Research on graphic design based on mind mapping method--
The example of traditional Chinese local opera, the Qin Qiang

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Abstract. Mind mapping has always played a role in graphic design as a logical analysis and integration of ideas. By using the method of mind mapping it is possible to develop thinking and reasoning from a wider range or different perspectives, thus reorganising relevant factors to break through the original deconstruction to achieve innovative research in graphic design. At the same time, the structural order and visualisation of the mind map is very conducive to logical reasoning and building systems for graphic design. Therefore, in this paper, the application of the mind mapping method in graphic design is investigated with the example of the traditional Chinese local opera, the Qin Qiang. Using the logical tool of mind mapping, a set of graphic design works on the theme of Qin Qiang was completed by clarifying the theme, divergent thinking and determining the direction and method of research to integrate and unify the various forms of Qin Qiang. This paper uses mind mapping to provide a wealth of information and inspirational derivation for the graphic design about the Qin Qiang, allowing the design to visualise effective information in a more comprehensive and concrete way. At the same time, this allows the central idea of the Qin Qiang to be communicated more effectively and accurately in the graphic design than in previous graphic design works.

1 Introduction
Graphic design has long been a part of our lives, from the packaging of snacks to outdoor advertising. As a design that communicates and expresses itself through the creation of symbols, pictures and words, using a 'visual language', graphic design is also known as visual communication design or graphic design[1]. As one of the most important methods of communicating information, graphic design focuses not only on the expression of information, but also on how design elements and information fit into current aesthetic and fashion trends. It can work with a variety of other people involved in the graphic presentation of language, such as: programmers, illustrators, writers, etc.[2]. At the same time, graphic design is a planning and problem-solving discipline that encompasses elements such as purpose, process, visual judgement, audience and context of use [2].

Paul Nini used a comprehensive user research approach in his study of the 'polished axe', which also included survey research, observational research and participatory research[3]. In Graphical ways of researching, Khemmiga Teerapong uses graphic design, visual data and visual presentation as research methods in order to clearly differentiate the visual effects of graphic design research from visual research [4]. Syllabus and Policies argue that documenting the cataloguing process and the methods of project examination and professional presentation can improve graphic design thinking and productivity, specifically in library research, collecting images, and thumbnail sketching [5], while Salman Alhajri suggests that creativity and problem solving in graphic design can be improved in the use of analogue and digital educational systems in graphic design teaching [6]. Vicente López Pena et al. developed a model for quantitative qualitative research of data to collect and quantitatively analyse process data for graphic design research [7].

At the same time, more and more designers are trying to apply new design thinking and methods to graphic design. For example, mind mapping. Mind mapping has the ability to aid memory, simulate relational networks, logical chains, generate ideas and map relationships, which is of great relevance to the methodologies of various disciplines. Currently, mind mapping is widely used as a problem analysis tool in various disciplines and as a method for their research. For example, Leonidas A used mind mapping as an investigative tool in conjunction with conjoint analysis (CA) to help engineering students assign samples and create scenarios for presentation[8]. Sri Adelila Sari and Halimatun Sakdiah used mind mapping as a medium to calculate floods and the impact on floods. It helps students to generate original ideas, stimulate memory and fulfil the teacher's teaching objectives[9]. In Annemarie Rosciano's study, it was found that the introduction of mind mapping in nursing students helped students to stimulate their thinking and memory and to generate creative thinking [10]. Ernest N. describes mind...
mapping as a tree structure that enhances learning at all levels and as a teaching aid for economics, marketing, etc [11]. MOHD NASIR ISMAIL uses multivariate analysis of variance (MANOV) to analyze experimental data on the main effects of teaching styles and logical thinking based on the power of mind mapping for creativity [12].

Currently, mind mapping is used in graphic design mainly as an analytical tool. For example, Casie M. Hoffman suggests that mind mapping can transform an existing idea into a new one, and that designers can use relational mapping to generate concepts and initial solutions [13], while Jones, Phil and Morrison, Marion identify mind mapping as a conceptual tool that can help designers to analyze units with different key points, transform writing into visualization and logically connect ideas at different latitudes [14]. Vasilije Kokotovich argues that concept mapping helps designers to understand the dynamic relationship between design problems and spatial problems, while mind mapping is more oriented towards aiding memory and making design more relevant [15].

