New Chinese furniture design research based on Zaltman metaphor elicitation technique

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Abstract. Objective To explore users' inner tacit knowledge from users' experience and extract the characteristics of users' demand for new Chinese furniture. Methods Zaltman Metaphor Elicitation Technique (ZMET) was used to extract the consensus constructs of users about new Chinese furniture, and these consensus constructs were integrated and sorted based on attributes, results and values, to build a consensus map. Then, according to the feature classification framework, the constructs were classified into demand levels, demand features and design features, and finally, the design features were connected with design elements. Conclusion The design dialogue framework based on Metaphor Elicitation Technique can dig deep into users' tacit knowledge and provide emotional design ideas for new Chinese furniture.

Keywords: new Chinese furniture; Metaphor Elicitation Technique; Mental consensus map; design element

1 Introduction

Chinese culture is profound, with rich connotations and forms precipitated in the long history of 5,000 years. As one of the carriers of culture, furniture has derived many types with the evolution of the times. These pieces of furniture from Shang and Zhou dynasties are collectively called Chinese furniture. The main style of Chinese furniture is palace-style architecture, with a symmetrical shape and mainly made of wood. Most

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of the impressions are grand and magnificent. With the development of the times, the diversity of architectural styles and the increasing personalization of user aesthetic values. People's expectations for Chinese furniture products have changed, and Chinese furniture has gradually extended to cultural furniture. Under this background, new Chinese furniture came into being. How to retain the characteristics of Chinese style and reflect the aesthetics of the new era has become the focus of new Chinese furniture design. From the perspective of perceptual cognition, this paper uses Zaltman Metaphor Elicitation Technique to explore the feelings related to emotional cognition in users' hearts. Provide design direction for new Chinese furniture.

2 The connotation of new Chinese furniture

The design of furniture is closely related to the Zeitgeist and contemporary culture, reflecting the aesthetics and culture of different eras. The furniture of each era is the inheritance and development of the furniture of the previous era, and the new Chinese furniture is a new interpretation based on Chinese furniture. From a broad perspective, all furniture designed and innovated based on Chinese furniture belongs to the category of new Chinese furniture. But strictly speaking, the new Chinese furniture should be able to inherit the spirit of traditional Chinese culture and reflect the characteristics of the contemporary era. On the one hand, Zhuang Wei believes that the new Chinese furniture should have a national character, which can reflect Chinese philosophy and culture. On the other hand, it can show the characteristics of the times with new materials and new processes[1]. Huang Jinyun believes that the new Chinese furniture should be able to reflect tradition, integrate the traditional culture into the design process, and apply new technologies and new processes[2].

New Chinese furniture is not a simple reproduction of Chinese furniture, but a reinterpretation of the connotation of China's traditional furniture culture under the current background[3]. The concept of new Chinese-style furniture originated in the 1990s. Since 2004, some new Chinese-style furniture brands have appeared in the market. However, at present, the development and design of new Chinese furniture in the industry are mostly focused on the combination of traditional furniture modeling and modern production technology, which leads to the serious homogenization of products and the inability of consumers to meet their needs better. Therefore, it is particularly important to explore users' expectations for new Chinese furniture before product design.

In this study, ZMET was used to conduct in-depth interviews with the audience of "new Chinese furniture", and extracted the audience's cognitive conception of new Chinese furniture based on the synonymous reproduction of "metaphorical" keywords. Based on this, a mental consensus map is drawn, which presents a clear explanation picture for the design focus of new Chinese furniture.

3 Zaltman Metaphor Elicitation Technique

The metaphor elicitation technique is proposed by Professor Zaltman of Harvard Business School, based on non-verbal pictures, through in-depth interview techniques, the Kelly repertory grid technique, laddering technique and other technologies to extract the latent ideas about the theme in the respondent's mind, and then sort out the relationship between the ideas and construct the research method of the respondent's mental model[4]. This method is based on human thinking in the early days, presented in the form of stories, ideas, mental models, sensory images, summary images, consensus maps, etc., through which researchers can capture people's true thoughts and feelings. Although the thinking level of the relevant way is different, the meaning produced can be connected with superficial knowledge and deep meaning, resonating with each other[5]. The specific operation is shown in Table 1.

Table 1. Operation steps about ZMET

step	definite and detailed
	Determine the topic of the interview
Determine the theme Picture preparation	1. Recruit interviewees 2. Users collect 8-12 pictures representing or suggesting the meaning, thoughts or feelings of the theme 7-10 days in advance.
User interview	1. tell stories; 2. Lost images; 3. Classifying pictures 4. Extracting ideas; 5. The most representative pictures; 6. The most opposite picture; 7. Sensory images
Summarize and analyze	1. Construction and arrangement of construction relations; 2. Data coding; 3. Draw a consensus map; 4. Observe the consensus map; 5. Describe important constructs and consensus relationships

Construction is a key description or "quasi-concept" about things summarized or created by people according to their own experience in a period, which will change with time[4]. The mental model is a temporary representation of the problem situation or external things established in short-term memory when people understand things and reason in their daily lives, and it can also be a stable representation of the external world that people have stored in memory for a long time[6]. In personal life memory, there are constantly some daily life events that leave feelings and impressions in the mind, and gradually form personal views or concepts about things, and then guide the individual's daily behavior, which is the mental model in cognitive psychology [7].

