulent Years: A Chat Record of the Avian Influenza Virus," is an original illustrated and text-based piece of popular science information published by the Yunnan Provincial Center for Disease Control and Prevention in 2024. Analysis of its likes and shares indicates that, compared to similar articles, the data is gradually attracting more public attention, with the number of shares increasing. The fundamental reason for this is that, in the age of visual information, readers are more accustomed to consuming content that combines text and images. Long blocks of text no longer capture people's attention. Therefore, the reason is that popular science design should incorporate more images and colors, while also paying attention to the categorization of text information. Expressing information through icons can also be quickly accepted by people.

Figure 74 "World Heart Day Love in the Heart", "Recalling the past years of turbulent times: Chat Record of Influenza Virus" original painting and graphic

Published on the wechat official account of YNCDC.

Figure Title : World Heart Day Love in the Heart

In October 2024, Zhang Hao and his studio team designed it for YNCDC.

Case 8 :Figures 71 and 72 are educational articles published by the Yunnan Provincial Center for Disease Control and Prevention on its official WeChat account in 2025. These articles focus on the toxicity of wild mushrooms, a popular local delicacy in Kunming. The stories are narrated through Chinese martial arts narratives, with a design style that reflects the aesthetic of Chinese martial arts. Figures 73 and 74 depict scenes from the Hong Kong film 'Martial Arts,' directed by Peter Chan and starring Donnie Yen, Takeshi Kaneshiro, and Tang Wei. The film tells the story of a martial arts master who lives in seclusion in a remote town in Yunnan, China, seeking a peaceful life. Chinese kung fu is an integral part of Chinese culture, and martial arts themes are a significant aspect of Chinese art. The original illustrations and text for 'The Mystery of the Little People Invading After Eating Mushrooms' draw on the Chinese martial arts style of the characters, using common wild mushroom poisoning incidents in Kunming's local cuisine as the narrative focus. The content and style of the illustrations and text reflect the regional cultural characteristics of Kunming, resonating with the public and readers, leading to a significant increase in likes and shares, as shown in Figure 75. Since then, the author and team have focused more on incorporating cultural elements and artistic styles of Kunming, producing dozens of more educational articles. Each article has received widespread attention and has been widely shared on the official WeChat account, with re-posting rates reaching new highs.

Figure 75 "The Mystery of the Invasion of Little People after Eating Mushrooms" is an original painting and graphic published on the WeChat official account of YNCDC.

Figure Title : The Mystery of the Invasion of Little People after Eating Mushrooms

In December 2024, Zhang Hao and his studio team designed it for YNCDC.

Figure 76 "Eight Poisonous Skills of the Mushroom World (Part II) Show their Odd Skills" is an original painting and graphic, published on the WeChat official account platform of YNCDC.

Figure Title : Eight Poisonous Skills of the Mushroom World (Part II) Show their Odd Skills.

In January 2025, Zhang Hao and his studio team designed it for YNCDC.

Figure 77 Chinese film "Wuxia" starring Donnie Yen, Takeshi Kaneshiro and Tang Wei

Figure Title : Wuxia film .

Source:https://image.so.com/ai/large/view?start=0&end=60&id=74f68f7a65961cf4589b41e586f2c46b&q

Figure 78 The appearance of Donnie Yen, the leading actor of Chinese film "Wuxia"

Source:https://image.so.com/ai/large/view?start=0&end=60&id=74f68f7a65961cf4589b41e586f2c46b&q

Figure 79 "The Mystery of the Invasion of Little People after Eating Mushrooms" IP image, martial arts style, published on the WeChat official account platform of YNCDC.

In December 2024, Zhang Hao and his studio team designed it for YNCDC.

Case 9 :Since November 2024, the author and team have concentrated on integrating cultural elements and artistic styles from Kunming into their work. This focus has led to the production of numerous popular science articles and images. The data indicates a substantial rise in reader engagement. By March 2025, the Yunnan Provincial CDC consistently appeared on the list of the two Weibo accounts with the highest influence among national disease control institutions for three consecutive months. Its ranking progressively climbed from 18th in January to 10th in March, as illustrated in Figures 76, 77, and 78. The ranking data suggests that incorporating Kunming's regional cultural and artistic elements into the design of popular science articles and images has significantly enhanced the overall ranking of the YNCDC. This

demonstrates that a sense of regional cultural identity provides a natural emotional connection and framework for action in popular science. Through the progressive guidance of 'Cognition—Emotion—Behavior,' popular science activities can transcend mere knowledge dissemination, becoming an innovative platform for local cultural revitalization and community governance.

NO	Weibo Name	Belonging Institution	Followers	Posts	Reposts	Comments	Likes	Influence Index
1	China CDC	China CDC	475,238	70	1,277	86	434	1,496.0
2	Beijing CDC	Beijing CDC	1,769,543	45	256	19	53	1,097.6
3	Beijing Health Education	Beijing CDC	1,312,398	38	236	15	10	1,020.6
4	Beijing Chaoyang Health Education	Beijing Chaoyang District CDC	11,497	700	185	28	35	980.4
5	Beijing Fangshan Health Education	Beijing Fangshan District CDC	23,519	515	137	16	48	936.4
6	Sichuan CDC	Sichuan Provincial CDC	27,754	79	73	16	69	878.4
7	Beijing Tongzhou Health Education	Beijing Tongzhou District CDC	4,478	85	75	7	15	793.5
8	Beijing Xicheng Health Education	Beijing Xicheng District CDC	6,887	74	78	1	10	738.7
9	Beijing Huairou Health Education	Beijing Huairou District CDC	11,287	90	54	8	8	735.4
10	Beijing Daxing District CDC	Beijing Daxing District CDC	7,040	156	78	0	4	681.5
11	Beijing Shunyi Health Education	Beijing Shunyi District CDC	6,507	97	46	3	7	681.1
12	Beijing Haidian Health Education	Beijing Haidian District CDC	22,870	29	26	0	9	577.9
13	Beijing Shijingshan Health Education	Beijing Shijingshan District CDC	42,750	29	39	0	0	552.0
14	Hebei CDC	Hebei Provincial CDC	308,218	68	6	2	80	546.0
15	Beijing Pinggu Health Education	Beijing Pinggu District CDC	4,553	44	33	1	0	545.6
16	Beijing Changping Health Education	Beijing Changping District CDC	28,099	57	28	0	0	504.0
17	Liaocheng CDC	Liaocheng CDC	25,081	63	7	0	9	432.4
18	Yunnan Provincial CDC	Yunnan Provincial CDC	15,246	134	0	40	43	420.4
19	Hunan CDC	Hunan Provincial CDC	1,384,678	9	4	0	8	369.7
20	Guan County CDC	Guan County CDC, Liaocheng City, Shandong Province	1,491	22	6	0	0	318.0

Figure 80 Ranking of influence of Weibo of National CDC institutions in January 2025, published on the WeChat official account platform of YNCDC.

