Page 1: My research topic is about generating implications for design in practice: How different stimuli are retrieved and help to generate design ideas.

Page 2: Here is my outline. First, I will introduce the motivation. The second part is the focused research area where I want to study during design process. Afterwards, I will present the related work in the literature, and finally I will present the conclusions and the next step for my research.

Page 3:

Why I choose this research topic? I have been involved in design **area** for more than a decade. No matter as a student, a designer or a design researcher, I have been haunted by two problems.

1. First, the design survey result is difficult to be transformed to design ideas.

Design survey is usually performed as the first step in design process. Designer hope the survey result will help them to find the inspiration and generate the design idea. Unfortunately, this approach is not so efficient. A large amount of survey does not necessarily lead to innovative ideas.

1. Second, depending on design’s **personal experience**, only a limited number of methods would be employed to generate their design idea.

Therefore I always want to figure out:

How to increase the conversion efficiency between the survey result and the design ideas? For example, how to design an effective survey with **good sources**,

and how to **enrich** the methods for individual designers.

Page 4: Those are issues in my personal experience. I was thinking whether this is a common situation for other designers? I got a chance to interview about 16 IF awarded designers when attending one award ceremony. These designers come from all over the world with different educational background and different industrial design area. I asked them the above two questions. Here is their answer. (Play the interview video)

From the interview, it can be seen that they also have difficulties to translate empirical findings to design ideas and **their design methods to get design ideas is constrained**. They also want to know how other designers get inspired and generate design ideas especially when they design some products in unfamiliar areas. At the same time, there is an unexpected phenomenon shown from the interview: some of them cannot articulate clearly how to get inspiration & generate design ideas. So giving designers including myself with even a brief opportunity to explore and refine our own ideation process may generate lasting benefits. Therefore, more research is necessary to understand how designersget inspiration and generate design idea from empirical findings.

Page 5: I ask myself if the problem has been solved or not? I found the answer from the following two papers. There still have challenge about translating empirical findings and other knowledge into design ideas, without consensus so far on how best to incorporate the fieldwork results into design. Because it is known that the generation of design idea is often considered a precedent-based type of reasoning, where knowledge is continuously transformed to produce new knowledge. This creative leap across the divide is very difficult, which means transforming one kind of knowledge (empirical findings) to another (ideas that inform design) is not an easy process.

Page 6: According to Tim Brown, the whole design process consists of three phases: inspiration, ideation, and implantation. Implementation can be further divided into five sub-stages. The problem we discussed before is a key factor from design research to design concept/ideas stage. Specifically, my research will focus on how designers get inspired and the way of translating the research insights to creative design ideas.

Page 7: Even the design implication is a big topic to study. To refine my research more specifically, I did a literature review, shown in this table. Because of time reason, I will not introduce them individually. Instead, I organize them hierarchically to in the next slide, where I would present them in a structured way.

Page 8: Through the literature review of design ideas generation, I get to know some state of research in related area. Design ideas could be generated from empirical finding or serendipitous inspiration. I hereby do not discuss the design ideas generated from serendipitous aspect but only from empirical findings. Because the way with serendipitous relies on uncertainty. **By contrast, the results derived from or relating to experiment and observation can make designer ignited with design inspirations, more targeted to resolve the practical problems, but also ensure the evidence obtained enables designer to answer the initial question as clearly as possible.**

As shown in the figure, I summarized five factors by using empirical finding source to generate design idea, including different design types of implications (what), idea generation in different areas (where), the design ideas generation time (when), the emotion factors during idea generation, and, the last and the most important, ideation from stimuli perspectives. I will only talk about stimuli because it is an additional tool to accelerate the design idea generation process. (click the stimuli)

Page 9: When talking about stimuli in design idea generation setting, it is something external that influences the design activity to elicit the formation of creative solutions for existing problems/potential needs. The stimuli is important to generate design ideas and valuable to research because searching for inspirational stimuli is an essential step in the initial stage of the design ideas generation. And understanding what and how stimuli designers use can help to support designers in a more efficient search, retrieval and usage of available inspirational sources.

Page 10:

Just the same to table before, I conducted another literature review for stimuli.

…

Literature review showed that there are various types of stimuli, including examples of products, pictures, written, documents and etc. The research also provided some evidence on what stimuli designers use in design ideas generation. In Malaga’s study, exposure to pictorial stimuli prompted the generation of more creative ideas than the textual. In another study, Goldschmidt and sever have shown the positive influence of using text as stimuli during idea generation, comparing with experimental conditions in which no external stimuli were received. It is seen that most research have investigated what stimuli designers prefer to use helping to generate design ideas between student and professional designers. However, there are few studies have explicitly addressed how stimuli are used in these two groups according to different projects. The imbalance is obvious.