However, current research on mind mapping in graphic design practice still has a small amount of data and is often overlooked. At the same time, designers continue to follow design thinking in the design process, and the use of mind maps does not play a decisive role, thus leading to a lack of more creativity in designers.

Therefore, this paper will use the mind mapping method to Qinjiang as an example of graphic design practice research, hope that through the mind mapping innovation around the Qinjiang graphic design, so that the Qinjiang as the theme of graphic design works can be more connotative and ideas while taking into account the aesthetic. Firstly, the first part of this paper introduces the concept, method and elements of the mind mapping method. The second part analyses the use of the Qin Qiang in graphic design with a case study. The third part uses mind mapping to analyze and study the artistic features and modeling characteristics of the Qin Qiang. The fourth part is the application, research and reflection on design practice.

2 Thinking Maps

2.1. Concept

A mind map is a visual network of relationships that unfolds through a central idea, often used to visually organize and represent information in a hierarchy as a visual network diagram that clearly demonstrates the logic and relationships between the whole and the branches [16]. Often the primary goal of most mapping techniques is similar; they are essentially diagrams that sort out a complex relationship to help people understand the relationship at a deeper level, analyze its components and remember its logical sequence [17]. However, there are significant differences in their use, with mind mapping, as one of the mapping techniques, being more of a diagram that organizes information visually in a hierarchy by focusing on a key concept, and expanding the chain of relationships by adding relevant information to show the relationship between the parts of the whole [18]. However, as a mind map is also known as a mind map, any ideas derived from the central idea in a mind map are derived by interconnecting them and then getting to the second level, third level, etc. Lines of different thicknesses, colours, pictures, shapes and vocabulary can be used to draw a network of relationships, forming a colorful tree structure [18]. The method can help people to record knowledge, carry out brainstorming, etc., facilitating the purpose of learning and memory.

First introduced by Tony Buzan in 1974 as Use Your Head, this radial tree concept involves expressing one's specific ideas on a horizontal plane through words and graphics. It was inspired by learners' notes, da Vinci's notes, by using pictures and text to illustrate one's ideas and linking different ideas on the same page [19]. This mapping technique was developed in the 1960s by Allan M. Collins and M. Ross Quillian and has been used in various fields [20]. Mento, Martinelli and Jones (1999) found that the use of mind mapping as a mapping technique with an emphasis on quick thinking in EMBA postgraduates provided a good understanding of the case [21]. Mind mapping is currently used as a study technique to help students better organize their thoughts, organize their thinking, etc [22].

2.2 Categories and method

Mind maps can be divided into: Flow Map, Multi-Flow Map, Brace Map, Tree Map, Circle Maps, Bubble Map and Double Bubble Map.

Flow Map [23]: It describes the different stages of a process of something and reduces the feeling of confusion at the visual level by merging edges. Visualise a network, process, other types of flow data or a set of processes and instructions. In the largest box, the subject of the thing is first written, then each step needed to complete the thing is described in smaller boxes and the steps are linked together with arrows. flow map is a great exercise in logical thinking and thoughtfulness.

Multi-Flow Map [24]: Suitable for identifying the causes and effects of a particular event. Because Flow Maps are executed sequentially in one direction and have no branches, they can solve the usual problem of complex processes with branching events. The flow of this map is generally as follows: first the cause of the triggering event is defined and finally the result of what happened. It can help to analyse the causes and outcomes of an event, allowing people to think about the connections and rights and wrongs, thus helping people to make better connections between different ideas and to develop a deeper sense of knowledge and understanding of concepts.

Brace Map [25]: The layout is similar to a tree diagram on its side. These apply to real objects or situations, rather than concepts or ideas. It is often used to analyze the structure of a thing and to help people understand the connections between the subject and its attributes.
Tree Map [26]: a space-filling visualisation method best suited to classifying and organising information, effectively representing a large hierarchical collection of data and listing its recursive relationships. Like a tree, the Tree Map is divided into roots, branches and leaves, with the roots being the topic, the branches being the categories on that topic, and the leaves being the descriptions of the specific content within those categories.

