EMOTIONALLY-INFORMED DESIGN IN INFORMATION GRAPHICS: A COMPARATIVE STUDY FROM CHINA'S REPUBLICAN ERA TO PRESENT AND ITS APPLICATION IN COVID-19 EDUCATIONAL GRAPHICS

Wenyi Zhang[1]
Visual Arts and Design, Faculty of Fine and Applied Arts, Suan Sunandha Rajabhat University
(Received : July 3, 2023 Revised : August 1, 2023 Accepted : October 4, 2023)

Abstract

This research aims to accomplish two primary objectives. The first objective is to conduct a comprehensive analysis of the evolution of emotionally-informed design in Chinese information graphics, tracing its development from the Republican era to the present day. The study employs a qualitative analysis methodology, utilizing the three-tier theory of emotionally-informed design as a theoretical framework. The analysis compares representative cases of information graphics across different periods, juxtaposing them with theories of societal cultural looseness and tightness. The study hypothesizes that changes in societal cultural looseness and tightness correspond to variations in the emotional depth exhibited in information graphics. The validation of this hypothesis forms a crucial part of this research. The second objective is to apply the patterns and trends identified in the first objective to the creation of information graphics. The study will summarize and apply methods of emotionally-informed design corresponding to these trends to develop three COVID-19 educational information graphics that resonate with the current era. The ultimate goal of this research is to explore the expressive methods of emotionally-informed design at three levels, adapting to contemporary society's reading habits and consumption environment. This approach aims to achieve a harmonious fusion of tradition, art, information, and technology.

Keywords: Information graphics, Information graphic design, Information visualization, Cultural looseness and tightness, Application

Introduction

As a comprehensive approach that integrates elements of data visualization, information compression, and graphic representation, information graphic design holds significant economic, cultural, and societal value in information processing and communication. It enables the transformation of vast and complex information into concise, clear, intuitive, and easily understandable visual designs. This design approach finds wide applications in fields such as news dissemination, book publishing, scientific research, and science education. With the evolving societal developments and changes in people's lifestyles and aesthetic preferences, higher demands and expectations have been placed on information graphic design. Therefore, delving into the theoretical and practical significance of information graphic design, as well as its applications and impacts in various domains, carries crucial academic value and research significance. The

[1]Doctoral Student of Philosophy Program in Visual Arts and Design, Faculty of Fine and Applied Arts, Suan Sunandha Rajabhat University, E-mail: s62584948003@ssru.ac.th

outbreak of the COVID-19 pandemic in 2020 witnessed unprecedented advancements and applications of information graphics in epidemic prevention and control. During this period, information graphics were extensively utilized in news media and industry data (Liu, 2012). According to industry experts at the "2015 Visualization and Data Journalism Sharing Conference and International Media Education Forum" in Beijing, the essence of visualization lies in simplicity, as a picture is worth a thousand words. The current era of visual-based learning and the prevalence of fragmented learning have led to the emergence of new trends in creative design, such as information visualization and digital media (Wu, 2016). Influenced by such external communication environments, exploring the cultural individuality and creative approaches in modern Chinese information graphics, designing information graphics that are tailored for target audiences to meet their daily functional and aesthetic needs have become effective pathways for the inheritance and sustainable development of modern Chinese information graphic design (Liu, 2011).

Development of emotion-driven design in information graphics differs between Europe/North America and China. Europe/North America have made significant progress in emphasizing emotion-driven design, utilizing elements like color, imagery, typography, and layout to evoke emotional resonance. In contrast, China traditionally focused more on conventional and functional aspects, but has recently started to pay attention to emotional expression.

Application of information graphics during the COVID-19 pandemic differs between Europe/North America and China. Europe/North America widely and diversely applied information graphics to disseminate relevant information, evoke emotions, and engage the public. China's approach was more traditional and functional, but they have also started exploring emotion-driven design in pandemic communication. However, there is room for improvement compared to Europe/North America.

