

# The Impact of Chinese Traditional Cultural on the Gesture and User Experience in Mobile Interaction Design

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**Abstract.** Many designer using traditional cultural elements in mobile application interaction design, this design concept enhance user's cognitive and emotion. Users will be inspired by an inner cultural identity when using App, and they will feel delighted about the operation. So integrate the traditional cultural elements into the interactive system is necessary, however, how to design the cultural element can conform to the user's mental model, and have a positive impact on the user experience, that is the direction of the paper.

This paper is focused on the impact of integration of the traditional cultural elements into the interactive system on the user experiences. Research is divided into two parts, part 1 for the extraction of characteristics of traditional cultural elements, the part 2 for cultural elements into the different model (Design Model, User Model, and System Model) of the effects on the user experience.

**Keywords:** Mobile HCI · Traditional culture · Mental model · User experience

## 1 Background

Traditional culture is overall characterization of ideological culture, ideology in national history. With the development of China's economic, the heritage of traditional cultural began to be national attention. A lot of mobile application that have traditional culture characteristics become the indispensable tool in people's life.

Many designer using traditional cultural elements in mobile application interaction design, this design concept enhance user's cognitive and emotion. Users will be inspired by an inner cultural identity when using App and they will feel familiar about the operation and also feel delighted. But in the process of practical, many mobile Apps just embedded culture elements through the way like duplicate, blend etc. The designer did not fully consider that there is a gap between user's understanding of cultural elements and gestures, this will lead to different degree of user experience problems.

Integrated the traditional cultural elements into the interactive system is necessary, however, how to design the cultural element can conform to the user's mental model, and have a positive impact on the user experience, that is the direction of the paper.

## 2 Literature Review

The famous American economist, Toffler said: “human need high technology, more need high emotional, people is not only need the satisfaction of material needs, but also need the spiritual and cultural needs. Once the products are given a good emotion, will shorten the distance of people and products on the emotional, behavioral cultural identity, it will convey different cultural background groups demand for cultural emotion”. Cultural identity will affect people cognitive and emotional to products, product design should be in accordance with the cultural values of the Times, through the design product to influence the culture of human society, to guide the formation of a new culture form [1].

Tradition is a process of accumulation, in this process formed many cultural phenomena, cultural style, cultural material, these elements which influence the development of traditional culture and art design, the traditional Confucian aesthetic concept in the form of a subtle infection native concept of life and aesthetic perception [2].

The Confucian traditional culture elements integrated into the APP interaction design, can close the distance between the user cognition and the APP, when users see or use in the APP will be inspired by an inner identity, will generate cheerful, familiar with the operation of the psychological [3].

However, the traditional culture elements of integrated into the APP, will indirect effect on the information, about the user’s selection, receiving, cognitive, operation. And cultural elements should be in what form integrated into the interactive system, can enhance the function of the elements and cultural affinity, and not to a user’s cognitive burden.

“Mental Model”, the concept was first put forward by Kenneth Craik, he thinks that mental Model is used to interpret the individual’s perception of the internal relations of things in the real world [4]. Then, many scholars from different angles to improve and complement the concept, such as Indi Young thinkmental model is the change of emotion and thought when people trying to execute an action [5]. Due to mental model application in various fields, so the definition is different priorities. But after a summary can be found, most of the cognitive scientists or scholars to define mental model descriptive definitions and purposes. In short, mental model is the way of thinking and ideas which hidden in the human brain, it represents the external reality mapping model which is formed by the internal representation in the brain, these models affect the person’s external behavior.

The formation of a mental model mainly relies on the anticipation of memory. When faced with new information, previously stored in the brain of a background, experience, will be out one by one, when these form a system, mental model was formed. When in contact with new things, mental models will be guiding behavior [6].

In the field of human-computer interaction, mental model can help designers a better understanding of the user, also can help users to better understand and use the product. Norman try to split interaction process into three models related to the mental model: Design Model, User Model, and System Model [7]. Design model is a bridge between the system model and user model, it determines the usability of the product. Design models tend to be more user mental models, the higher the usability of the

product, the user will feel program easier to understand and use, the users learning and using cost will be reduced [8].

