How the Designers' Keyword-Thinking Influences on the Ideation

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Abstract: The purpose of this study is to explore the designers' thinking pattern in the ideation process by considering the linking relationship between the keywords they are thinking about and the idea sketch they are drawing. For the purpose, the method of observations with 34 graphic design students and an analytical process with 3 coders were conducted. The analysis shows that some specific objects from their keyword thinking process could be easily thought about for forming an idea sketch. Besides, most design students tend to develop an idea sketch with the features of simple and abstract for the task in the study. Besides, the retrospective interview is a method that not interrupts the participants during their ideation process. It's also helpful to the study and should be considered about in the future study.

Key words: Ideation, Design thinking, Referring behavior

1. Introduction

Designers' brainstorming or ideation is a process to finding images or concepts that can be adopted into their design ideas. Cheng [1] stated that before designers sit down with a pencil to start sketching their ideas, they often first browse through some relevant information or images online or from printed material, such as books or magazines. Some researchers argue that visual data can trigger designers' mental image and help them to develop the solutions in the design process [2, 3, 4]. The visual stimuli therefore have been regarded as the significant influence when designers are dealing with various design problems [5, 6].

A current research issue is to understand how the images may affect designers' creativity and ideation process. Petre et al. [7] proposed that designers tend to select and adapt a given source or incorporate the source into their imagination to produce indirect or unexpected ideas. Many researchers have also studied how designers utilize their own sketches and how such sketches help them think up ideas and concepts [4, 8, 9, 10]. In summary, these researchers investigate designers' thinking procedures in the designing through analyzing their external representations.

We are interested in how the searched target will have influence on designers' associative mechanism when they are generating the desired ideas, specifically, in the context of graphic design. In this paper we report an experiment conducted to investigate how a graphic designer might draw their idea sketches and how the retrieved information or data may influence on designers' ideation process. Thus, the first question here is, what kind of influence that different type of idea may have in designers' ideation process? The second question is then, when designer make use of a particular idea for their designs, what types of transfer might that be? To find the answer to these questions, we conducted an empirical study and coding analysis to investigate the influence of the retrieved data and associated ideas in design ideation.

2. Experiment

We recruited 34 graphic design students (20 males and 14 females) as the subjects for the experiment. The participants were second year undergraduate students from the Visual Communication Design Department, National Yunlin University of Science and Technology in Taiwan. For investigating the designers' thinking pattern in the ideation process, we asked those student designers to take the same design task in an arranged studio. The task aims to be a design topic for tracing the designers' thinking path, which is asking designers to write down some ideas and draw the logos for a traditional food restaurant, named "Yuan Zhi Wei (means original taste)". The student designers were given unlimited time to carry out their task until they thought an expected logo sketch had been completed. Besides, they were free to search for or retrieve any information and pictures related to the topic.

The sequence of the experiment was as follows: 1) the task was given to the participants on a written instruction sheet accompanied by a brief oral explanation, 2) participants were given 10 minutes to write down or draw their ideas on the left column of an idea sketch sheet (see Figure 1). They were free to list as many as they wish, 3) Then the participants were asked to design a logo for "Yuan Zhi Wei traditional food restaurant". There was no time constrain to perform the design task by hand on the right column of an idea sketch sheet (see Figure 1).

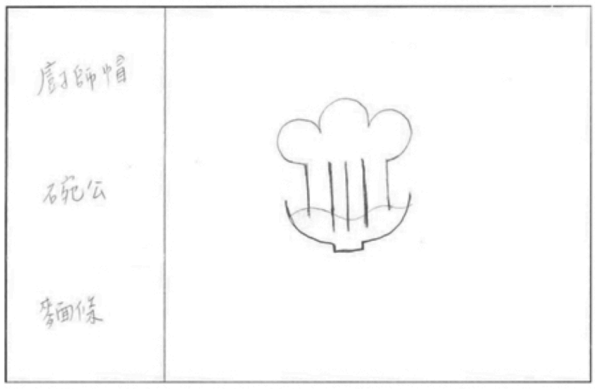

Figure1. An example of the idea sketch sheet

After the experimental data was collected, we processed an analytic process to identify the relationship between the retrieved data and designers' idea sketch with inter-coder reliability. The collected experiment data includes 34 copies of idea sketch. In the analytic process, three design researchers at Tatung University (a professor and two graduate students in the design field) serve as coders for the analysis. There are two sections in the analytic process, which are: 1) sorting the idea sketches into groups according to those designers' written ideas and naming each group, and 2) writing down each keyword the designers keyed in while reviewing all designers' desktop screen record, as well as identifying the relationship between those keywords or retrieved information and the written ideas.