This research focuses on Chinese information graphic design as the object of study and practice, with the aim of providing effective methods to enhance contemporary information graphic design. The study seeks to achieve the following three outcomes: (1) Based on the application of emotionally-informed design at three levels in information graphic case studies, a summary of the developmental trends of emotionally-informed design in modern Chinese information graphic design will be compiled. (2) The hypothesis will be proposed that as societal cultural looseness and tightness change, information graphics also exhibit varying degrees of emotional depth at the three levels of emotionally-informed design, and this hypothesis will be validated. (3) The research findings will be applied to create three COVID-19 educational information graphics that reflect the development trends of the current era.

Research objectives

1. To examine the representative cases of information graphic design from the Republican era in China to the present day, and to conduct a comparative study applying the theory of emotion-driven design. To further propose a synchronicity between the evolving trend of emotional design in information graphics and the corresponding shifts in social and cultural dynamics.

2. To apply the research findings to create COVID-19 educational information graphics that are in line with the developmental trends of the current era.

Literature Review

Information graphic design is a design process that transforms a large amount of information into easily understandable visual communication. It is of significant importance in the current era of information explosion (Liu, 2013). In the face of vast amounts of information, the challenge lies in quickly and accurately filtering and conveying key information (Yu, 2015). Information graphic design organizes, distills, and organizes complex data and text and utilizes visual elements and design principles to present information concisely and comprehensibly to the audience. It communicates information visually, aiding readers in better understanding and comparing data and providing intuitive and accurate interpretations (Yu, 2015).

The origin of information graphic design in China can be traced back to the Self-Strengthening Movement, a period when China began comprehensively studying Western culture. Throughout this period, various levels of government and statistical agencies published a significant amount of statistical literature and charts, laying the foundation for the development of information graphic design. From the Republican era until before the Anti-Japanese War, the variety and data of information graphics gradually expanded, forming the initial prosperous phase of information graphic development. However, the development of information graphics practically halted during the Anti-Japanese War. It wasn't until the establishment of the People's Republic of China that information graphic design once again found broad applications. With the acceleration of China's economic development, information graphic design also exhibited energetic growth.

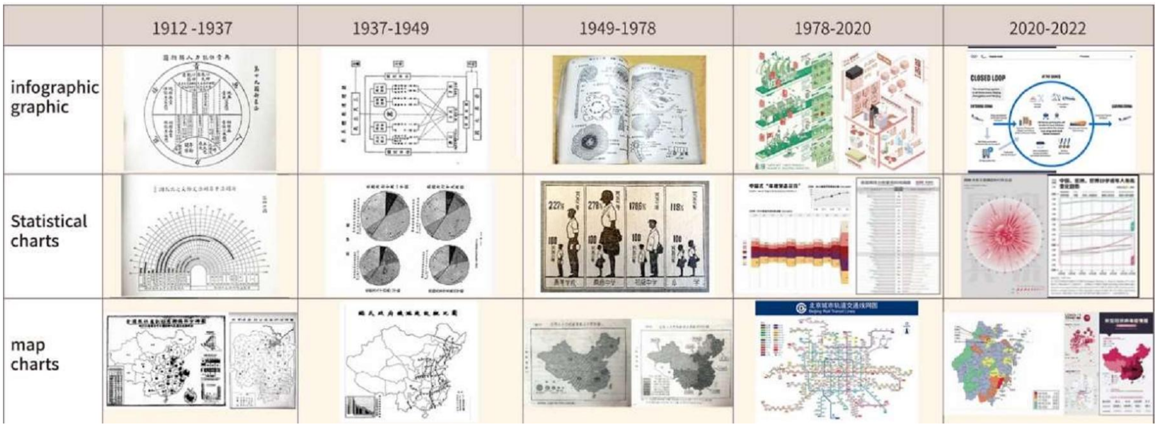

Figure 1: Evolution of Modern Chinese Information Graphics
Source: Compiled by the author

Emotionally-informed design is a concept in design psychology that originated from the work "Emotional Design" by American cognitive psychologist Donald Norman. In the book, Norman explains the important role and impact of emotion in design, focusing on three levels of design: visceral, behavioral, and reflective. He emphasizes using the user's emotions and feelings as a starting point for design creativity (Norman, 2007). Information graphic design is a design that serves the users, and it impresses the audience through aesthetic expression, optimized readability, and associative elaboration (Wang, 2017).

