22 A Cognitive Approach to Architectural Style

several characteristics of design thinking in architecture

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INTRODUCTION

Designing is a complicated human behavior and method, and is often treated as a mysterious "black box" operation in human mind. In the early period as for theory-studying of design thinking, the way of thinking that the researchers took were mostly descriptive discussions. Therefore, they lacked direct and empirical evidence although those studies provided significant exploration of design thinking (Wang, 1995). In recent years as for the study of cognitive science, they have tried to make design "glass box". That is to try to make the thinking processes embedded in designers publicized. That is also to externalize the design procedure which provided the design studies another theoretical basis of more accurate and deeply researched procedure (Jones, 1992). Hence the studying of design thinking has become more important and the method of designing has also progressed a lot. For example, the classification of the nature of design problem such as ill-defined and well-defined (Newell, Shaw, and Simon, 1967), and different theoretical procedure modes for different disciplines, such as viewing architectural models as conjecture-analysis models and viewing engineering models as analysis-synthesis (Cross, 1991).

In the process of architectural designing, from the planning stage to the construction stage, the practical operations involve very much complicated problems and contents. Given the overall framework of architectural processes, how do architects consider issues of functions, esthetics and concepts in mind? There are a lot of problems to clarify. Therefore this study will discuss, in the process of design thinking, representations and characteristics of function, form, experience, intention, and their roles underlying the thinking processes? The aim of this research is to find out several characteristics of architectural design process through cognitive experiments to bring forth the definite theoretical models. In addition, the secondary objective is to find out the components interacted in these models.

1.0 BACKGROUND

In the previous studies of architecture, the explanation about phenomenon in the processes of design is not complete. In his famous book The Logic of Architecture, Mitchell mentioned that Louis Sullivan alternatively proposed that "from fallow function", but this provides little practical guidance since failed to specify precisely what he meant by "form" or "function" or (for that matter) "form" (Mitchell, 1992). In the process of architectural design, there are too many factors involved, including design

problems and design behavior. The design problem contains a passive agenda in terms of its organizations and representations. The designer provides an active agenda dependent on the goals. The two agendas are woven together in the design process: the designer projects their unique experience onto the design problem to form a unique design solution (Lloyd, 1994). Consequently, we need a more accurate and deeper theoretical basis to explain and handle the general phenomenon in designing. Moreover, in the contemporary cognitive science as for discussing the procedures of design studying, scholars start to definitely define and locate the methods and the scope of design thinking in the past. There are also quite a few scholars bringing forth theoretical models of thinking to explain the phenomenon in design thinking such as Simon's (1981) search model and Schön's (1992) seeing-moving-seeing model. All those studies provide the advanced knowledge about how designers think. Another way, in designer's experience study, Peter Lloyd point out: less experienced designers utilized a global approach to design problem solving whereas more experienced designers used a localized approach demonstrating an ability to decompose and structure the design problem(Lloyd, 1994).The design process of expert is top-down and non-expert is bottom-up(Akin, 1978).

2.0 EMPIRICAL STUDY

The research methods adopted in this study is retrospective protocol analysis to analyze verbal data and drawings produced during the procedure of the experiments. The analysis structure is based on three utterance categories by Peter Lloyd. We use G (generative), D (deductive), E (evaluation) to analyze the protocol of the subjects. In addition, We will add F (function) and f (form) to judge what kind of design approaching strategies that designer is performing. The subjects in this experiment are 6 male designers and 1 female designers. They have acquired 5-year to 11-year professional experiences in architecture. In this experiment, we gave each designer the same design problems and asked them to study the problems well and draw some sketches on paper. In the process of these subjects' designing, they were told to explain their thinking methods if there were any and to explain reasons for each important step. Additionally, a video was equipped to record all the procedures in the experiments.

RESULTS AND CONCLUSION

We can see some phenomena by experimental data (fig. 1). From the design thinking process, the subject one have acquired 11-year architectural design experience, so that when he faced to the design problem he could generate a solution immediately, and moved into the next thinking stage. Moreover, the subject six have gained 5-year architectural design experience. He repeated the D/G stage in his design thinking process in order to search for several possible solutions, and to decide the best one.