Circle Maps [27]: consist of two circles, a small inner circle that defines the core topic being described, and a large outer circle that lists all understandings and descriptions related to this core topic as a mapping of its own form. This diagram is often used for brainstorming before the start of a project and is simple, straightforward and clear. A circle with a central idea at its core, each filled with related ideas from the previous layer.

Bubble Map [28]: consists of a number of bubbles, with a central topic bubble describing the core theme, surrounded by attribute bubbles describing attributes about that topic, and each bubble having a line to the topic bubble i.e. using relevant adjectives and descriptions to explain the topic or theme. This type of map is often used to define the attributes or corresponding connections of things, helping people to add depth and variety to their portrayal of a thing when writing or expressing it.

Double Bubble Map[29]: A double bubble map, also known as a Venn diagram, combines two bubble maps to show related topics and to compare and contrast the differences between the two topics separately. Double bubble map is actually a variation of bubble map, which makes it easier to expand thinking if there are two or more topics. The Double Bubble Map makes it easier to find commonalities between topics.

If the mind map is seen as an illustration with a keyword or phrase in the middle, firstly lines need to be used to connect from the middle to a main idea, and secondly more lines need to be connected from the main idea to the details in order to achieve the effect of doing an extension from the centre outwards. This needs to include: keywords for the topic, main ideas in the topic, extended connections and relationships of main ideas, etc. [32] Then the steps to construct a mind map [30] are divided into: 1. First select and determine the topic of the mind map, extract keywords or key phrases its visualisation as a graph to place it in the middle of the drawing. 2. Second present three or more main ideas and then arrange them around 3. then connect the topic of the mind map to each main idea with a line. 4. fourth brainstorm and provide details to support each main idea, such as relevant feelings, problems, strengths and weaknesses, etc. 5. finally connect each main idea with supporting details using a line.

Where a node is a point in the mind map that shows information or ideas (Fig. 1) [31].

2.3 Current status of the use of mind mapping in various disciplines

Mind mapping is currently used in a variety of subjects. For example, in order to help third year mechanics students to understand the overall conceptual structure of the course and to organise their thinking and understanding of specific technical concepts, mind mapping using visual technology can solve the problem of teachers being unable to ensure that students in large classrooms can effectively understand the course content when using traditional teaching methods to transfer knowledge. According to questionnaire and experimental results, 65% of students are visual learners and the use of mind mapping as a teaching method will make it easier for students to solve course problems, recall memories, etc. (Fig. 2) [33]; in order to enhance the development of innovative ideas for creating systems and thus help the DBA technique to be more invisible, by combining it with mind mapping to create a tool that will help designers Narrowing the use of DBA to better develop biologically inspired concepts for a specific function makes the system more invisible, as well as helping designers to imagine, explore connections between concepts and thus stimulate the imagination to improve the complexity of project processing [34]; mind mapping helps teachers to get feedback on the development of students’ mental structures and psychological structures. It can also help students to consolidate their knowledge, increase their engagement in the teaching process and improve their creative thinking [35]; mind mapping as a mapping tool can help us to develop information and access it in the brain. It can help students to get a framework for their ideas before writing. Students can follow a ladder pattern with the help of mind maps to sort out ideas so that information such as data and concepts can be coherently linked into an essay (Fig. 3). Participants were encouraged to review their group’s mind maps and found that due to the detailed connections, visualisation of information and categorisation of mind maps could help students to better balance learning new knowledge and reviewing old knowledge [36].
3 QinQiang

Qin Qiang, one of the oldest Chinese Han operas. As a local culture, it originated in Shaanxi (part of the Qin state in ancient times) during the Qin dynasty and is sung and read in the Guanzhong dialect of Shaanxi hence the name Qin Qiang. The instruments used to accompany it are: erhu, bangzi, sanshin, flute and suona. The Qin Qiang role system consists of four sons, six dancers, two purists and one clown. The face painting, as one of the three major faces in China, is drawn in a unique style and has a complete system. "The upper five colours: red, yellow, green, white and black, and the lower five colours: blue, purple, pink, lake and incense, constitute the main colours of Qin costume. The three primary colours are used as the main colours for the Qin Qiang costumes, supplemented by the inter-colours, the flat colours and the baking colours. The use of colour is important for its stability, generosity and vividness. Red, black, straight and pink are used to express the characters' personalities."