Michele Gelfand, an organizational behavior professor at Stanford University's Graduate School of Business, introduced the concept of tight and loose cultures in her book "Rule Makers, Rule Breakers: How Tight and Loose Cultures Shape Our World," published in 2018. Tight and loose cultures refer to different attitudes societies have towards norms, control, and adaptability. Tight cultures emphasize order, norms, rigor, and rule-following, and social members in such cultures tend to adhere to strict behavioral codes and regulations. In contrast, loose cultures are more flexible and encourage individual freedom, creativity, and adaptability. Gelfand's research shows that these cultural differences exist at various societal levels, including families, organizations, nations, and regions. Her studies reveal the influence of tight and loose cultures in social behavior, values, institutions, and organizational structures. Tight cultures tend to place greater emphasis on rules and order, emphasizing social uniformity and collective interests. On the other hand, loose cultures value individual freedom and diversity, emphasizing individual rights and self-expression. Gelfand's research has also found that tight and loose cultures have significant influences on people's behaviors, attitudes, trust, and cooperation.

Methodology

This research employs a blend of qualitative and descriptive analysis. The specific procedures are as follows:

Collection and Analysis: Relevant literature and materials will be gathered from sources such as the National Library of China, the National Bureau of Statistics website, and Netease Data. This will provide an understanding of the thematic content, design techniques, and characteristic features of modern Chinese information graphic design. A qualitative analysis will be conducted from the perspective of emotionally-informed design, with an inductive analysis used to summarize the changing trends in intuition, behavioral drivers, and reflective aspects of information graphic design from the Republican era to the present. After the research data is gathered, a development trend chart will be created to illustrate the trend of information communication.

Application of Findings: Based on the identified trend, corresponding methods for emotionally-informed design will be deduced and summarized. These methods will then be applied to create three "COVID-19 Science Popularization Information Graphics" that align with the developmental trends of the era.

Evaluation: A structured questionnaire will be employed to obtain 100 valid responses. According to the scattered and extensive characteristics of investigators, the questionnaires were classified and grouped. Divided into 15 groups according to different occupations and age groups. After each group completed the survey data collection, the median of each group was calculated, and then the summary analysis was carried out.The survey will target individuals in universities, hospitals, and communities in Jiujiang. The survey will focus on the efficient communicative abilities of the information graphics, centering on the three levels of emotionally-informed design. The survey results will be evaluated for their validity, outlining the preferred information communication effects and demands of the target consumers regarding the information graphics.

Figure 2: Research conceptual framework

Source: Compiled by the author

Research results

When designing the "Epidemic Science Communication Infographic", we can apply emotional design principles extracted from examples of Chinese modern information graphics.

Table 1 Design and analysis table of infographic version of Epidemic Prevention and Control Manual

No.	Title	Product picture	Level Category	Design pattern
1	Introduction to the transmission of Omicron virus		Infographic instinct behavior reflection	The graphic representation is bifurcated into two distinct sections, each dedicated to delineating the symptoms and transmission pathways of the virus. Utilizing a parabolic model, the Omicron variant and its three antecedent viruses are sequentially arranged and explicated. The lower of the image employs the metaphor of a person running and a motorcycle to juxtapose and illustrate the accelerated transmission rate of the virus.

No.	Title	Product picture	Level Category	Design pattern
2	Close contact determination instructions		infographic instinct behavior reflection	A 2.5D technique is employed to intuitively reconstruct the virus's propagation across diverse life scenarios. Emphasis is placed on magnifying crucial details for better understanding. An orange flow line serves as a visual guide through the entire process, while the three-dimensional representation enhances the clarity and intuitiveness of the process.
3	Principle of automatic determination of space-time adjoint		infographic instinct behavior reflection	A 2.5D technique was utilized to intuitively reconstruct the principle of automatic determination of spatio-temporal companions by mobile devices during the epidemic period. Key details are magnified for clarity. The spatial column, three-dimensional representation, and visual performance collectively contribute to making each scenario distinct and prominent.

Source: Author

From the design of Table 1, "Epidemic Science Communication Infographic," it is evident that all three examples of information graphics are presented as information visualizations.