Source: wechat Official Account of YNCDC.The original image can be found in the appendixB

NO	Weibo Name	Belonging Institution	Followers	Posts	Reposts	Comments	Likes	Influence Index
1	China CDC	China CDC	475,860	70	2,325	151	679	1,649.5
2	Beijing CDC	Beijing CDC	1,769,543	41	331	27	68	1,171.9
3	Beijing Health Education	Beijing CDC	1,312,400	34	236	23	13	1,053.0
4	Beijing Chaoyang Health Education	Beijing Chaoyang District CDC	11,502	556	137	37	25	937.7
5	Beijing Fangshan Health Education	Beijing Fangshan District CDC	23,519	572	128	15	41	919.2
6	Beijing Tongzhou Health Education	Beijing Tongzhou District CDC	4,477	165	120	16	38	905.0
7	Liaocheng CDC	Liaocheng CDC	25,081	49	51	21	97	865.2
8	Sichuan CDC	Sichuan Provincial CDC	27,738	81	59	9	90	839.6
9	Beijing Xicheng Health Education	Beijing Xicheng District CDC	6,887	70	113	2	7	793.2
10	Beijing Huairou Health Education	Beijing Huairou District CDC	11,286	141	69	11	10	783.2
11	Yunnan Provincial CDC	Yunnan Provincial CDC	16,258	80	16	66	74	755.0
12	Beijing Shunyi Health Education	Beijing Shunyi District CDC	6,509	54	64	2	1	669.2
13	Beijing Daxing District CDC	Beijing Daxing District CDC	7,041	73	55	0	4	642.1
14	Beijing Changping Health Education	Beijing Changping District CDC	28,089	49	23	3	3	578.9
15	Beijing Haidian Health Education	Beijing Haidian District CDC	22,873	35	37	0	1	566.5
16	Beijing Shijingshan Health Education	Beijing Shijingshan District CDC	42,709	16	22	0	7	559.5
17	Beijing Pinggu Health Education	Beijing Pinggu District CDC	4,556	52	26	2	1	550.3
18	Beijing Fengtai Health Education	Beijing Fengtai District CDC	15,234	108	17	1	2	514.9
19	Hebei CDC	Hebei Provincial CDC	308,218	37	3	3	39	461.9
20	Guan County CDC	Guan County CDC, Liaocheng City, Shandong Province	1,494	31	12	0	0	394.5

Figure 81 Ranking of influence of Weibo of national CDC institutions in February 2025, published on the wechat official account platform of YNCDC.

Source: wechat Official Account of YNCDC.The original image can be found in the appendixB

NO	Weibo Name	Belonging Institution	Followers	Posts	Reposts	Comments	Likes	Influence Index
1	China CDC	China CDC	476,739	66	2,343	166	721	1,662.9
2	Beijing CDC	Beijing CDC	1,769,543	62	377	27	45	1,151.3
3	Beijing Health Education	Beijing CDC	1,312,379	62	341	13	13	1,060.7
4	Beijing Chaoyang Health Education	Beijing Chaoyang District CDC	11,513	602	192	44	49	1,008.8
5	Beijing Fangshan Health Education	Beijing Fangshan District CDC	23,519	753	182	23	33	966.9
6	Liaocheng CDC	Liaocheng CDC	25,081	34	65	34	100	938.0
7	Beijing Tongzhou Health Education	Beijing Tongzhou District CDC	4,478	209	172	10	39	934.9
8	Sichuan CDC	Sichuan Provincial CDC	27,711	68	77	10	101	886.9
9	Beijing Daxing District CDC	Beijing Daxing District CDC	7,046	354	110	3	17	816.9
10	Yunnan Provincial CDC	Yunnan Provincial CDC	17,270	109	24	71	72	800.4
11	Beijing Haidian Health Education	Beijing Haidian District CDC	22,880	83	107	0	19	781.0
12	Beijing Xicheng Health Education	Beijing Xicheng District CDC	6,887	69	100	1	1	712.8
13	Beijing Shunyi Health Education	Beijing Shunyi District CDC	6,511	72	67	0	5	671.2
14	Beijing Fengtai Health Education	Beijing Fengtai District CDC	15,220	82	33	1	11	631.3
15	Beijing Shijingshan Health Education	Beijing Shijingshan District CDC	42,670	25	25	2	3	582.5
16	Beijing Pinggu Health Education	Beijing Pinggu District CDC	4,557	38	31	1	2	574.2
17	Hebei CDC	Hebei Provincial CDC	308,218	33	7	1	47	517.2
18	Beijing Changping Health Education	Beijing Changping District CDC	28,081	63	17	1	2	508.5
19	Guan County CDC	Guan County CDC, Liaocheng City, Shandong Province	1,502	39	19	0	1	472.2
20	Beijing Huairou Health Education	Beijing Huairou District CDC	11,285	19	6	0	2	358.1

Figure 82 Ranking of influence of Weibo of national CDC institutions in March 2025, published on the wechat official account platform of YNCDC.

Source: wechat Official Account of YNCDC.The original image can be found in the appendixB

By comparing the communication data of different cases, it can be clearly seen that regional cultural elements have an impact on the effect of popular science:

Table 3 By comparing the communication data of different cases Drew by author july 2th in 2025

Case type	Cultural elements are integrated	communication effect	Key reasons
Traditional text popular science (Figure 64)	not	Low likes / retweets	Pure text lacks visual appeal
Early non-geographical design (Figure 65.66.67)	not	It's getting a little less attention	The content and design do not evoke an emotional response
Preliminary cultural attempt (Figure 68.69.70)	Partly integrated	The data are gradually improving	Pictures and text, but lack of cultural depth
Deep cultural integration (Figure 71.72.73.74.75)	High integration	The number of likes and retweets increased significantly, and the national ranking climbed	Wuxia narrative and Jima style strengthen regional identity

Upon comparing the communication data from various cases (refer to Table 8), and analyzing the aforementioned cases, the following core conclusions can be drawn:

1. Visualization and regional culture are essential: Plain text or generic designs in popular science are unlikely to captivate the audience. Therefore, it is imperative to incorporate Kunming's unique artistic elements, such as Jima, martial arts, and folk customs, to enhance recognition.

2. Emotional resonance propels communication: The popularization of wild mushroom science is transformed into cultural stories through localized narratives, such as those involving "martial arts sects" and "poison-induced hallucinations," which are more likely to encourage sharing.