The perceptual analysis of new Chinese furniture design elements based on ZMET is to integrate the metaphor elicitation technique with design. and its core is to find the user's inner implicit needs through interviews, which are based on the user's implicit experience and expressed through metaphorical pictures. Transform this implicit demand into explicit knowledge to obtain design features, which provide ideas for the design of new Chinese furniture.

4 ZMET research practice

4.1 Semi-structured interview

The topic of the interview is "What do you think new Chinese furniture looks like", and the purpose of the discussion is to understand the respondents' expectations for the new Chinese furniture. According to the verification, ZMET can effectively represent about 90% of the respondents' thoughts only by interviewing 4-5 respondents[8]. This interview recruited eight interviewees who are highly involved in new Chinese furniture, including two males and six females. Ask respondents to spend a week looking for 8-12 metaphorical images of their inner "new Chinese furniture" through various means, which must represent the feelings or meaning of the research topic to the interviewee.

Semi-Structured interview is adopted to conduct a one-on-one guided interviews with the interviewees, which takes about one hour. The interview content is recorded throughout. Take eight images provided by Respondent X as an example. (figure 1). First, interviewee X was asked to describe the nine pictures she provided one by one. Second, categorize the nine images according to their meaning and name each category, which divided the nine images into four categories: cultural, historical, exquisite and traditional. third, Using the triplet classification in the Kelly grid method, the 1st, 3rd, and 8th figures were randomly selected from the eight pictures shown in Figure 1, then respondent X was asked to classify them. She believes that figures 3 and 8 represent ease and pleasure, while figure 1 represents bondage. Then, the ladder-climbing interview method was used to understand the more core causal relationship and value behind the keywords provided by respondent X. This process is repeated until respondent X fatigues or no new keywords are proposed.

Fig. 1. pictures of interviewee X

4.2 Construction extraction

A total of 68 metaphorical diagrams were provided by the eight respondents. After the interview, the author carried out the data encoding steps.

First, extract constructs. Integrated the audio recordings of the eight interviewees and collected the high-frequency words that appeared in the interviews. Combine the content of the stories provided by the interviewee to capture the basic constructs proposed by each respondent. Subsequently, the author merged and sorted out

constructions with similar attributes, and confirmed the constructs that best matched the original meaning according to the context. By merging the same or similar keywords, a total of 248 ideas were preliminarily obtained.

Second, sort out the logical relationship between constructs. The constructs are divided into initial constructs, connecting constructs and final constructs. The initial construct is the respondent's association with new Chinese furniture; The connecting construct is used to describe the context or feeling created by the initial construct, which is the respondent's perception of new Chinese furniture; The final construct is the ultimate result of the connecting construct, and it is also the deep understanding of the new Chinese furniture provided by the initial concept to the respondents [9].

Third, code the co-construct. Consensus constructs that can be included in the consensus map should follow the principle of convergence: First, there are constructs mentioned by 1/3 of the total number of respondents; Second, one-quarter of the total number of respondents mentioned the relationship between constructs[4,10]. The total number of respondents in this study is 8, so the number of people who mentioned construct and construct relationship is 2.67 and 2 respectively. Ultimately, constructs proposed by 3 or more people are identified as common constructs, and the relationships between constructs mentioned by 2 or more people are included in the consensus map. Based on the above conditions, 30 consensus constructs have been sorted out.

4.3 Feature classification

4.3.1 Building a consensus map.

Among the 30 common constructs obtained from the above steps, there are 9 initial constructs,15 connecting constructs and 6 ending constructs. At this point, a mental consensus map of respondents on new Chinese furniture can be constructed (Figure 2)

4.3.2 Draw an A-C-V matrix table.

The resulting 30 common constructs, combined with the means-goal chain, are divided into basic attributes (A), use results (C) and values (V). For numbering these constructs, the basic attribute hierarchy is A1, A2... A9, the use result hierarchy is C1, C2... C15, the value level is V1, V2... V6. Use and build relationships between them to get every A-C-V climbing chain. There are two types of relationships between constructs: one is direct (two constructs are directly connected) and the other is indirect (two constructs need to be connected through other constructs). Direct relations are encoded with integers, which are counted as 1.00 for each mention, and decimals for indirect relations are encoded with 0.01 for each mention. based on this the A-C-V matrix is drawn (Table 2)