1. The depiction of the transmission of the Omicron variant employs a 2.5D methodology. The image is bifurcated into two sections to lucidly elucidate the symptoms and transmission. A parabolic curve is utilized to sequence the Omicron variant along with its three antecedent viruses, accentuating their interrelation. The lower section incorporates metaphorical representations, using the imagery of running and motorcycles to illustrate the rapid transmission speed. This enhanced method allows viewers to intuitively comprehend the symptoms and transmission pathway of the Omicron variant and its preceding viruses. This 2.5D visualization not only facilitates the dissemination of knowledge about the Omicron variant but also augments public cognizance of the velocity of virus transmission, thereby bolstering epidemic control and public health consciousness.

2. The infographic for close contacts aims to visually represent the spread of the virus in various life scenarios using a 2.5D approach, with an emphasis on key details. The introduction of orange flow lines guides viewers through the transmission process, and the three-dimensional representation renders the entire process clear and intuitive. This enhanced method visually displays the transmission pathway and methods of the virus in different scenarios, thereby deepening the understanding of virus transmission mechanisms. This 2.5D visualization method holds significant value for studying epidemic control, formulating corresponding strategies, and strengthening public awareness. It provides robust support for a better understanding of the virus transmission process and the role of close contacts.

3. The infographic explaining the principle of automated determination of temporal-spatial companions during the epidemic period was designed using visual techniques such as spatial partitioning, three-dimensional representation, and figurative expression. These techniques aim to enhance the comprehensibility and applicability of rule descriptions. The 2.5D approach adds depth while retaining the characteristics of flat images, enabling viewers to better understand the details and relationships in the scenarios. Spatial partitioning separates the elements of rule descriptions according to their temporal and spatial attributes, clearly illustrating their spatial relationships. Concurrently, the three-dimensional representation provides rule descriptions with a sense of depth, enabling viewers to better perceive the spatial relationships and hierarchical structure. Figurative expressions are also used, visualizing abstract rule descriptions into intuitive images using graphics, symbols, or icons, making it easier for viewers to understand the meaning and key points of the rules. By applying these visual techniques, the rules for automated determination of temporal-spatial companions during the epidemic period are successfully visually depicted, clarifying each scenario and highlighting key information.

Table 2 Relationship between the three page designs of the Epidemic Prevention and Control Manual

No.	Design page	Instinctive	Behavior	Reflective	Emotional design
1	Introduction to the transmission of Omicron virus	□	□	□	Contains three levels
2	Close contact determination instructions	□	□	□	Contains three levels
3	Principle of automatic determination of space-time adjoint	□	□	□	Contains three levels

Source: Author

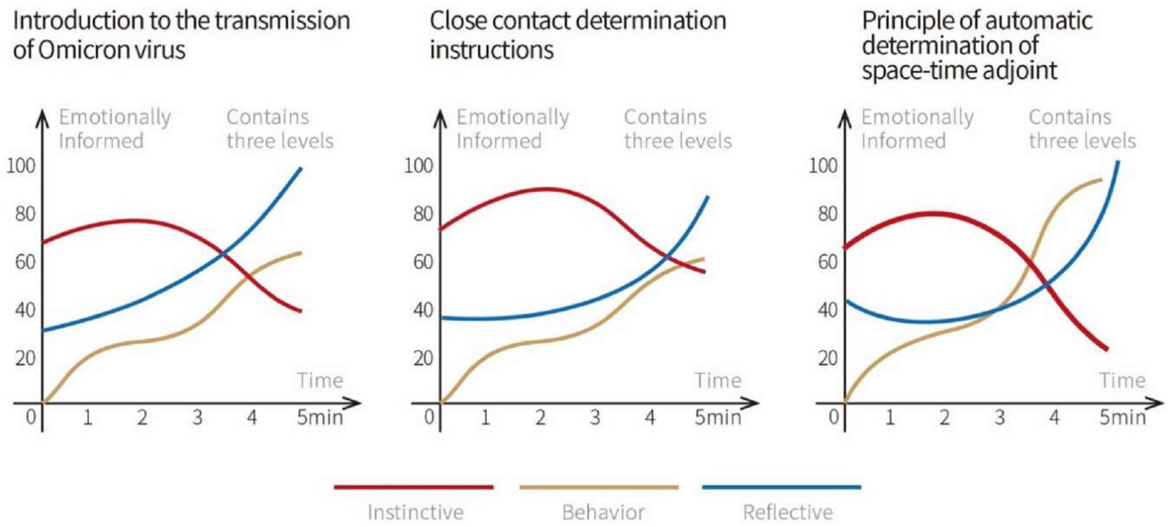

Figure 3: A three page emotionalized design of the epidemic control manual
Source: Compiled by the author

The relationship between the OMICRON Popular Science Infographic and emotional design can be discerned across three levels: instinct, behavior, and reflection. This infographic falls under the category of information graphics, and its visually clear and intuitive format aids readers in enhancing their memory and comprehension.