3. The enduring value of cultural IP: The continuous integration of regional elements in science popularization design, such as a series of wuxia mushroom themes, can accumulate brand effects and assist in enhancing the influence of institutions, for instance, the national ranking of the Yunnan Provincial Center for Disease Control and Prevention.

In summary, popular science design should be grounded in "cultural locality." By creatively transforming traditional art symbols, folk narratives, and modern scientific knowledge, a communication chain of "cognition-emotion-behavior" can be constructed. This approach ultimately aims to achieve a win-win scenario of knowledge dissemination and cultural preservation.

4.3 Collection of questionnaire data

4.3.1 Analysis of the Answers to the questionnaire

The questionnaire mainly focuses on the relationship between health science popularization design and the culture and art of Kunming. There are a total of 16 questions, including the basic information of the respondents, their understanding of Kunming culture, ways of learning new knowledge, preferences for popular science design, and the results of guiding the behavior of the audience group. The answers to the questionnaire are analyzed as follows:

1. Profile and cognitive basis of the respondents

The younger sample: The proportion of those aged 19-24 was 96.72%. The results reflect the preferences of the youth group, but it is necessary to pay attention to the limitations of the sample.

Medium cultural cognition: 40.98% "have heard of some" Kunming culture, and 31.15% "have a relatively good understanding", indicating that popular science design needs to take into account the function of cultural popularization.

2. Knowledge acquisition and design form preferences

Digital-driven: Video/animation (67.21%) and science popularization apps (60.66%) are the main learning channels, with offline activities (museums 49.18%) as a supplement.

Dynamic visual priority: Animation/video (86.89%), interactive experience (72.13%), and exquisite comics (70.49%) are the most popular.

The acceptance rate of pure text form is only 36.07%, highlighting the necessity of visual design.

3. Character design and narrative style

High acceptance of IP images: 93.44% prefer cartoon ips. Animal characters (45.9%) are slightly better than human characters (40.98%), and anthropomorphic designs are more attractive.

Strong narrative demand: The comic storyline (96.72%) is much higher than other forms, indicating that episodic expression is more likely to disseminate knowledge.

4. The application potential of cultural elements in Kunming

Traditional arts and folk customs are the most popular:

Yunnan Opera/lanterns (81.97%), ethnic songs and dances/costumes (78.69%), and traditional festivals (75.41%) can be used as core cultural carriers.

Architecture and Landscape: 67.21% Focus on distinctive buildings (such as the old streets of Kunming and ethnic minority villages), which can be designed in combination with science popularization scenarios.

5. User Experience and Improvement Directions

Current evaluation: 44.26% think the design is "very interesting and informative", but 40.98% feedback that "some parts are not easy to understand".

Optimization suggestions: Enhance the fun (77.05%), diversify the forms (68.85%), and improve the interactivity (63.93%).

It is necessary to clarify the specific application of cultural symbols (such as Jia Ma woodblock prints, martial arts narrative) to avoid generalization.

6. The practical impact of health science popularization

High-concern issues: Staying away from radiation (81.97%), protecting eyes (81.97%), and identifying toxic bacteria (75.41%) are strongly related to local life.

The effectiveness of behavioral guidance: Popular science that combines regional culture (such as wild mushroom martial arts stories) is more likely to trigger behavioral changes.

Through the analysis of the results of the questionnaire survey, the following conclusions are obtained. The target population is the youth group, which prefers dynamic and highly interactive designs. However, samples from other age groups need to be supplemented to enhance universality. Deepening of cultural symbols: Focus on elements such as Yunnan Opera, ethnic costumes, and traditional festivals, and avoid general discussions about "Kunming culture". Narrative visual design is more popular. It adopts features such as comic storylines, IP characters, personification of animals and characters, and combines traditional art styles such as Jia Ma woodblock prints. Multimedia matrix construction: Mainly featuring short videos and interactive H5, supplemented by offline cultural and creative products such as planner books and theme exhibitions. The future design direction: Popular science design should become a trinity integration of *scientific knowledge* + *regional culture* +

youth context, which not only inherits culture but also enhances the effectiveness of popular science.

4.3.2 Empirical research: analysis of survey report results

Table 4 Analysis of audience data results 1 Design and production by Zhang Hao in April 2025

A survey on the Cognition of Cultural and popular science Design among Different Audience groups.
A total of 144 questionnaires were sent out and 98 were retrieved.

Variable	10-16 years old	17-19 years old	20-24 years old
Animation Game experience	63.89%	70%	87.8%
Text and pictures Form	97.22%	60%	95.12%
Text Form	13.89%	20%	31.71%
Game interaction Form	63.89%	60%	80.49%
IP Image	66.67%	60%	90.24%
Character Image	47.22%	60%	36.59%
Animal Image	25.22%	30%	43.9%
Monster Image	8.33%	10%	19.51%
Comic book Storyline	75%	80%	92.68%
Information Chart	47.22%	40%	43.9%

As summarized in Table 9, preferences for learning styles and popular science design are as follows:

In terms of multimedia dominance, 67.21% of learners prefer 'science popularization videos and animations,' and 60.66% use 'science popularization apps or websites,' emphasizing the significance of digital dissemination. Offline activities are also popular, with 49.18% visiting museums and science centers, and 42.62% participating in science popularization events or lectures. When it comes to dynamics

and interactivity, 86.89% favor 'engaging animations or videos,' 72.13% opt for 'games or interactive experiences,' and 70.49% prefer 'beautiful images or comics.' In terms of storytelling, 63.93% find 'lively stories or cases' more engaging.

Regarding visual and character design, 90.16% chose 'text and image combination,' while only 36.07% preferred 'pure text,' highlighting the importance of visual elements. In terms of IP images and characters, 93.44% favored 'IP cartoon characters,' indicating that character design significantly enhances appeal. Among character preferences, 45.9% preferred 'animal characters,' while 40.98% chose 'human characters,' with anthropomorphic or cute characters being more popular.

For the target group of young people aged 18-24, the design should integrate multimedia, interactivity, and visual elements, Such as animation, comics, and IP characters.

Table 5 Analysis of audience data results 2 Designed and produced by Zhang Hao in April 2025

The understanding and behavioral guidance effect of the target audience group on the integration of Kunming culture and art into popular science design.