3.1 Introduction to the aims and objectives of choosing the Qin Qiang as a case study

The Qin Qiang, as a local culture and popular art, is sung and read in the dialect of the Guanzhong region of Shaanxi, and in the course of its development it incorporates the language of poetry, lyrics and songs from the Han and Tang dynasties. Its performance form is full of life and boldness but, due to regional and other factors, there are differences in the singing style.

As one of the ancient operas, the repertoire of the Qin Qiang is mostly based on heroic or tragic stories, of which there are about a thousand or more traditional Xi Fu Qin Qiang plays, but no scripts have survived and they are only passed on orally by the artists, thus, many have been lost. The rise and fall of the Qin Qiang have important implications for today's artistic creation and development, and for cultural construction. At the same time, as one of the traditional cultures of China, the Qin Qiang is a cultural treasure of the Chinese people, with its virtues of benevolence, righteousness, propriety, wisdom and trust, as well as the folk culture of the north-western Qin region. With the rapid development of increasingly diverse modern cultural products, we need to not only focus on the heritage of the Qin Qiang, but also to promote the art of Qin Qiang, follow the footsteps of the times, broaden the market for the dissemination of Qin Qiang culture, and make it widely available.

3.2 Setting of related studies

Firstly, graphic design as a craft about communicating information and visually feeling attractive through the production of visual content. As a traditional opera, Qin Qiang conveys content and ideas through the visual and auditory senses [37]. The colours of Qin Qiang faces and costumes usually contain strong emotional colours as well as cultural undertones, and the faces themselves have incorporated many traditional cultures from different times and backgrounds during their development, so there are many elements that can be used and much room for creativity. The use of highly saturated colours and distinctive face images can easily stimulate the senses of the audience, while the use of graphic design can most directly pass on the cultural values and show the evocative power of the Qin Qiang itself, allowing people to think and imagine through visual experiences, playing a good propaganda role [38].

3.3 The challenges of Qin Qiang in graphic design

The bright colours and varied images of the Qin Qiang faces are highly decorative. It is most commonly used in graphic design either as a whole or as a partial image. Often the design of Qin Qiang peripheral products is a mere copy of its form, without summarising the artistic features of the Qin Qiang face painting or the colours, lines and musical instruments of the Qin Qiang elements for visual symbolisation or other visual innovation. As an open system of design, we need to consider the historical background and accumulation of culture as a traditional culture, but we also need to keep up with the times and modern technological trends and innovate the visual aspects of Qin Qiang art in print. Often in graphic design, in order to highlight the strong national character and visual tension of the Qin Qiang, most use only its form. However, it is also important to draw on the art forms, graphic elements and cultural backgrounds of the Qin Qiang itself as visual extracts [39].
3.4 Can this challenge be addressed using mind mapping

Through a mind mapping approach, we analyse the various elements of the Qin Qiang that are worthy of reconstructing and designing. This is because, regardless of the rapid advances in technology, the unique aesthetic characteristics and significance of the art of Qin Qiang need to be expressed in the graphic design process not only in terms of the beauty of the characters, good and evil, and the ups and downs of the plot, but also in terms of its artistic form. Mind mapping can not only simulate the relationship network, logic chain, but also help designers to brainstorm and generate ideas, and can help designers to analyse the same type of works such as: Beijing Opera, Western opera, etc. to summarise the characteristics of different works and take the essence and discard the dregs so as to spread their creative thinking. Therefore, it is possible to use mind mapping as a method of deconstructing and reconstructing the graphic design of the Qin Qiang [40].