1. At the instinct level, the principles of visual aesthetics are employed to construct the basic elements. The image is bifurcated, with OMICRON at the center, encircled by earlier iterations of the virus. The surrounding area includes a succinct introduction and associated symptoms, preserving the advantages of precise and intuitively clear presentation.
2. At the behavior level, the lower portion of the image on the right metaphorically represents the faster spread of the virus by comparing the speed difference between running and motorcycles. This allows readers to acquire information in the most direct manner and perceive the velocity of virus transmission.
3. The reflection level is manifested in the use of a map that incites empathy, enabling individuals to make associations through the geographical locations marked in red on the map.

The Close Contact Determination Explanation is presented as a flowchart, utilizing an information architecture approach that amalgamates an overall view with focused details. This approach enables readers to easily comprehend the overall information while also intuitively perceiving the finer details.

1. At the instinct level, the design adheres to the principles of visual aesthetics. The scene depicting the close contact determination explanation is presented in a 2.5D format, with a moderate level of saturation and brightness as the primary color tone, creating a harmonious color scheme. The layout is divided into two areas based on different scenarios, with appropriate screen division proportions, satisfying visual aesthetic preferences.
2. At the behavior level, the information is organized in a logical and sequential manner, guiding the reader from a macro perspective to specific details through the use of arrows.
3. At the reflection level, symbolic forms are used, with 2.5D visuals depicting the everyday scenes of close contacts, maximizing visual resonance.

The Principle of Automatic Determination of Spatiotemporal Companions is presented as an informational graphic, utilizing a naturally structured combination of partitioning in its information architecture.

1. At the instinct level, a sense of order is created by arranging multiple information areas side by side. The use of 2.5D graphics, tilted text, and colored blocks in the background creates a sense of rhythm.
2. At the behavior level, the viewing order is guided by numbers, and the parallel elements are clearly distinguished with distinct hierarchical levels.
3. At the reflection level, complex information is summarized and represented through familiar scene depictions, transforming intricate information into relatable scenarios to enhance the interest and resonance of the provided information.

The affective infographic theory divides the cognitive process of human information into instinct level, behavior level and reflection level. These three levels can be expressed through specific forms, including the form of beauty balance, visual suggestion and form symbol. The balance method of the beauty of form is to use the balanced allocation of graphics, colors and composition layout to produce emotional effects. Visual suggestion method is to use graphics, color, and motive force to imply information and promote the preset behavior. The law of form symbol is to realize the interpretation of information in two ways: displacement resonance and form symbol. Finally, the information transmission of the chart content is realized in an emotional way.

Conclusions

Information graphic design plays an increasingly important role in today's era. This study takes Norman's three levels of emotional design as theoretical guidance, providing theoretical support for the emotional design methods in the diverse field of information visualization (Tao, 2014).

Through the classification, analysis, and summarization of Chinese modern information graphic cases, this study has derived the patterns of emotional design in information graphic creation. By utilizing the emotional design methods, this study uses the design of the "Epidemic Popular Science Infographic" to create visualizations that meet the audience's needs. The design transforms abstract concepts and data into visually understandable representations, achieving a harmonious integration of design form and informational content across the three levels of emotional design.