3. Results and Discussions

A total of 34 idea sketch sheets were collected and analyzed by 3 coders in the analytic process. The participants averagely spent 40 minutes to complete their idea sketch for a restaurant's logo design. Based on those

participants' idea sketch sheets, as well as the three coders' analysis and their review of desktop screen records, this paper shows the results of the experiment as follows:

3.1 Categories of the 34 Idea Sketches

The 34 participants' idea sketches and written idea are showed in Table 1, the figure in the gray row indicates each participant's number. According to the grouping result of the idea sketches by referring to the participants' written ideas, seven categories of idea sketch are sorted (see Table 2), which are the categories of "people", "food", "plant", "tableware", "Chinese character", "geometrical figure" and "feeling".

The category "people" includes the ideas of chef and mother, such as the idea sketches of participant No.6, 15, 20 and 31. The category "food" includes the ideas of fried egg, noodles and fish, such as the idea sketches of participant No.9, 15, 16, 17, 18 and 27. The category "plant" includes the ideas of leaves, vegetables, rice, seedling, plant and forest, such as the idea sketches of participant No.3, 7, 9, 11, 12 and so on. The category "tableware" includes the ideas of chopsticks, bowl, coffee cup, dish, knife and fork, such as the idea sketches of participant No.1, 2, 4, 5, 7, and so on.

In the category "Chinese character", the character 'Yuan' (原) shows the meaning of original, which seems to be the main idea for those participants. That is, they took the character's meaning (original) and shape to form an idea sketch, such as the idea sketches of participant No.16, 17, 18, 22 and 34. The category "geometrical figure" includes the ideas of diamond, curve, circle and streamline shape, such as the idea sketches of participant No.1, 3, 4, 13, 14 and so on. Then, the category "feeling" includes the ideas of hot, smell good, local, taste good, excellent, smile, happy and fresh, such as the idea sketches of participant No.4, 5, 8, 11, 12 and so on.

Table 1. Idea sketch and written ideas of the 34 participants

No.	Idea sketch	Written ideas	No.	Idea sketch	Written ideas
1		diamond chopsticks	18		fried fish dish Yuan (原)
2		bowl	19		leaves hot
3		curve leaves	20		chef fork
4		circle coffee cup hot	21		leaf smile
5		coffee cup smell good	22		leaf Yuan (原)
6		mother	23		seedling dish
7		leaf dish	24		plant bowl

8		fork local	25		forest happy
9		fried egg leaf	26		plant
10		knife & fork	27		fishes
11		vegetable taste good	28		plant fresh
12		rice excellent	29		plant taste good
13		circle chopstick	30		circle taste good
14		streamline shape leaf	31		chef circle
15		chef noodles bowl	32		circle plant
16		noodles Yuan (原) smell good	33		plant
17		noodles onion Yuan (原)	34		Yuan (原) smell good

Table 2. Categories of the 34 participants' idea sketch

Category	Participant	The mostly used idea
people	6, 15, 20, 31	a chef
food	9, 15, 16, 17, 18, 27	noodles
plant	3, 7, 9, 11, 12, 14, 17, 19, 21, 22, 23, 24, 25, 26, 28, 29, 32, 33	leaves
tableware	1, 2, 4, 5, 7, 8, 10, 13, 15, 18, 20, 23, 24	a bowl, a fork, a dish
Chinese character	16, 17, 18, 22, 34	Yuan (原)
geometrical figure	1, 3, 4, 13, 14, 30, 31, 32	a circle
feeling	4, 5, 8, 11, 12, 16, 19, 21, 25, 28, 29, 30, 34	smell good, taste good

3.2 What Ideas the Designers Mostly Thought about for the Task?

Based on the result of the sketch categories, we found that only participant No.2, 6, 10, 26, 27 and 33 thought about one aspect of idea among the 34 participants during their task performing process. However, most participants took two aspects of idea to design the logo for "Yuan Zhi Wei" traditional food restaurant. Participant

No.4, 15, 16, 17 and 18 even took the task by considering of three aspects of idea. For instants, participant No.4 took three category ideas, 'a coffee cup', 'a circle' and 'hot', to be the main elements to form an idea sketch.