4 The artistic characteristics and stylistic features of the Qin Qiang under the analysis of the mind map

4.1 Analysis of the mind mapping framework

Firstly, this paper will focus on the Qin Qiang as the central idea and the mind map as the research method so as to carry out a logical analysis of the modelling characteristics and artistic features of the Qin Qiang. In the process of creating the mind map, the paper divides the Qin Qiang into four main research themes: facial costumes, musical instruments, cultural communication and cultural creativity. It is hoped that the combination of traditional culture and creative design can provide new ideas for the design innovation of Qin Qiang culture, thus promoting the inheritance and development of Qin Qiang culture (Fig. 4).

4.2 Nodal Analysis I

Node one is the costume of the Qin Qiang face. The five main roles of the Qin Qiang, namely, the Sheng, Dan, Jing, Miao and Clown, and their corresponding colours, were extended to reveal that the patterns and colours of their costumes and weapons also reflect the characters’ personality traits. The study of the colours and patterns reveals that there is a high degree of overlap between the Qin Qiang and the Shaanxi shadows, so that the key word ‘connection’ can be obtained through the Shaanxi shadows, allowing for creative ideas about ‘connection’ (Fig. 5).

4.3 Node Analysis II

Through research and study, the most popular opera cultural and creative products are Japanese opera cultural
and creative posters and creative design products. "They are usually used in various household products and electronic products, etc. They can be used in a variety of scenarios, appealing to different age groups. For example, the products that are currently preferred by people under 30 years of age in China: pet school bags, transforming plugs, hooks and tableware, are extremely practical, cute, colourful and have a high degree of character reproduction. In order to achieve an organic combination of culture and life, Chinese cultural and creative products often use material culture as the source of creativity and use substitution, reproduction and traditional Chinese painting techniques such as white space to create products that are both ornamental and practical, taking into account the aesthetic needs of the audience and the role of cultural communication. However, if the surface form or physical elements are only extracted and copied, the level of application will only remain superficial and will not reach a deeper level. We therefore need to collate its artistic features and analyse its modelling characteristics. We need to summarise the colours, lines and their combinations and apply them, for example, symbolically and abstractly (Fig. 6).

4.4 Nodal Analysis III

In the process of analysing the development of the Qin Qiang, it was found that there is an important connection between the shadow and the Qin Qiang, therefore, based on the idea of trying to combine "calligraphy" and its related elements with the "connection" element of the shadow and apply it to the design of the Qin Qiang, based on this idea, from the "calligraphy", the "strokes" element of the Chinese character is used. The strokes are also used in the process of forming Chinese characters by connecting different strokes to form Chinese characters. The strokes are also used in the process of forming the character by connecting different strokes, thus conforming to the characteristic of "connection" and "association" (Fig. 7).

5 Design research, practical application research

5.1 Summary of design features

In this study, the graphic design of the Qin Qiang is mainly based on the central face, the characteristic cultural customs and the main musical instruments. The design is based on the use of the central faces of Wen Sheng and Xiao Dan and the fact that the original Qin Qiang is closely related to the Shaanxi cultural custom of "not sitting on the bench and squatting" and that the main musical instrument in the performance is the erhu, so in order to meet the needs of a highly nationalised and modernised design in the dissemination of Qin Qiang culture. The first step is to extract the five senses from the original form of the Qin Qiang face painting and combine them with the strokes of Chinese characters by stretching, curling, combining, interspersing, deforming and flipping them. The strokes are used to borrow the form of the face, but in a way that is separate from its shape. This not only preserves the artistic characteristics of the face painting itself but also reflects the cross-fertilisation of traditional Chinese culture, Chinese folk art and modern technology, while retaining visual tension and expressive impact.

5.2 Draft design

In The author Jia Pingwa's book "Qin Qiang" and his calligraphy works are inspired by the key word "calligraphy", while the traditional shadow puppet performance method is to rotate and shake each important part of the shadow props individually to achieve a dynamic presentation. The paper therefore takes this approach as the design concept, rehearsing the combination of the strokes of the Chinese characters and using the colours of the face painting to replace the graphics and colours of the main musical instruments used in the Qin Qiang performance. Secondly, the Chinese characters are combined with pinyin writing forms to achieve a secondary composition of calligraphy (Fig. 8).
5.3 Final design effect

Poster:
With the central idea of "falling strokes into paintings", the strokes of Chinese characters are treated with a shaking effect in order to achieve "falling strokes" and "falling strokes". The face is placed at the bottom of the poster by rotating, shaking and axisymmetrically forming the brush strokes to achieve the effect of 'painting', presenting an overall 'image of falling strokes'. The image of the face is derived from the image of 'Sheng' in Qin opera because 'Sheng' is the most important character in Qin opera performance, and the overall poster harmonises with 'falling strokes - becoming a painting' (Fig. 9).