1. Emotional design analysis of infographics from the Republic of China to now

This study collected and analyzed 100 representative cases from the Republic of China to the present day. Proportional statistics and year-on-year comparison data show that the application of emotional design in the progression of time has become increasingly prominent. From 1911 to 1937, the period from the establishment of the Republic to the outbreak of the Sino-Japanese War, there were different changes in information graphics due to the transition from a loose cultural environment after the overthrow of the monarchy to a tense cultural environment during the war (Scribner, 2018). The level of emotionalization presented by design also varied, but overall it was relatively weak. The presentation of cases remained at the basic level of emotional design. From 1937 to 1949, the period from the full-scale resistance against Japan to the establishment of New China, the pressure of war prioritized efficiency in society. The society was in an even more extreme state of tension, focusing more on the behavioral level and placing instincts and reflection at a lower priority, thus resulting in a decrease in emotionalization. From 1949 to 1978, the period from the establishment of New China to the beginning of the reform and opening-up, China focused on economic development, which led to an increase in emotional design during this stage, and the social and cultural environment gradually transitioned from tension to looseness. There was a significant improvement at the instinctual level. From 1978 to 2019, the period from the reform and opening-up to before the outbreak of the COVID-19 pandemic, with the rapid growth of China's economy and the flourishing of cultural development, the social and cultural environment further shifted towards loose culture. Emotional design in information graphics reached a high level across all three levels. However, from 2019 to 2022, during the COVID-19 pandemic, due to the urgency of the situation, the societal and cultural environment once again shifted towards tension. Design focused more on the behavioral level, resulting in a decrease in emotionalization, but overall, it remained at a high level. In summary, since 1911, as the overall societal and cultural environment in China transitioned from tension to looseness, the level of emotional design in modern Chinese information graphics has shown an overall upward trend, reflecting the corresponding changes in the societal and cultural environment during different periods. It can be inferred that in the future, Chinese information graphics will continue to evolve in accordance with the changing societal and cultural environment.

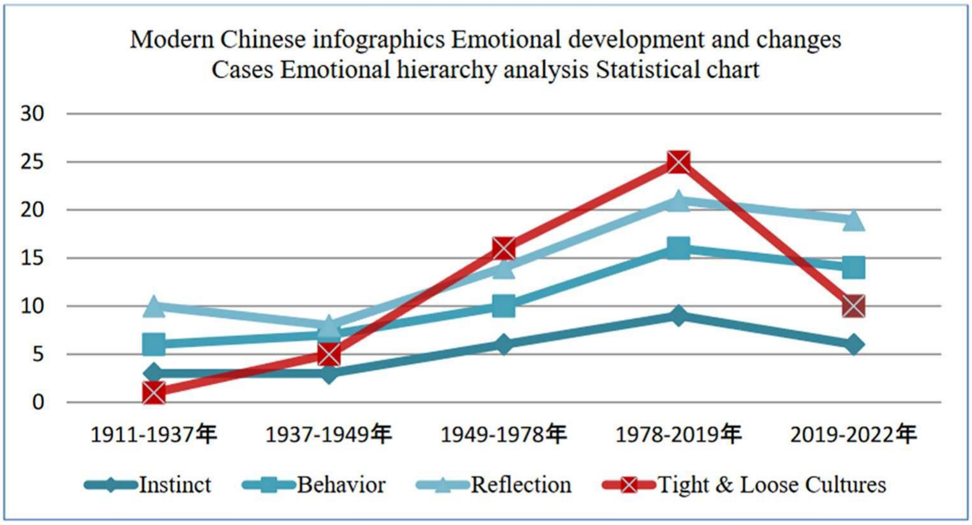

Figure 4: Emotionalized development and change of infographic in modern China
Source: Author Drawing (2022)

2. Conclude the formation rule of emotionalized design in infographic

This research is based on the selection and analysis of relevant cases of modern Chinese information graphics, which are categorized into three design methods: Balanced Form Beauty, Visual Suggestion, and Form Symbolism, representing the instinctual, behavioral, and reflective levels in emotional design. The essence of information graphics design lies in the art of transforming abstract concepts and data into visually understandable representations. In the design process, the chosen forms of beauty are determined based on the emotional presentation media of the target audience. Secondly, the information is transformed into actionable guidance through methods such as symbolism and suggestion, according to the project’s action goals. Finally, existing forms in the audience’s mindset are utilized to express new content, using symbolic means to convey new information, thus achieving the unity of form language and information content and accomplishing reflective-level design.