From the result of her drawings, the subject three clearly followed a top-down thinking mode, and function-follows-form approach. In contrary, the subject four followed the form-follows-function approach and a bottom-up thinking mode. Although approaches found in the behavior of subject three and four were very clear in the beginning, they also used opposite approaches in the rest of their processes.

From the designers' verbal data, in the first stage of design process, the verbal data of the subject five and six have obviously intentional description, and the result of their drawing were different from others.

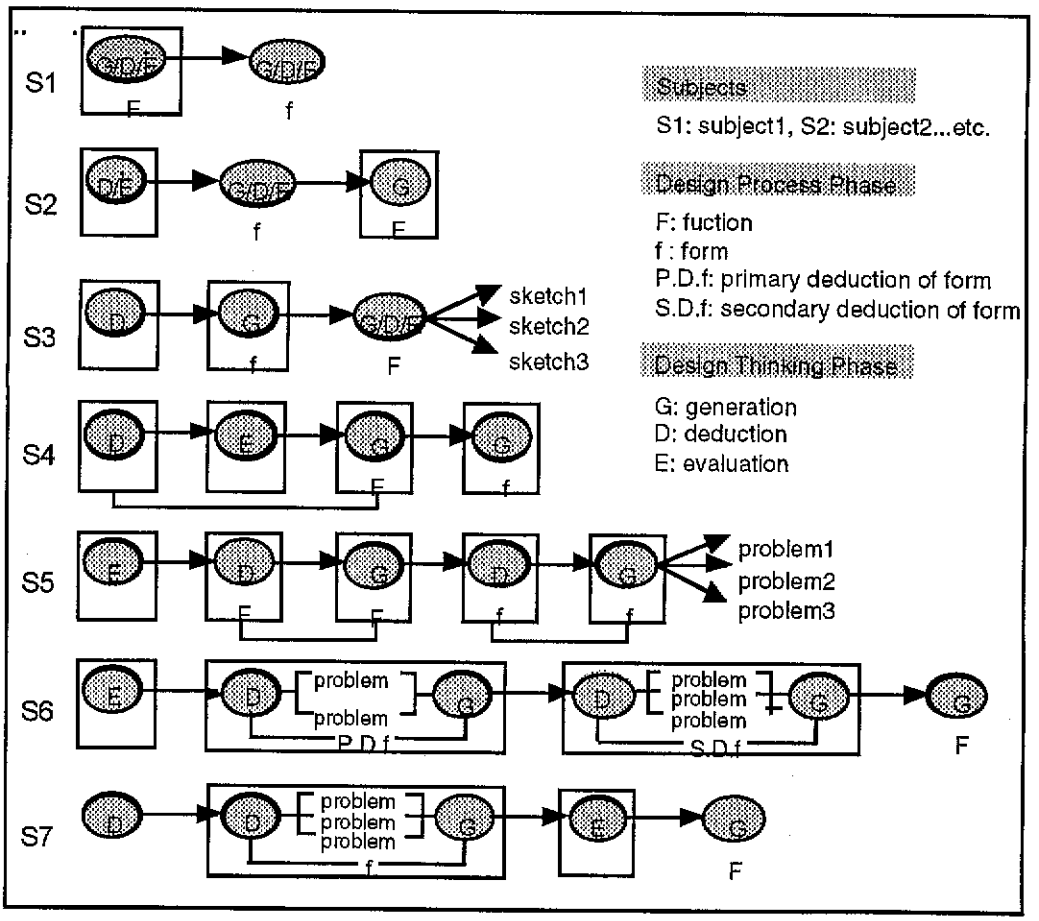

Fig 1: Experiment results

So, the following viewpoints can be concluded:

- Designers who acquired more experience simply perform forward-chaining search in the design thinking process, whereas designers who acquired less experience repeated deduction in the design process and made backward-chaining search. Designers acquired more experience normally take a short time to solve problems and fewer steps to consider; designers acquired less experience need longer time and more steps to solve problems however more possibilities of design could be explored.

- The thinking mode of designers is combined the two different search in design thinking process. For example, in form-follows-function thinking mode, we can also find designers approached by the mode function-follows-form.

- The first stage of design thinking can dominantly decide the design result. It is possible to find E stage in the beginning during the process of the subjects who

followed the intentional mode. Therefore, it is valuable to further explore the role of E stage in design as evaluation after actions and evaluation in the very beginning.

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