When we are in the APP design on traditional culture, the role of mental models is particularly important, designer based on the understanding of traditional culture, and integrate the traditional cultural elements into the interface and interaction design, then the form the Design model of the product. And user access to cultural APP scenario, their behavioral logic in this scene is influenced by the cultural background, the user for the understanding of traditional culture to build a mental model, affect their understanding of the cultural elements of the interface and interactive operation. If the design of cultural elements of the metaphor is not in conformity with the user's mental model, the user may use the wrong gestures, unable to accomplish its task, as a result affect the user experience.

This paper is focused on the impact of integration of the traditional cultural elements into the interactive system on the user experiences. Research is divided into two parts, part 1 for the extraction of characteristics of traditional cultural elements, the part 2 for cultural elements into the different model (Design Model, User Model, and System Model) of the effects on the user experience.

### 3 Experiment I - The Traditional Culture Element Feature Extraction

The goal for this part is to select typical ones from multiple Chinese cultural elements to be candidates for the integration into mobile apps.

Traditional elements is not only the Chinese ancient pattern, design, artifacts, also including sounds, smells, scene, many experts put the traditional culture elements into the recessive and dominant characteristics. Recessive characteristics through the value identity and aesthetic to express, dominant characteristics through the appearance shape, color, totem and so on. In this paper, the research object for the dominant characteristics of cultural elements.

We choose 6 typical cultural representations with various forms, based on cultural identity, semantic and symbolic meaning, and the relationship with interaction. These representations were Chinese Calligraphy, Pippa, Ink Painting, Kung Fu, Chinese Chess, and Chinese Opera. These representations contain visual characteristics, tactility, can represent the typical Chinese culture and nationality.

We used these cultural representations as the samples in Experiment I (shown in Fig. 1), and invite 20 student aged 17–30 to evaluate these samples according to the aspects of “Typicality of Chinese Culture”, “Element -Gesture Correlation”, “Semantics”, “Identification”, “Easy-to-use”, “Memorability” and “Degree Of Preference”, using 5-point scale.

The results indicate that:

- These 6 culture representations have significant differences in “Typicality”, “Semantics”, “Identification”, “Easy-to-use” and “Memorability”, with the corresponding  $\alpha$  values smaller than the threshold 0.01 (Shown in Table 1).

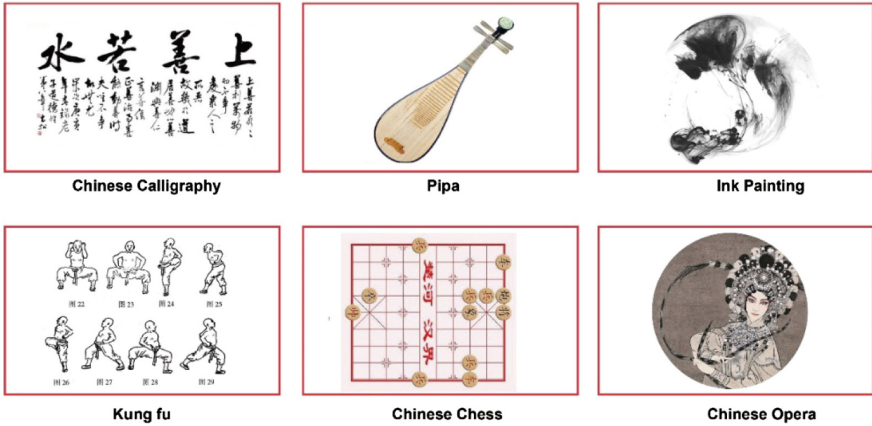


Fig. 1. Chinese culture representations

Table 1. Results of one-way ANOVA

ANOVA		Sum of squares	df	Mean square	F	Sig.
Typicality	Between groups	17.767	5	3.553	6.320	.000
	Within groups	64.100	114	.562		
	Total	81.867	119			
Semantics	Between groups	22.267	5	4.453	9.543	.000
	Within groups	53.200	114	.467		
	Total	75.467	119			
Identification	Between groups	23.767	5	4.753	9.659	.000
	Within groups	56.100	114	.492		
	Total	79.867	119			
Easy to use	Between groups	23.875	5	4.775	8.634	.000
	Within groups	63.050	114	.553		
	Total	86.925	119			
Memorability	Between groups	19.842	5	3.968	6.839	.000
	Within groups	66.150	114	.580		
	Total	85.992	119			

- Participants feel more familiar to Ink painting, it is very close to the scenes of life, ink painting are compatible to utilize in interaction design, Ink painting shown a high score in “Typicality of Chinese Culture”, “Element -Gesture Correlation”, “Semantics”, “Identification”, “Easy-to-use” and “Memorability”. The probably reason lead to this results are: (1) Ink painting is more common in scenes of life, it has a higher identification level; (2) Ink painting have the attributes and characteristics of Confucian culture; (3) Ink painting is the elements that can be directly control and influence by action, it can naturally utilize into interactive system.