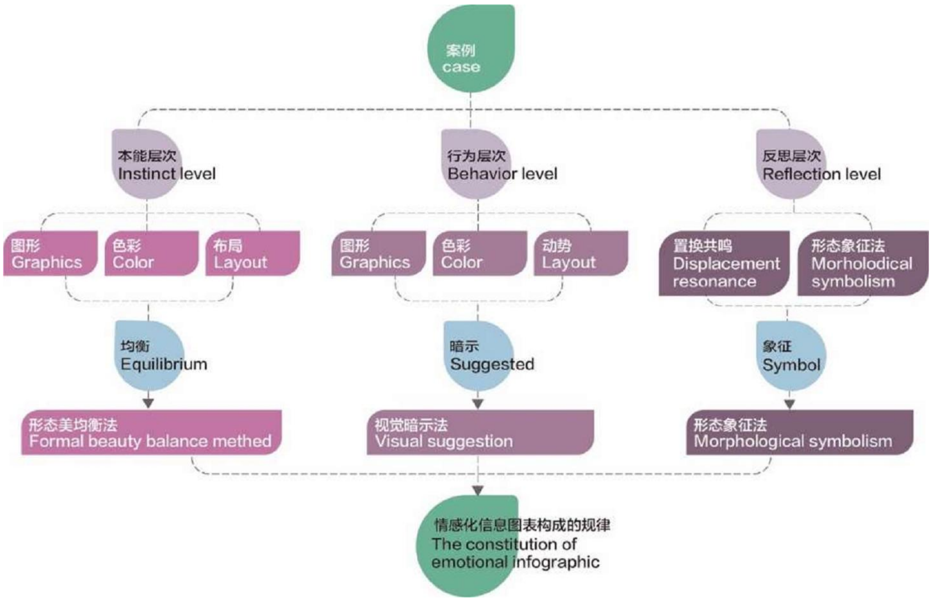

Figure 5: Emotionalized design method model diagram of infographic
Source: Author

3. Inheritance and innovation of the infographic version in "Pandemic Science Popularization Infographics"

This study applies the theory of emotional design to create the “COVID-19 Science Communication Infographics” artwork, which represents the inheritance and innovation of modern Chinese information graphics. The design draws upon the patterns identified and summarized from relevant cases of modern Chinese information graphics, thereby inheriting the wisdom of Chinese information graphics design. The layout creatively utilizes symbolic forms to evoke a sense of familiarity and employs contextualization to resonate with the audience. In terms of visual presentation, innovative techniques such as 2.5D and modern layout composition are applied to achieve aesthetic expression. By breaking away from the conventional text-based layout, this design represents a significant innovation in this type of promotional design.

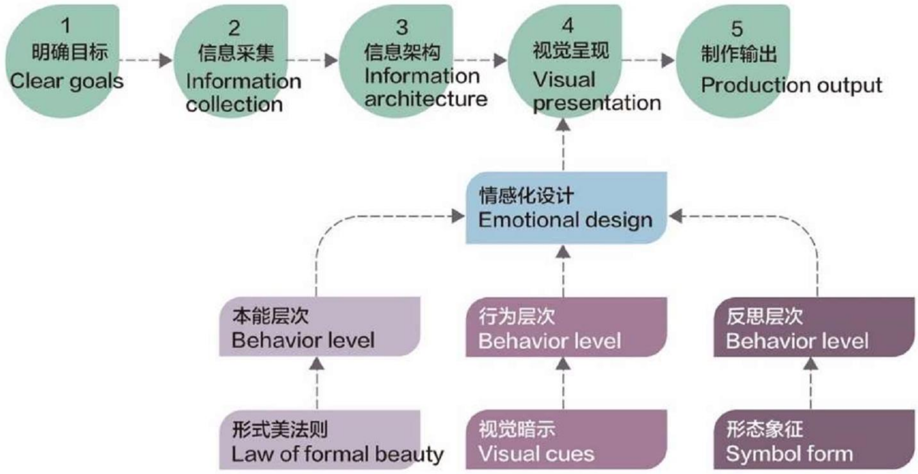

Figure 6: Emotionalized design method model diagram of infographic

Source: Author

Table 3 The relationship between the process of experimental creation and emotional expression