Logo design for opera characters and the main instruments played:
Based on the presentation of shadow puppets, one of the ways of performing Qin opera: shadow props. The dynamic way in which shadow puppets are performed is through the movement of the shadow props as an important part of the characters or objects. This is why the main elements of the face are the "raw", "dan", "pure", "last" and "ugly" characters. "The main elements of the face are extracted and reproduced through the free combination of different strokes and colouring (Fig. 10).

6 Reflection and discussion
As a traditional Chinese material culture, QinQiang is the main source of inspiration for its image and colour scheme, but as most of the material culture in China is based and developed in reference to people's daily lives and is closely related to them. Therefore, in order not to overly focus on the cultural forms and the presentation of the IP images of other types of cultural and creative products, which would make them impractical, the design concept of this study relies on the unique Chinese writing language: the strokes of Chinese characters and pinyin.

In order to emphasise the aesthetic value of the design and the integration of cultural features, a mind map was used as a logical analysis tool in this design process to help me analyse the composition of the original form of the Qin Qiang, the regularity of the combination and the coherence of the logic in the related extensions. It helped me to analyse the combination and arrangement of the different elements of the Qin Qiang.
and to promote the structural reorganisation, enhanced decoration and transformation of the patterns in the design process. This allowed me to use traditional cultural symbols to create a new image of the Qin Qiang, while preserving the original form of the Qin Qiang face. Secondly, this study discusses and analyses the specific forms of the Qin Qiang face in the process of using a mind map as a mapping tool, but in the process of post-checking it was found that the historical background, the evolution of the forms and their classification were overlooked in the process of combing the mind map. Therefore, although the mind map can help us to sort out the logical sequence and identify the correlation between the different points of view, it does not guarantee the comprehensiveness of our view. In the design of contemporary visual communication, we need to consider not only the innovative forms of expression, but also the 'form', 'colour', 'meaning' and 'context' of the subject matter. The "context of development", etc. By analysing the 'form, colour and meaning' from the inside out, we can obtain a unique design idea as well as the meaning of the abstract pattern and the culture it reflects. The paper concludes with an analysis of the Qin Qiang through a mind map and then abstracts and symbolises the image of the Qin Qiang elements, and inherits and innovates on the basis of its colours, showing the possibilities of the traditional Chinese local opera art of Qin Qiang in contemporary graphic design.

7 Conclusions

As a local opera culture in Shaanxi and Northwest China, the art of Qin Qiang is a product of local customs and folklore, and therefore needs to reflect the cultural characteristics and connotations of the region in the process of dissemination. In order to make it better, this paper explores the role of mind mapping in graphic design research, using the art and culture of the Qin Qiang as a starting point, and using mind mapping as a research method in the context of its regional history and culture. Specifically, it discusses the mapping of logic, thinking, creativity and derivation through the use of mind maps. The study uses the traditional culture of Chinese characters as a cultural resource and combines it with modern graphic design techniques, while extracting the unique symbolic culture and colour palette of the Qin Qiang art to obtain a cultural design that takes the regional culture, language culture and Qin Qiang art as elements.

As a regional opera art in Shaanxi, Qin Qiang needs to be designed with culture and creativity in mind in order to better communicate its unique art and culture. This paper therefore uses mind mapping to analyse and organise regional and traditional cultural elements to obtain a design concept.

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34. Feralhia, A., 2021. See discussions, stats, and author profiles for this publication at: https://www.researchgate.net/publication/350567414 SURFACE WATER QUALITY ASSESSMENT IN SEMI-ARID REGION (EL HODNA WATERSHED, ALGERIA) BASED ON WATER QUALITY INDEX (WQI).