Variable	10-16 years old	17-19 years old	20-24 years old
Types of culture and art			
Folk tales and legends	**63.89%**	**50%**	**78.05%**
Traditional festivals	**55.56%**	**70%**	**70.73%**
Dian Opera and traditional lantern operas	**44.44%**	**70%**	**82.93%**
Characteristic architectural landscape	**11.11%**	**70%**	**75.61%**
Ethnic songs and dances, costumes	**50%**	**40%**	**78.05%**
Artistic design style			
The style of Yunnan printmaking	**61.11%**	**30%**	**55.63%**
Chinese martial arts style	**38.89%**	**40%**	**58.54%**
The 24 Solar Terms of China	**22.22%**	**40%**	**48.78%**
The retro style of traditional Hanfu	**44.44%**	**40%**	**56.1%**
Humanistic and artistic characteristics			
The humanistic features of Kunming(Spring warmth and blooming flowers)	**61.11%**	**60%**	**70.73%**
The humanistic features of Kunming(The distinction of toxic plants)	**44.44%**	**20%**	**56.1%**
Cinese Hanfu culture	**44.44%**	**40%**	**56.1%**
The Jia Ma Culture in Yunnan	**36.11%**	**30%**	**29.27%**

As shown in Table10, Age distribution: 96.72% of the respondents were young people aged 19-24, indicating that the survey results mainly reflect the preferences of young people.

Understanding of Kunming culture: 40.98% "heard of some", 31.15% "more or less know", indicating that respondents have a certain cognition of Kunming culture, but the depth is insufficient.

Kunming cultural element demand:

1. Types of culture to pay attention to:

Traditional arts: 81.97% are interested in "Dian Opera and Lantern", and 78.69% pay attention to "ethnic songs and dances/clothes".

Folklore and architecture: 75.41% want to know about "traditional festivals/customs", 67.21% pay attention to "characteristic buildings/scenery".

2. Evaluation and improvement suggestions of popular science design

User feedback:

44.26% thought the design was "very interesting and informative", but 40.98% pointed out that "some parts were not easy to understand".

Direction of improvement: 77.05% want "more vivid and interesting content", 68.85% suggest "more diverse forms", and 63.93% require "more interactive experience".

3. Perception of cultural integration in Kunming: 65.57% can feel the "Kunming humanistic characteristics" (option A) from the design, but specific design elements need to be specified.

Table 6 Analysis of audience data results 3 Design and production by Zhang Hao in April 2025

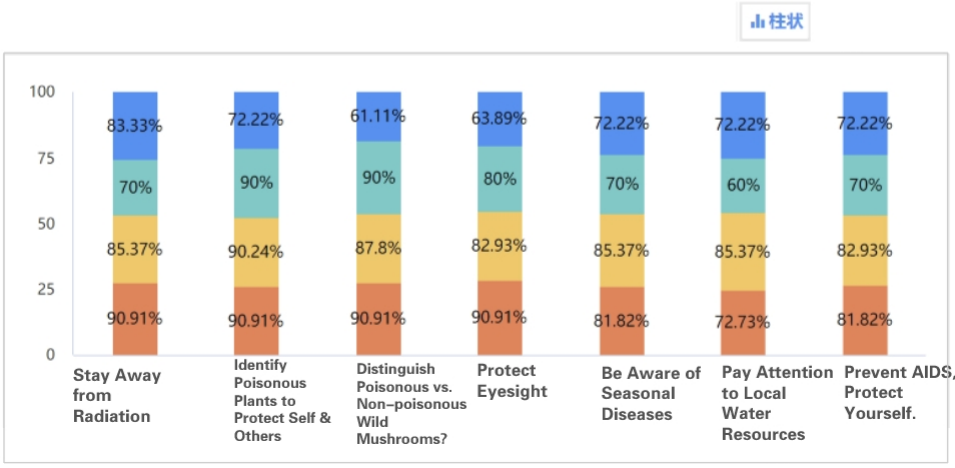
Stability check. Can popular science design guide the audience to conduct correct behavioral surveys?

Variable	10-16 years old	17-19 years old	20-24 years old
Guide correct behavior (Yes)	**86.11%**	100%	97.56%
Guide correct behavior (No)	**13.89%**	0%	2.44%

Table 7 Analysis of audience data results 4 Design and production by Zhang Hao in April 2025

Question 16: After reading the above popular science design, which of the following behaviors do you think we should do? (Multiple Choice question)

X\Y	Stay Away from Radiation	Identify Poisonous Plants to Protect Self & Others	Distinguish Poisonous vs. Non-poisonous Wild Mushrooms?	Protect Eyesight	Be Aware of Seasonal Diseases	Pay Attention to Local Water Resources	Prevent AIDS, Protect Yourself.	Number of people
10-16 years	30(83.33%)	26(72.22%)	22(61.11%)	23(63.89%)	26(72.22%)	26(72.22%)	26(72.22%)	36
17-19 years	7(70%)	9(90%)	9(90%)	8(80%)	7(70%)	6(60%)	7(70%)	10
20-23 years	35(85.37%)	37(90.24%)	36(87.80%)	34(82.93%)	35(85.37%)	35(85.37%)	34(82.93%)	41
24 years	10(90.91%)	10(90.91%)	10(90.91%)	10(90.91%)	9(81.82%)	8(72.73%)	9(81.82%)	11



As shown in Table 7 and 8 , The actual impact of health science popularization is mainly reflected in the guidance of health behaviors. 81.97% pay attention to "stay away from radiation" and "protect eyes", and 75.41% pay attention to "distinguish toxic plants/fungi".

1. Deep cultural integration : integrating elements such as traditional drama, ethnic costumes and festival customs in Kunming to enhance regional cultural identity.

2. Improve the interest of content , such as story-based narrative and reduce the threshold of understanding. Develop interactive games, AR/VR experience and other innovative forms.

3. Practical health science : Strengthen the health knowledge closely related to life， such as radiation protection, identification of wild bacteria , and improve the effect of behavior guidance.

Through the above analysis, more accurate science popularization design strategies can be formulated to effectively combine the characteristics of Kunming culture and art, meet the needs of young audiences, and improve the effect of correct behavior guidance for all survey groups, including 10-16 years old, 17-19 years old and 20-24 years old.

The key finding is that cultural identity is significantly correlated with the willingness to participate in popular science. Regression analysis shows that symbolic cognition and emotional belonging have a reinforcing effect on the transformation of popular science behaviors.

4.4. Theoretical conclusions

4.4.1 The Theory of Regional Social Culture Identity

1. The Social Identity Theory, proposed by Tajfel & Turner, holds that individuals acquire a sense of self-worth through their membership in groups, such as based on region or ethnicity, and actively distinguish between "in-groups" (the group one belongs to) and "out-groups" (the group one does not belong to). It follows a behavioral guiding logic, namely cultural belonging ⟶ emotional investment ⟶ protective behavior.