Process Steps for Experiment Creation	The role of emotional expression
Clear goal	Who is the audience, what the purpose is, and what is the standard for achieving the purpose. The goal guides the completion of the emotional design style.
Information Collection	What is the information that the audience most needs to understand and grasp? From the behavioral level, it can guide information editing to a logical, orderly and effective direction.
Information architecture	The way of information architecture can guide the instinctive level of information layout of the entire layout, thereby guiding the primary and secondary relationship or parallel relationship of information transmission.
Visual presentation	Instinctive level, the constituent elements of the law of formal beauty and the composition rules of the law of formal beauty.
	Behavioral level Information needs to be received clearly and effectively, visual suggestion method, clear expression of level.
	Level of reflection Let the audience have a sense of intimacy and resonance, using morphological symbolism.
Make output	Instinctive level needs, visual output should show the best effect, touch should be comfortable, printing output, paper selection.

Source: Author

Table 4 Emotional design three levels of theoretical evaluation and analysis table

Emotional evaluation	Instinctive level good-looking	Behavioral level easy to use	Reflective level connotation
Design requirements	attractive	Design facilitates use of features	Trigger recall thinking and link emotions
Elementary +1	Survival and Security Needs	Identify Serious Patterns Faster	Emotional extension triggers individual memories
Intermediate +1	aesthetic experience needs	Easier to understand the connotation	Cultural connotation and social meaning are far-reaching
Advanced +1	Demand for Surprise Experience	Easier application design and output	Multiple metaphors contain philosophy of life

Source: Author

Emotion-driven design enhances the efficiency of information communication by evoking emotional resonance and expressing rationality. In the context of popularizing knowledge about epidemics, emotion-driven design enables more effective and relatable communication of the same content.

The data analysis of emotion-driven design in information graphics is evaluated through three levels of emotional engagement, taking into account visual flow and cognitive psychology. By leveraging emotion-driven design to its fullest potential, information is organized based on visual flow and cognitive psychology, resulting in enhanced communication effectiveness.

In summary, emotion-driven design makes information communication more efficient and engaging. By eliciting emotional resonance and expressing rationality, optimizing visual and cognitive processes, information graphics can effectively convey complex information and create stronger resonance, holding immense potential in domains such as popularizing knowledge about epidemics.

Acknowledgments

Researcher would like to express her sincere to the thesis advisor for his invaluable help and constant encouragement throughout the course of this research. In addition, the researcher has to give thanks to all lecturers for their assistance. At the same time, the researcher gratefully thanks to everyone who give great supports. Finally, the researcher would like to express her gratitude to the Faculty of Fine and Applied Arts, Suan Sunandha Rajabhat University for supporting in every aspect.

References

Gelfand, M. (2018). **Rule Makers.** Rule Breakers: How Tight and Loose Cultures Wire Our World.

Liu, S. (2011). **Infographic Page Design Research**. Master's Thesis, Shantou University. Retrieved from https://kns.cnki.net/KCMS/detail/detail.aspx?dbname=CMFD2012&filename=1011206634.nh

Liu, T. (2013). **Interactive Infographic Design Research** (Master's Thesis, Jiangnan University). Cnki. https://kns.cnki.net/KCMS/detail/detail.aspx?dbname=CMFD201401&filename=1013309516.nh

Liu, W. (2012). **Knowledge-Based Infographic Design Research** (Master's Thesis, Zhongnan University).

Cnki. https://kns.cnki.net/KCMS/detail/detail.aspx?dbname=CMFD201401&filename=1014144394.nh

Norman, D. (2007). **Emotional Design: Why We Love (or Hate) Everyday Things**. New York City: Basic Books.

Wang, J. (2017). **Research on Emotional Design of Information Graphics** (Master's Thesis, Shenzhen University). Cnki. https://kns.cnki.net/KCMS/detail/detail.aspx?dbname=CMFD201702&filename=1017813357.nh

Wu, P. (2016). **User Experience Infographic Design Research** (Master's Thesis, Wuhan University of Technology). Cnki. https://kns.cnki.net/KCMS/detail/detail.aspx?dbname=CMFD201901&filename=1018806961.nh

Yu, J. (2015). **Research on Emotional Design for Small Furniture** (Master's Thesis, Zhongyuan Institute of Technology). Cnki. https://kns.cnki.net/KCMS/detail/detail.aspx?dbname=CMFD201601&filename=1016043364.nh