Based on the experimental results, we confirm choose Ink Painting as experimental material (Fig. 2).

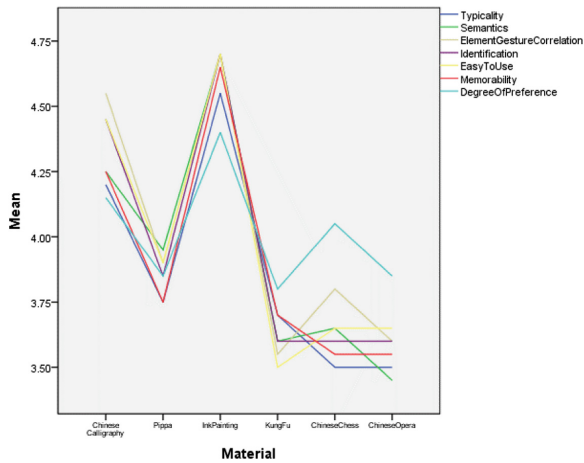


Fig. 2. Chinese culture representations' scores in dependent variables

#### 4 Experiment II Materials-The User Mental Model and the Design Model Extraction

First, let ordinary users and professional designers to express their understanding of Ink Painting element, and then extract the user's mental model and design model, and use the two models in experiment II, to test the matching degree between the System Model, User Mental Model, and Design Model, and their relationship with the user experience.

This experiment mainly use User Interviews and Think Aloud Protocol, to understand the user and designer how to think about Ink Painting element. Reference Indi Young of construct a mental model method, this research will be summarized the mental model of the extraction steps as follows:

User stories - sort out mental information (from the interview recording video and Think Aloud Protocol) - mental information extracted from "character description"- put same properties of "features" together - form a "stack", and name it - put the same attribute features "stack" together - form the "mental model", and the graphic performance.

Experimental invite 20 students, ask each participant some questions, including describing the understanding of Ink Painting element, recall the Ink Painting application scenarios at ordinary time's life, and the behavior of the interaction process. Let the participants in the case of without prompt situation, repeat to complete the above questions, write and make records.

Based on the extraction of mental information, clear up the interview results of 20 students, to map the user and designer mental model figure of Ink Painting, the process as shown Fig. 3. The user's and designers mental model of Ink Painting will be used in the experiment II as materials.

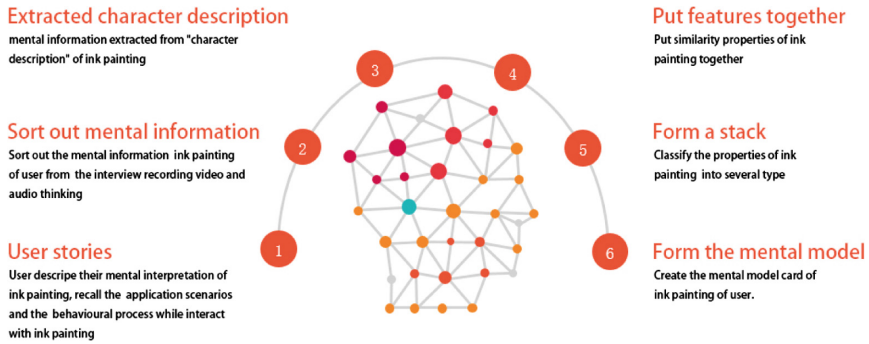


Fig. 3. The extraction process of mental model

## 5 Experiment II – Test on the Influence of Cultural Elements on the Interactive Experience

The goal of this part is to explore the cultural elements integrate into different models could affect the user experience in the mobile apps.