Moreover, most participants thought about the ideas from "plant" category to design a logo for the restaurant. A total of 18 participants had written down the ideas of this category before they draw their idea sketch, which occupied over half of all participants. Then, a total of 13 participants thought about the ideas from "tableware" and "feeling" category to design a logo for this task. They had written down the ideas of this category before they draw their idea sketch, which occupied 38% of all participants. After that, a total of 8 participants thought about the ideas from "geometrical figure", 6 participants thought about "food" category, 5 participants thought about the ideas from "Chinese character" category, and 4 participants thought about the ideas from "people" category to draw the sketch for the restaurant logo. By examining the number of participants in thinking about the category of ideas during their task, the ranking of the idea categories are "plant" > "tableware", "feeling" > "geometrical figure" > "food" > "Chinese character" > "people" (refer to Table 2).

Among the 18 participants who considered about the "plant" category, 'a leaf' was an element being thought of mostly during the task. Among the 13 participants who considered about the "tableware" category, 'a bowl', 'a fork', and 'a dish' were more often being thought of during the task. Interestingly, a typical element for Chinese traditional food, chopsticks, was even not being used so frequently in this category. Then, among the 13 participants who considered about the "feeling" category, the abstract figures what present the feeling of 'smell good' or 'taste good' (refer to the idea sketches of No.5 and 11 in Table 1) were more often being thought about during the task taking period in this category.

Besides, in the "geometrical figure" category, 'a circle' was more often being used for this task. In the "food" category, 'noodles' was being thought about mostly. Then, in the "Chinese character" category, the five participants all took the character 'Yuan (原)' to be an element for the logo of the traditional restaurant. In the "people" category, most participants were thinking of 'a chef' to be an element of the logo.

We may conjecture that the leaves could create more association on designers' mind to draw a logo for "Yuan Zhi Wei" traditional food restaurant. Designers might take the image of the leaves to show the meaning of 'original' for drawing the logo to be consistent with the meaning of the Chinese character '原' (Yuan). However, to those designers, the images of "food" might not be a main element for designing a logo of the traditional food restaurant. Besides, in terms of the development of geometrical figure, we found that designers seem to use a circle to draw a logo for the task, since the pronunciation of the Chinese character '圓' (means a circle) is completely the same as the pronunciation of the character '原' (Yuan).

3.3 Combinations of Different Idea Categories for This Task

By checking each participant's written ideas and idea sketch, the study made a matrix to show their combination of different category ideas in Table 3. Among all participants, six of them combined the idea of the "plant" category with the idea of the "feeling" category to form their idea sketch, which occupied 18% of all participants. It means that more designers thought that this kind of idea combination could make a proper logo for the traditional food restaurant.

Besides, several participants made a combination of the idea from the category of “plant” and “tableware”, from the category of “food” and “Chinese character”, “geometrical figure” and “plant”, “geometrical figure” and “tableware”, or “feeling” and “tableware” (refer to Table 3) to perform the task.

However, there was no participant took the task by making the idea combination from the category of “people” and “plant”, “people” and “Chinese character”, “people” and “feeling”, “food” and “geometrical figure”, or “Chinese character” and “geometrical figure”. It shows that, among the seven categories, designers mostly would not like to combine the idea from “people” category with other category. From the result, we may conjecture that the idea from “people” category is more difficult to be combined with other category idea. This kind of idea might mostly be regarded as an only one element for the logo of the traditional food restaurant.