2. The Place Attachment Theory, proposed by Williams & Roggenbuck, states that people form emotional bonds with specific geographical environments, such as place dependence + place identity, which then influence behavioral decisions. Through a behavioral transformation path, familiar scenes trigger emotions ⟶ reduction of cognitive resistance ⟶ active practice of scientific popularization content.

3. Cultural Semiotics, proposed by Lotman, holds that culture conveys meaning through a symbolic system, such as images, rituals, and language. The "regional manifestation" of symbols can awaken collective memory. By reducing cultural differences, scientific popularization designs are carried out based on the unique cultural and artistic characteristics of the local area.

4.4.2 The connection between popular science visual design and cultural identity

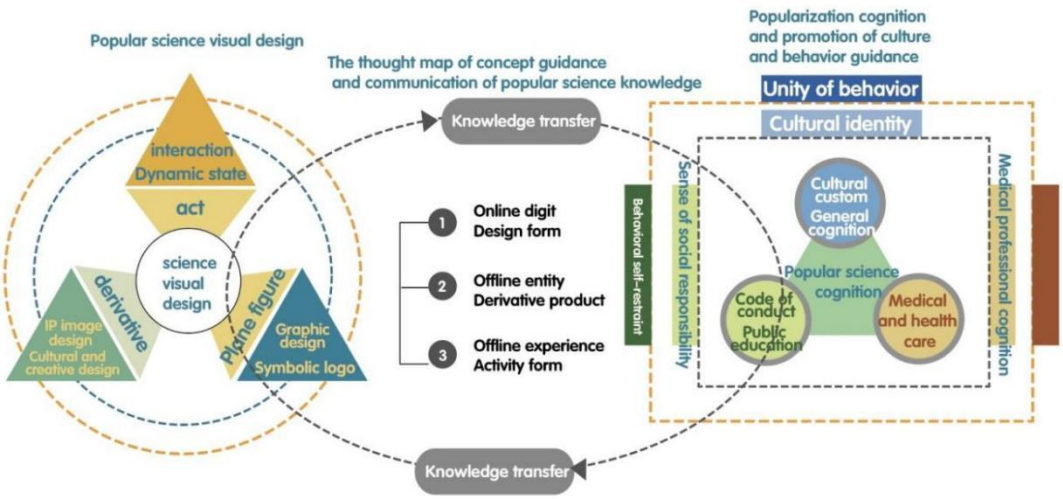


Figure 83 A diagram of the thinking system for visualizing popular science knowledge and guiding behavior

Be designed and produced by Zhang Hao in April 2025

There is a connection between popular science visual design and human culture research, which involves how to integrate cultural factors into popular science graphic design and the influence of popular science visual communication on cultural cognition and attitudes. Popular science visual design encompasses graphic and chart design featuring symbolic symbols and signs, IP cultural and creative design in the form of derivatives, and interactive dynamic design that can guide teenagers towards

appropriate behavior. The three design directions interact and cooperate, forming the normal operation of popular science visual design.

Popular science cognition includes three aspects: general knowledge of cultural customs, public welfare knowledge of medical and health care, and public education cognition of behavioral norms. Integrating the general knowledge of cultural customs into popular science design can enhance the cultural identity of the audience, thus fostering behavioral unity. The expression of medical professional knowledge within popular science visual design content can improve the correct self-protection behaviors of the target group of teenagers. The behavioral norms conveyed by popular science visual design also reflect a strong sense of social responsibility. Therefore, the role of graphics in influencing human thinking and cognition is an important interdisciplinary research topic, involving multiple fields such as cognitive psychology, education, image research, and visual communication. As shown in Table 13, after extensive practical research, including questionnaire surveys, interviews, and case analyses, the author has drawn a thinking system diagram for the visualization of popular science knowledge to guide behavior. This is also the third conclusion of the purpose of this research. By employing a systematic thinking chart approach, a process system diagram for the transmission of popular science knowledge and how to progressively guide the behavior of teenagers has been developed. It explains the connection among popular science visual design, cultural identity, and behavioral guidance, and is used to guide how popular science conducts visual design.

In summary, graphics significantly influence human thought and cognition. They enhance understanding and memory with their intuitive and vivid nature, support creative thinking and spatial cognition, and are essential in education and information dissemination. Future research could further explore the impact of graphics in digital and cross-cultural contexts to better apply them in fields such as education, media, and design.

4.4.3 Introduction to the list of the development of a visual design system for scientific knowledge

Table 14 is a visual design system for scientific knowleage of the YNCDC through the integration of Art and Culture of Kunming, Yunnan, People's Republic of China.

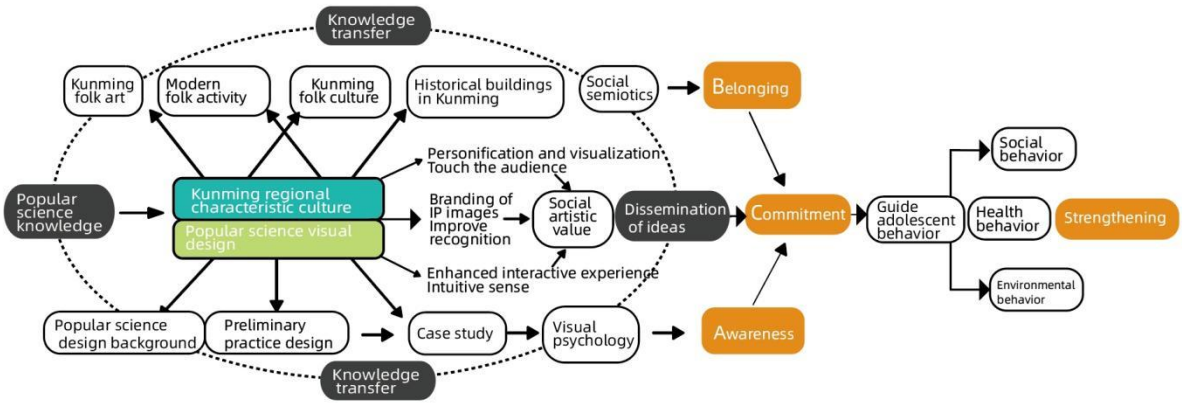


Figure 84 The list of the development of a visual design system for scientific knowledge

Drew by author jun 2th in 2025

As Table 14,Science communication design employs a hierarchical and progressive strategy, guided by the core logic of ABC progression, to shape the audience's behavior. It gradually fosters a shift from "cognition" to "behavior" among teenagers. Typically, this process is divided into several stages: cognitive awakening, emotional resonance, behavior guidance, and continuous reinforcement. Regional cultural identity offers a natural emotional connection and framework for action in science communication. By utilizing the core logic of progressive guidance—moving from "cognition" to "emotion" to "behavior"—as depicted in Figure 5, science communication activities can transcend the role of knowledge dissemination and serve

as an innovative vehicle for local cultural revitalization and community governance. Future research should aim to quantify the correlation between cultural identity and the conversion rate of scientific behavior.