The independent variables in this experiment are “Different Product Model”, and “Task Type”. According to the extraction model, we divided “Product Model” into 3 conditions: “System Model”, “User Model” and “Design Model”. “System Model” means that the practical operation of the machine and software model, can be understood as a model of the engineer. “User Model” means the users of Ink Painting element model of cognition. “Design Model” means the designers of Ink Painting element model of cognition. We choose our phones commonly used functions and operations, such as unlock, dial-up, writing, viewing articles, Ink Painting elements can be natural integrate into these operations, so the four operations as the experiment tasks.

The controlled variables include “experimental facilities”, “Experimental environment”, “and Interface elements design form”. We designed 12 kinds of experiment materials (shown in Fig. 4) and designed the questionnaire based on the PACMAD mobile usability model. Test subjects including Feedback Clarity, Memorability, Easy to Understand, also contains the emotional factors, for example, the degree of innovation, satisfaction. Integrated these factors, this experiment involved with the 11 items to measure the various aspects of the user experience.

The subjects are 20 young people aged 18–30, in which half are male and half are female, 12 are from department of industrial design, and the other 8 are from other areas. All subjects are experienced iOS users.

The results indicate that:

- When ink painting integrate in Design Model and User Model with different level and form, the design model shown significant impact on “Satisfaction For Culture Element”, “Easy To Use”, “Degree Of Preference”, this results state that integrate culture elements in design model can enhance the user experience, at the same time, the usability of interface and the rate of user successfully finish the task both improved;







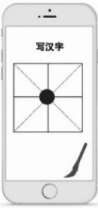
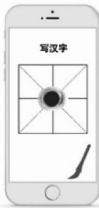



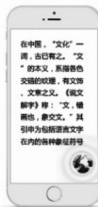
	System Model	User Model	Design Model
<b>Slid unlock interface</b>			
<b>Dial a number</b>			
<b>Write Chinese</b>			
<b>Slid the screen</b>			

Fig. 4. Materials for experiment II

when the effect of design model exceeded expectations of user, user will be impressive to our product and clearly feeling the innovation and interesting (Fig. 5);

- In three models, the “Memorability” affects the user experience significantly, other 5 evaluations are the best in the System Model, the median in Design Model and User Model. The reason of this result may be the design elements in the System Model is more simple, easy to remember, and other two models have the rich form of elements in the design, also combined with a variety of interactive effect, it may be a burden to user’s memory; This result indicates that the integration of cultural elements promoted the user experience, even though it reduced the “Memorability” (Fig. 6).