Table 3. The matrix of designers’ idea combination result

	People	Food	Plant	Tableware	Chinese character	Geometrical figure	Feeling
People							
Food							
Plant							
Tableware							
Chinese character							
Geometrical figure							
Feeling							

3.4 Four Semantic spaces of the 34 idea sketches

According to the features of the 34 idea sketches, three coders sorted them into four different semantic spaces (refer to Figure 2), which are the space of ‘simple-abstract’, ‘simple-concrete’, ‘complex-abstract’ and ‘complex-concrete’. From the figure, the idea sketches of participants No. 3, 4, 5, 13, 14, 15, 19, 20, 22, 28, 29, 30 and 33 are placed into the space of ‘simple-abstract’. That is, a total of 13 participants drew a logo belong to the feature of ‘simple-abstract’, which occupied 38% of all participants. Then, the idea sketches of participants No.6, 7, 12, 24, 25, 26 and 27 are placed into the space of ‘complex-concrete’. It means that a total of 8 participants drew a logo belong to the feature of ‘complex-concrete’, which occupied 23% of all participants. The idea sketches of participants No. 1, 2, 8, 10, 11, 18 and 21 are placed into the space of ‘simple-concrete’. That is, a total of 7 participants drew a logo belong to the feature of ‘simple-concrete’, which occupied 21% of all participants. Finally, the sketches of participants No.9, 16, 17, 23, 31 and 34 are placed into the space of ‘complex-abstract’. It

means that a total of 6 participants drew a logo belong to the feature of ‘complex- abstract’, which occupied 18% of all participants.

Moreover, within the ‘simple-abstract’ space, 7 out of the 13 designers made the logo by thinking about the idea of “plant” category, and 5 of them made by thinking about the idea of “tableware” category. Within the ‘simple-concrete’ space, 5 out of the 7 designers made the logo by thinking about the idea of “tableware” category. Within the ‘complex-abstract’ space, 3 out of the 6 designers made the logo by thinking about the idea of “food” category, and 3 of them made the logo by thinking about the idea of “Chinese character”. Besides, within the ‘complex-concrete’ space, 6 out of the 8 designers made the logo by thinking about the idea of “plant” category.

By checking the result of the semantic space, we found that most designers tended to develop an idea sketch with the feature of simple and abstract for performing the task. However, there are fewer designers developed an idea sketch with the feature of simple and concrete, complex and abstract, and complex and concrete.