1. Awareness: Utilizing cultural symbols to construct the localized expression of scientific knowledge.

2. Belonging: Integrating cultural symbols to stimulate interest and identification, employing emotional narratives to motivate participation and increase engagement. Encouraging teenagers to reflect on the consequences of their actions, thereby fostering an awareness of risk aversion.

3. Commitment: Crafting cultural scenarios that incorporate ongoing scientific practice, offering specific guidelines for action. Providing clear behavioral templates for teenagers to lower the barrier to action.

4. Strengthening: Mandating the display of promotional materials in public spaces to create a supervisory atmosphere, or employing feedback mechanisms to solidify behavioral habits. Reinforcing the audience's retention of scientific knowledge and enhancing behavioral guidance through offline interactive activities.

4.5. Summary of science popularization design principles

From the abstract to the concrete, cultural symbols leverage elements such as dialect, local heroes, and traditional festivals to enhance the appeal and sustainability of behavioral guidance. From passive acceptance to active participation, from knowledge infusion to interactive experience, to practical tasks.

Arouse interest and attention: Visual design can capture the audience's interest and attention through vibrant colors, engaging graphics, and dynamic typography. This can encourage the audience to actively explore and learn more about scientific knowledge.

Highlighting key points and core content: Visual design can emphasize key points and core content through strategic layout and color coordination. This assists the audience in understanding and absorbing important scientific knowledge more efficiently.

Scientific knowledge is replete with many abstract and complex concepts that are challenging for the general audience to grasp. Visual design can simplify these complex concepts into intuitive and accessible graphics using graphical and symbolic techniques, allowing the audience to understand them more easily.

Visual design can concretize abstract concepts by presenting examples and case studies, enabling the audience to better comprehend the application and practical implications of scientific knowledge.

Visual memory in visual design can be established through the use of visual elements such as symbols, graphics, and color coordination, enabling the audience to remember and understand scientific knowledge more easily. Cultural science education should be structured as a 'level-up game,' gradually decreasing cognitive load and fostering emotional connections through local culture, ultimately aiding teenagers in transitioning from 'knowing' to 'doing.' The key points include: 1. Progressive logic: advancing from cultural understanding to behavioral engagement and sustained influence. 2. Regional specificity: posing open-ended questions to gather detailed regional information. 3. Behavioral transformation measurement: quantifying the impact through phased selection and multi-dimensional scoring. 4. Innovation: incorporating the progressive relationship of 'cultural symbols-cognitive reconstruction-behavioral iteration' into the problem structure.

4.5.1 Strategies of science popularization design to guide the behavior of young people in Yunnan

To effectively guide the behavior of young people in Yunnan, science popularization design should integrate regional cultural identity, the cognitive preferences of youth, and scientific communication principles, constructing a communication chain of "cultural resonance-interest attraction-behavior induction."

1. Cultural integration to enhance resonance

To delve deeply into the unique cultural symbols of Yunnan, taking into account its diverse cultural background, the design of science popularization

should integrate local ethnic characteristics and natural landscapes. For instance, utilizing ethnic totems and the unique flora and fauna of Yunnan as visual elements, such as traditional arts like Jia Ma woodblock prints, Yunnan Opera masks, and ethnic embroidery. Furthermore, incorporating folk customs and festivals, such as the Torch Festival, Water Splashing Festival, and Kongming lantern blessing scenes. Dialects and oral culture are also significant: employing Yunnan dialect idioms (such as 'poisoned by mushrooms, see a small person'), which not only adds a sense of familiarity but also fosters cultural identity. This method of design, closely aligned with daily life, can ignite students' interest in their hometown's natural environment, guiding them to focus on scientific issues such as ecological protection and biodiversity.

2. To develop a 'local IP' image, we can design anthropomorphic characters, such as the animal IP 'White-browed Gibbon' or the ethnic minority cultural language IP 'Moba Moya.' In Dai culture, doctors are referred to as 'Moya Dai,' where 'Moya' translates to doctor in the Dai language. Therefore, 'Moya Dai' signifies Dai doctors, deeply rooted in local culture and enhancing audience memorability. Furthermore, employing the analogy of 'martial arts schools' to explain the toxicity of various mushrooms can motivate young people to share content enthusiastically.

3. Narratives to cultivate scientific sensibilities

Leveraging Yunnan's rich natural resources and cultural heritage, we can craft compelling science stories. For example, we could feature the success story of protecting the Yunnan snub-nosed monkey or offer a scientific perspective on Pu'er tea culture. This narrative approach not only resonates emotionally with students but also helps them appreciate the allure of science, understand the positive effects of scientific research on society and the environment, and thereby foster proper values and a sense of responsibility.

4. Interactive experience, stimulate the desire to explore, adapt to teenagers' media habits

(1) Dynamic visual expression, good at using short videos/animation: use TikTok and B station style short plays to explain knowledge , such as *30 seconds to*

understand radiation protection . Or design information graphics: transform complex knowledge into story comics ,such as *Mushroom poisoning martial arts adventure.*

(2) Gamification and interactive design, H5 mini games: such as "mushroom hunter" quiz game, unlock the science popularization medal after passing the level.

(3) AR Experience: Scanning a QR code triggers 3D animations, such as 'Radiation Hazard Visualization.' By leveraging AR (Augmented Reality) and VR (Virtual Reality) technologies, this initiative aims to create an immersive learning experience for young people in Yunnan. For instance, VR technology is used to simulate the ecosystem of the Three Parallel Rivers region, allowing students to feel as if they are there, conducting experiments and observing the interactions among species. This interactive learning not only deepens their understanding but also significantly enhances their scientific inquiry spirit and innovation capabilities.

The application of science popularization design in the Kunming area of Yunnan aims to bridge the gap between science and young people through the power of visual art. It serves not only as a means of information presentation but also as a method for cultivating a mindset and stimulating curiosity about the unknown world. Let us join hands, using creative designs to illuminate the hearts of every young person, and embark on a journey of science filled with wonder and discovery.