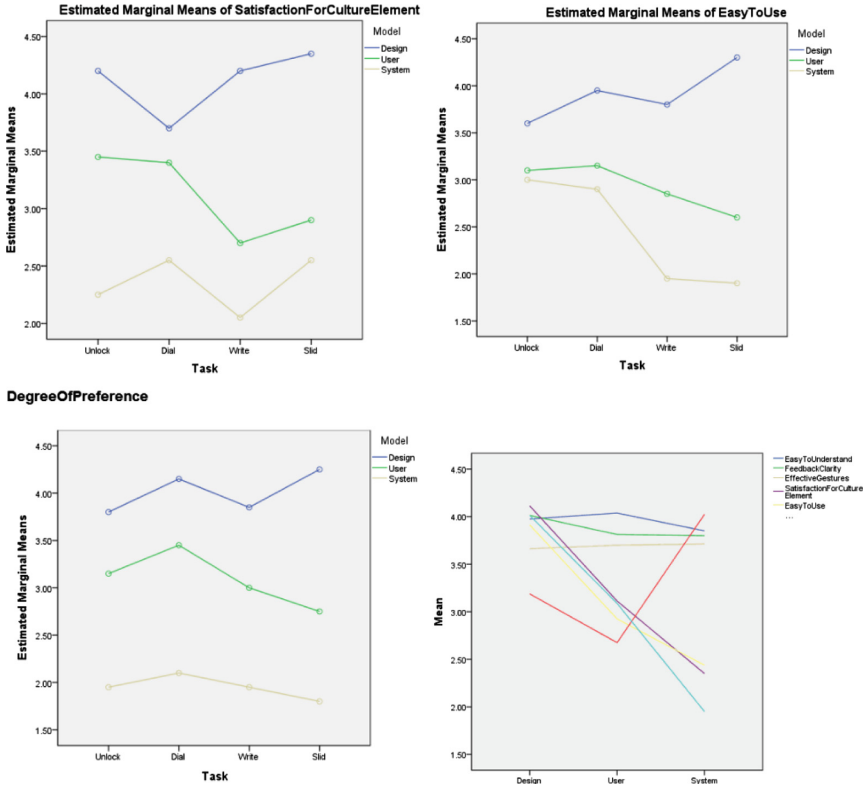


Fig. 5. Relationship between different model and user experience

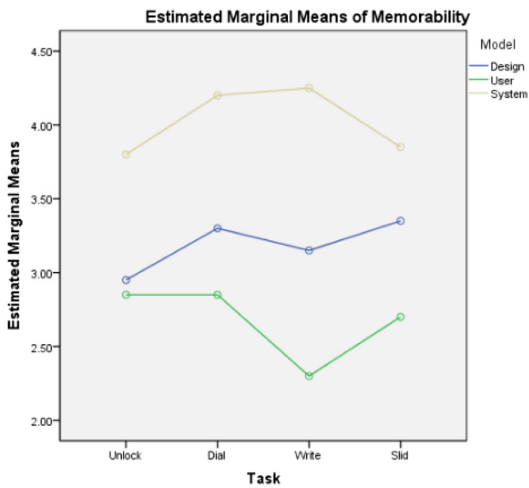


Fig. 6. Relationship between different model and user experience



- Different complexity of task type, there is no bigger difference influence on user experience; the “Easy to Understand”, “Feedback Clarity” affects the user experience significantly, it indicates that Ink Painting element fit into multiple functions and interface design scenario (Fig. 7).
- “Effective Gestures” has very limited influence on the interaction experience. May be because the user do an operation used gestures are familiar, such as clicking, sliding gesture, so the user gestures have a weak influence on different model (Fig. 8).

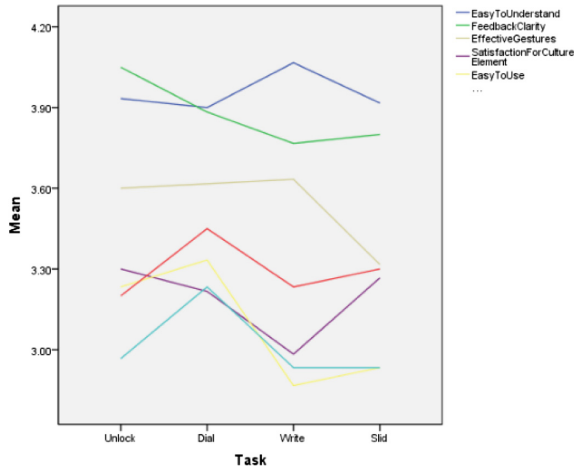


Fig. 7. Relationship between task and user experience

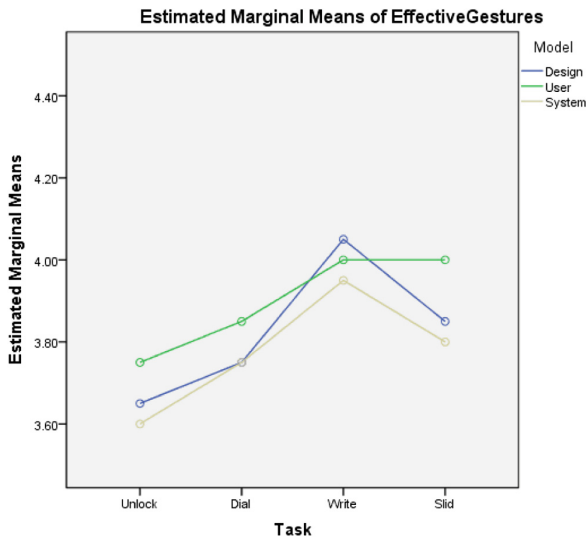


Fig. 8. Relationship between different model and user experience

## 6 Conclusion

Mental models still have high guiding significance in the interaction design of mobile Internet products, the user's understanding of cultural elements significantly affects the interaction experience. Traditional culture elements integrate into interaction design improving the emotional and operational experience.

When the elements implementation effect beyond user expectations of the Design Model, the usability of the product will be high, the user experience will be better. Users can clearly realize the product innovative and interesting, and can have more impressive. When the System Model is inconsistent with User Mental, the usability of the product is reduced, the user experience will be affected.

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