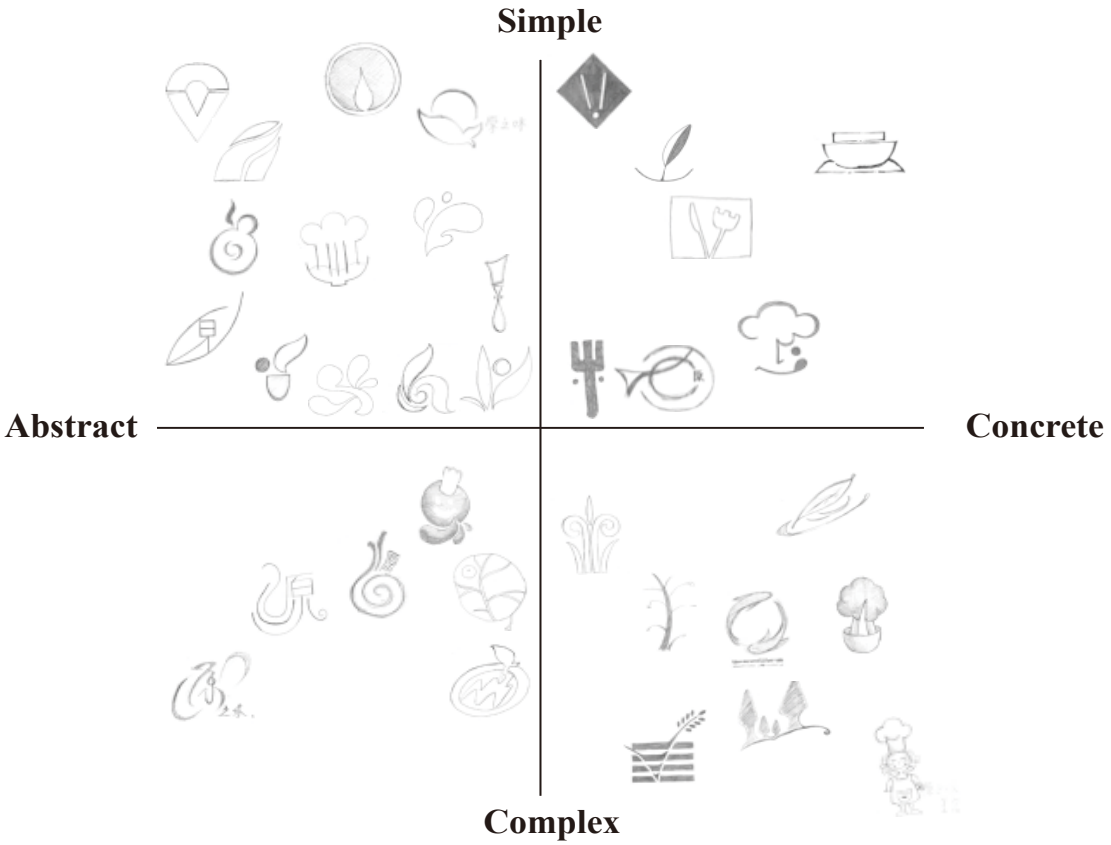

Figure2. Semantic space of the 34 idea sketches

3.5 Designers’ keywords for retrieving related information on-line

By tracing the participants’ keyed in keywords, the study totally recorded 48 different keywords from the 34 participants’ task taking process. Six categories are sorted by three coders, which include the categories of “nature”, “food”, “people”, “tableware”, “shape” and “adjectives”.

The “nature” category includes 25 different keywords, which are ‘green’, ‘leaves’, ‘forest’, ‘seedlings’ and so on, occupied 52% of all keywords. The “food” category includes 8 different keywords, which are ‘snack’, ‘Braised pork rice’, ‘Taiwanese food’, and so on, occupied 16% of all keywords. The “people” category includes

3 different keywords, which are ‘chef’, ‘mother’ and ‘grandmother’, occupied 6% of all keywords. Then, the “tableware” category includes 5 different keywords, which are ‘bowl’, ‘fork’, ‘knife’, ‘dish’ and ‘chopsticks’, occupied 10% of all keywords. The “shape” category includes 4 different keywords, which are ‘circle’, ‘diamond’, ‘spiral’ and ‘semicircle’, occupied 9% of all keywords. Then, the “adjectives” category includes 3 different keywords, which are ‘traditional’, ‘original’ and ‘simple’, occupied 7% of all keywords.

Based on the result, most designers in the study retrieved some related information through keying in the “nature” category keywords to perform the task. The result also interprets why most designers thought about the ideas from “plant” category to design a logo for the restaurant.

4. Conclusions

In this paper, we conducted an experiment to explore and investigate how the designers develop their idea by retrieving some related information on-line during their ideation process. We have sorted the designers’ idea sketches, collected and analyzed the designers’’ written ideas, and sorted their retrieving keywords. Based on the discussion, several findings are found as follows: firstly, ‘leaves’ could show the meaning of ‘original’ for drawing the logo to be consistent with the meaning of the Chinese character ‘原’ (Yuan). Secondly, in terms of the development of geometrical figure, designers tend to use a ‘circle’ to draw a logo for the task, since the pronunciation of the Chinese character ‘圓’ (means a ‘circle’) is completely the same as the pronunciation of the Chinese character ‘原’ (Yuan). Thirdly, the idea from “people” category is more difficult to be combined with other category idea and mostly be regarded as an only one element for the logo of the traditional food restaurant. Finally, most designers tend to develop an idea sketch with the feature of simple and abstract for the task.

Moreover, an interesting issue and a suggest may need to be considered about in the future study. That is to investigate the relationship between the ‘chopsticks’ and a ‘traditional food restaurant’ by conducting an experiment with more participants. And the further study should conduct a retrospective interview after each designer’s task is completed for getting a deeper understanding of his/her idea transferring process.

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