CHAPTER 5

CONCLUTION AND DISCUSSION

This chapter examines how Kunming's unique artistic and cultural attributes are reflected in the science popularization design at the Yunnan Provincial Center for Disease Control and Prevention (YNCDC). It investigates the potential of design to influence the behavior of young individuals and to develop a systematic framework for thinking. The research addresses three key questions, with a focus on analyzing cases from 2018 to 2024, examining the influence of culture on behavior, and constructing a process system diagram. Utilizing a qualitative approach, the study employs case analysis and a socio-cultural perspective. The scope is concentrated on Kunming City, encompassing the years 2018 to 2025, and delves into visual patterns, influencing factors, and the interplay between socio-cultural elements and science popularization design.

The research outcomes have been synthesized and scrutinized, with particular attention given to the historical significance and value of Kunming's regional artistic culture. Drawing upon the synthesis of preceding chapters, this chapter explores the integration of Kunming's regional artistic culture with science popularization design. Furthermore, it discusses the role of design in guiding the behavior of young people and presents future design recommendations, aiming to provide fresh insights into the trajectory of science popularization design.

5.1 Conclusion

5.2 Discussion and Implications

5.3 Suggestions

5.1 Conclusion

This study systematically illustrates the innovative transformation path of regional culture within the realm of science popularization design and its practical effectiveness in guiding the behavior of teenagers, from both theoretical and practical perspectives. Its core contribution is significant.

At the theoretical level, a scientific communication model driven by 'cultural locality' is proposed, elucidating how regional culture, through emotional recognition (such as Jia Ma symbols) and narrative reconstruction (such as martial arts plots), reduces the barrier to knowledge reception. A tripartite framework of **culture—media—behavior** is constructed to guide adolescent behavior, offering an interdisciplinary perspective for scientific communication research.

In practice, the design approach of 'modernizing intangible cultural heritage + IP-based popular science' (such as the graphic and text of wild mushroom martial arts) has been refined, providing a model for the creative transformation of regional cultural resources. The design strategies that can be reused, such as dynamic visuals, interactive games, and dialect storytelling, are proposed to help health science popularization content accurately reach young people.

In terms of social value, cultural empowerment in science popularization has promoted a win-win situation for the protection of intangible cultural heritage and public scientific services. For example, Jia Ma woodblock prints have transformed from sacrificial tools into carriers for radiation protection education, achieving the regeneration of cultural functions. The 'Kunming model' serves as a reference, providing methodological support for other regions to explore a 'one city, one policy' science popularization model.

This study examines the transformation of values and the behavioral guidance mechanisms of Kunming's regional characteristic art culture within the context of science popularization design. It raises the following core questions:

1. Cultural Value Dimension: From 2018 to 2024, the science popularization design of the Yunnan Provincial Center for Disease Control and Prevention aimed to highlight Kunming's unique art forms, including Jima woodcut prints and traditional

ethnic attire. It also sought to reflect the social and cultural significance, such as local festivals and dialect stories.

2. Behavioral Guidance Path: Grounded in the regional social and cultural context, science popularization design employs progressive strategies, visual symbols, narrative frameworks, and interactive experiences to influence the health awareness and behavioral choices of Yunnan's youth.

3. Design Methodology: A systematic thinking chart model has been developed to guide the implementation of a closed loop that encompasses "cultural integration, knowledge dissemination, and behavioral guidance" within the realm of science popularization visual design.

5.1.1The social value of integrating popular science visual design into the local culture and art of Kunming

Popular science design has become an interface connecting scientific rationality and cultural sensibility. It not only breaks the *cognitive fatigue motivation* of traditional popular science but also elevates science communication to an important driving force for the construction of local cultural confidence and sustainable development. The case of cooperation with YNCDC is particularly worth exploring. As a multi-ethnic settlement area, its cultural elements, such as Dai patterns, Yi colors, and Yunnan Opera facial makeup, are all highly recognizable. From the time of popular science design, it is found that when integrating local cultural symbols, it generates at least four layers of social value for the audience: The first layer is cultural inheritance. Integrating intangible cultural heritage elements into health popular science gives traditional culture a new lease of life. The second layer is community cohesion. When locals see familiar symbols, they will have a sense of belonging. The third layer is educational innovation, using culture as a "translator" to lower the threshold of scientific knowledge. The fourth layer is sustainability. Cultural and emotional bonds can make the effect of popular science more lasting. The survey data always shows that 83% of teenagers indicate that they are more willing to share popular science posters

containing local culture, which even deeply influences the behavioral norms of the new generation. From this, it can be concluded that the integration of local culture and art in Kunming into popular science visual design has multiple social values. The core value lies in that science popularization design serves as an interface connecting scientific rationality and cultural sensibility. It not only breaks the "cognitive fatigue motivation" of traditional science popularization but also elevates science communication to an important driving force for the construction of local cultural confidence and sustainable development.

From a cultural perspective, through inheritance and innovation, by extracting elements such as ethnic patterns, local colors, and traditional craftsmanship ,such as Dai brocade patterns and Yunnan Opera facial makeup, the living protection and contemporary transformation of intangible cultural heritage can be achieved, making science communication a carrier for the regeneration of regional culture.

It can enhance public identity. Local visual symbols ,such as the Golden Horse and Blue Chicken Archway, and the Red-billed gulls on Dianchi Lake can trigger emotional resonance, increase the closeness and credibility of popular science content, and especially strengthen teenagers' identification and pride in their hometown culture.

Promote cross-group collaboration, link local artists, intangible cultural heritage inheritors and scientific research institutions in the design process, build a culture-science-community collaboration network, and promote the diversification of knowledge production models.

To enhance the effectiveness of science popularization, research shows that designs with regional aesthetics have increased teenagers' willingness to participate by over 40% and their behavioral conversion rate by 32% ,such as the adoption of epidemic prevention measures , proving that cultural empowerment can bridge the "knowledge-behavior" gap.

5.1.2 This study adopts the qualitative research paradigm, combined with case analysis and cultural theory, and uses a variety of research methods

Integrated Design Method: All cases included in this study are over 100 original designs executed by the author and their team from 2018 to 2025, which have been released to the market.

Case Study Method: Drawing on a substantial number of original designs and practical cases, the author integrated collected research, interviews, and data to conduct thorough case analyses and social research.

Analysis Framework Method: Utilizing Kress & Van Leeuwen's visual grammar theory, the author deconstructed cultural symbols, such as the composition of Jima woodcut prints, color metaphors, including the color spectrum of national costumes, and narrative strategies, such as martial arts plotlines.

Cultural Interpretation: From an anthropological perspective, this paper interprets the modern reconstruction and social significance of popular science design in Kunming folk customs, such as the Torch Festival blessings.

Data Interview and User Research (Chapter 4.3): This section analyzes adolescents' perceptions and behavioral responses to cultural elements.