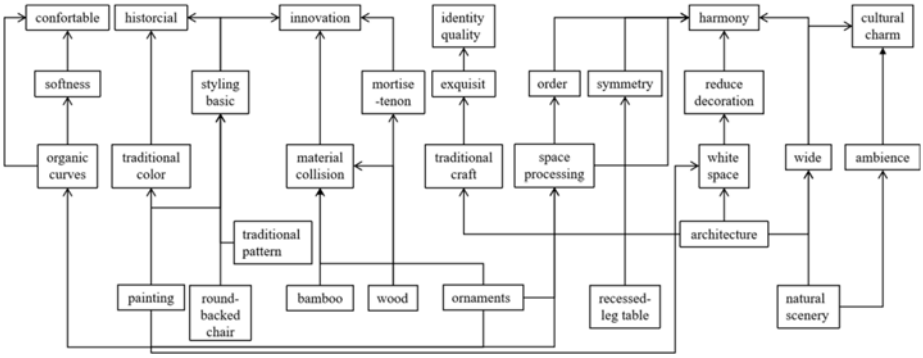

Fig. 2. Consensus Map of New Chinese Furniture Perception

Table 2. Matrix of construct relationship

	Constructs	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	V1	V2	V3	V4	V5	V6
1	A1 painti		3.000	5.000			4.000				0.003	2.000				0.003		0.009	0.007	0.002		
2	A2 round-backe											3.000							0.003	0.003		
3	A3 bamb				3.000															0.003		
4	A4 wood				5.000								3.000							0.007		
5	A5 natural scener							4.000							5.000			0.004				0.007
6	A6 recessed-leg									3.000								0.003				
7	A7 or-na-ments	5.000	5.000		4.000				0.005		0.003						0.007	0.007		0.004		
8	A8 tra-di-tional											3.000							0.003	0.003		
9	A9 archi tectur					4.000	2.000							0.004	2.000	0.002		0.004			0.003	0.002
10	C1 organic curves								5.000								6.003					
11	C2 space processin										3.000							4.003				
12	C3 tra-di-tion																		6.000			

13	C4 material colli-							4.00		
14	C5 tra-di-tional pro	5.00							0.03	
15	C6 white			3.00			0.03			
16	C7 ambience									4.00
17	C8 softne				3.00					
18	C9 sym m					3.00				
19	C10 or-					4.00				
20	C11 styling basic						8.00	3.00		
21	C12 mortise-tenon							3.00		
22	C13 ex-quisit								3.00	
23	C14 wi					4.00				3.00
24	C15 re-duce decoration					3.00				
25	V1 comfort									
26	V2 harmony									
27	V3 histor									
28	V4 in-no-va-tion									
29	V5 identity qu al-ity									
30	V6 cul tu-ral cha									

4.3.3 Draw a hierarchical value map (HVM).

Plot the hierarchical value map according to the A-C-V matrix table (Figure 3). The drawing criterion is as follows: if the relationship between the constructs is direct, the cut-off value is 3.00, if the relationship between the constructs is direct and indirect, the cut-off value is 3.03, and if the relationship between the constructs is indirect, the cut-off value is 0.03.

4.4 Design practices

Design element joins based on hierarchical value tables. According to the three design features of cocking case, traditional craftsmanship and sense of history, the form, color, material and craftsmanship are conceived, and the final effect is shown in Figure 4.

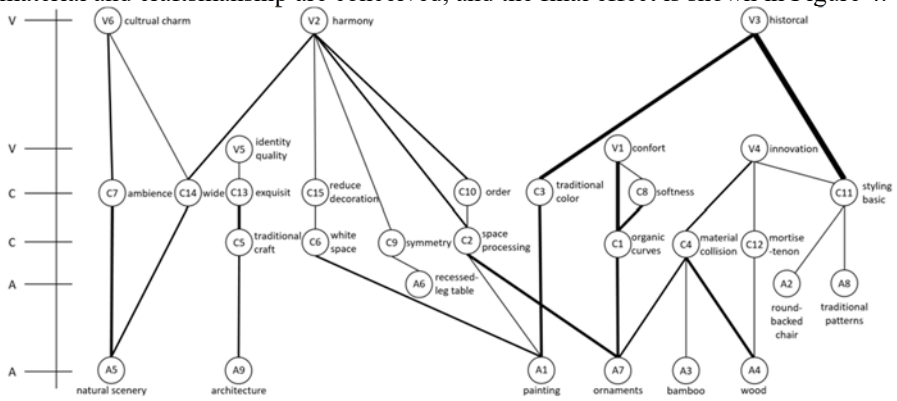

Fig. 3. Hierarchical value map

Fig. 4. The final effect of the new Chinese tea table

5 Conclusion

The design of new Chinese furniture should be based on scientific theory, and at the same time meet the needs of contemporary people's life and aesthetics, and have the spiritual value of inheriting traditional culture, which is an inevitable choice for historical development. It is not advisable to simply reproduce traditional furniture and only

focus on the combination of traditional furniture modeling and modern production technology. Those explorations of furniture that lack cultural context and social reality are destined to be short-lived[11]. Therefore, designers of new Chinese furniture should start from the social reality and the actual needs of users, and combine the classic elements of traditional culture to show the unique style of modern Chinese furniture with more novel and classic characteristics.

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