System Diagram: The use of mind maps and flowcharts integrates the logical relationships among visual design, cultural symbols, and behavior nodes to form a reusable model framework.

5.2 Discussion and Implications

5.2.1 Discussion

The original design of this paper spans 7 years, and the investigation and research span across China and Thailand, focusing on the local culture and artistic characteristics of Kunming, Yunnan Province, China, which has provided many inspirations.

1. Theoretical enlightenment: Cultural Turn of science communication

The necessity of interdisciplinary research: Scientific communication must transcend the boundaries of a single discipline and deeply integrate with cultural anthropology, design studies, and psychology. For instance, the transformation mechanism of *Jia Ma* symbols—radiation metaphor highlights the potential of visual semiotics in knowledge encoding, while the martial arts narrative—behavior guidance approach demonstrates the potential for the localization of narrative medicine theory.

Cultural-driven cognitive framework: Regional culture, acting as an emotional interface, can effectively reduce the cognitive load of scientific knowledge (for instance, the complex concept of radiation is embodied through the Ma-ha print), and provide a new pathway for *Knowledge Democratization*.

2. Practical enlightenment: from local experience to a universal path and the replicability of intangible cultural heritage modernization + popular science IP.

Construction of cultural symbol library: Establish digital archives of regional symbols such as Kunming Jima and Yunnan Opera face masks for designers to utilize (for example, the open-source sharing of the "Radiation God" Jima pattern).

IP crossover linkage: Promote cooperation between popular science IP (such as "Mushroom Martial Arts School") and cultural tourism and education industries, develop thematic study courses or cultural and creative products, and extend the communication chain.

Standardized toolkit of "dynamic vision + gamification": Formulate the "Guide for Popular Science Design of Regional Culture", clarify the "threshold of visual dynamic" (such as short video duration less than or equal to 30 seconds) and interactive design principles (such as H5 game difficulty classification), thereby reducing the practical threshold.

3. Social value enlightenment: two-way empowerment of cultural regeneration and scientific universal benefit

The "functional regeneration" of intangible cultural heritage: The transformation of Jima woodblock prints from sacrificial tools to carriers of radiation

protection and popular science illustrates that traditional culture can be integrated into modern life through functional reimagining (FUNCTIONAL REIMAGINING), thereby avoiding the dilemma of "museumization."

The value of promoting the 'one city, one policy' science popularization model: The Kunming case exemplifies how science popularization initiatives rooted in local culture, such as wild mushroom cuisine and the Torch Festival, can effectively engage the intended audience. Other regions can emulate this strategy by exploring local symbols, such as integrating the Mazu belief in Fujian with marine ecology education or connecting the Nadam culture in Inner Mongolia with sports and health education, to develop unique approaches.

Teenagers are central to *cultural inheritance and scientific practice.* They are not only the natural disseminators of regional culture, such as the social spread of dialect memes, but also the core practitioners of healthy behaviors. Through their dual roles, science popularization initiatives can simultaneously advance cultural inheritance and public health objectives.

5.2.2 This research represents a practical contribution to both China and Thailand.

Both China and Thailand are countries with rich cultural heritage and diverse ethnic arts. The conclusion drawn from this study can provide design suggestions for the future science popularization visual designs of China and Thailand. It is reflected in the following three aspects:

1. Cultural Value Dimension: Starting from the design of popular science visual materials, it serves as a platform for promoting regional cultural regeneration and aesthetic innovation. Emotionally, it strengthens cultural exchanges and connections between the two countries.

2. Behavioral Guidance Path: Based on the social and cultural backgrounds of China and Thailand, the science popularization design adopts a progressive strategy, involving visual symbols, narrative frameworks, and interactive

experiences, to influence the healthy cognition and behavioral decisions of teenagers in both countries. Behaviorally, it promotes the correct behaviors of teenagers to love themselves, society, and the environment.

3. Design Methodology: A comprehensive thinking chart model was established to guide the realization of the "cultural integration - knowledge dissemination - behavior guidance" closed loop in scientific popularization visual design. This provides logical thinking and methodological assistance to professionals dedicated to the dissemination of scientific knowledge.

5.3 Suggestions

The thesis explores the intersection of design studies, communication studies, and public policy. The fundamental demands are not just a compilation of suggestions; they should also embody academic innovation and policy influence, particularly emphasizing the unique value of Kunming as a multi-ethnic border city. The popular science visual design, which not only showcases the distinct characteristics of Kunming but also metaphorically represents the fusion of culture and science, has elevated popular science design from a technical level to one of cultural confidence.

The research on the integration of cultural identity and popular science design, in conjunction with the local cultural practices in Kunming, proposes the following key suggestions:

1. Establish the *Kunming Science Popularization and Cultural Symbol Library* to collect intangible cultural heritage patterns ,such as Yi ethnic embroidery, architectural totems , ecological symbols ,Red-billed gull, etc. Additionally, formulate the "Guidelines for Visual Translation of Science Popularization," clearly defining the levels of symbol usage.

2. Actively utilize AI-assisted design tools to train local cultural datasets and automatically generate popular science templates that conform to ethnic aesthetics ,for example, converting the pollution data of Dianchi Lake into an infographic in the style of Dai brocade.

3. Ensure that cultural creators' design contributions are protected by corresponding rights and interests.

4. Through the deep integration of *science, culture, and behavior*, a communication ecosystem that combines humanistic warmth and scientific rationality can be constructed. This study indicates that when *Jia Ma* printmaking meets radiation protection and martial arts narratives integrate the toxicity of fungi, scientific knowledge is no longer obscure but takes root in the land, grows within the culture, and is rejuvenated through the active sharing and practice of teenagers.

Knowledge is no longer an obscure and profound theoretical discipline; popular scientific design is not only a tool for knowledge dissemination but also an innovative platform for regional cultural regeneration and community governance. The "Kunming case" in this study reveals that in an era dominated by technological rationality, regional culture is not the opposite of science but rather its support point—it has transformed radiation protection from a cold term into "the guardian of the armored and armored divine Army," and turned the medical warning of mushroom poisoning into "the survival rule of the martial arts world."

Let science grow in the soil of Kunming, explain microbial symbiosis with the lotus in Cuihu Lake, guard the antibiotic instructions with the copper-tiled cat, and demonstrate the formation of nanostructures with the forging of Miao silver. When popular science design becomes the expression carrier of cultural genes, science communication elevates from knowledge imparting to the torch of civilization inheritance.

In the future, the mission of popular science may lie in making every culture an annotation of science, enabling everyone to find the balance between rational cognition and emotional identification at the intersection of tradition and innovation, and even more so, to unlock new action power among the youth.

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