Page 11：

The mostly referenced external stimuli include visual stimuli, text stimuli, object stimuli, verbal or conversational stimuli, and audible stimuli. (add figure for different types of stimuli)

Most research focus on the benefit of different types or categories of stimuli. And in practice, the different stimuli would be used in different project, even the same stimuli still plays a different role in different project. However, less research pay attention to the effectiveness of stimuli during design ideas generation by specific project.

Page 12: Moreover, studies indicated that designers are typically known having a preference for visual stimuli such as images, prototypes and so on. That might be partly because visual stimuli can provide straightforward cues which do not need translation between different modalities. In addition, visual stimuli has shown dual (positive or negative) effect during design ideas generation in a number of studies: it helps to generate more creative ideas than non-visual or mixed stimuli; it also help students & expert architects to deal with ill-defined problem.

Even the majority of the studies review indicated positive attitude toward visual stimuli use from the designers, there were also some exceptions. For example, some designers have negative opinions such as use of pictorial representation of existing problem could block/prevent/hinder the creative ideas generation **by limiting ideas to replicating (coping) works/ideas of existing examples**. So, while visual stimuli can improve the effectiveness and enhance creativity during design ideas generation, they can also lead to a type of design fixation which is an unconscious 非主观意识的 tendency to reuse ideas/principles of previously seen examples. **Sometimes, it is also difficult to use pictorial representation helping to present some abstract modalities.**

Due to the two-folded effect of visual stimuli, it depends on projects whether visual stimuli prompt or hinder the ideas generations. 加一句跟自己研究方向结合的话

Page 13:

The designers are also a key factor of this research. (add discussion of designer’s responsibility, add reason of why divide designers, it would be interesting…). According to **…**, **designers can be divided into two groups**: student and professional designers. Two rules are employed to distinguish professional designer from student designers:

1) Student designers are problem-based while professional ones are solution-focused. 2) Student designers do not have a clear structure to organize collected information, whereas professional ones analyze the problem extensively and embark on a quest for all kinds of helpful information.

The results show that there is no distinction between student and professional designers in choosing stimuli. But in general, professional designers generate design ideas more effectively and the design output is usually better. The problem is why?

Page 14: I make a hypothesis consisting of two reasons. First, the stimuli are retrieved and transformed differently by student and professional designers. Even if they have the same stimuli at the beginning, the output of design process would be different. Second, student and professional designers have different mindset in terms of design. For student designer, they are educated with concrete design techniques, but lack of mature design thinking. Therefore, it would be valuable to study how different visual stimuli are retrieved and transformed to generate design ideas, and study what is the mindset difference between student and professional designers.

Page 15:

To summarize, first, more research is required to generate design ideas from stimuli with an increased efficiency because most of previous works pay attention on the taxonomy of stimuli but not the effectiveness of using stimuli.

Second, stimuli shall be chosen with caution depending on specific project. Even for visual stimuli, the most popular stimuli, they may compromise the ideation process of designers.

Third, there is an obvious difference between student and professional designers when they apply the same stimuli. Based on this, I propose a hypothesis to explain the reasons behind.

Finally, for my next step, I would like to validate my hypothesis by answering following questions:

1. How different visual stimuli are retrieved and transformed to generate design ideas.
2. What is the difference between student and professional designer when they apply the same stimulus?

Page 17: Based on what was found in the literature review, the following are important issues to address as I plan for future studies in stimuli helping to generate design ideas:

More research needs to conduct in less explored skills area such as how stimuli are used during design ideas generation process;

The use of well established measures with clear reliability and validity information was not enough;

Help designers reflect upon their own design idea generation process, explore their mindset involved would generate lasting benefit;

Research should not only pay attention to specific techniques, but also the whole process and mindset included during design ideas generation.

Page 18:

Regarding to what have been done in literature review, my research questions are:

1. How do designers conduct a selection of stimuli, amongst the overwhelming diversity of available (visual) sources?

2. How different types of stimuli are used helping to transform empirical findings into design ideas?

1. What might be the difference between student and professional designers on the way to utilize (visual) stimuli during ideation? What is the difference about their mindset?

Page 19: At the beginning, I use ‘convenience sampling’ to get the participants. With the research going on, ‘purposeful sampling’ method was used for getting more targeted participants. The interview questions combine core questions together with the freedom to follow up points as necessary which make me get all intended data and unexpected statements. By the way, I also pay attention to gender balance, different nations to make sample more diversity.

Regarding to the data collection, as the interview is one-on-one face to face or online interview depending on the availability and accessibility of interview respondents, I use audio recording which allows me preserve raw data for review and analysis at a later data, but also allow me to focus on the question/answer process at hand. The designer’s visual dialog or documentation are also asked to present, in order to show their design ideas generation through typical design project included in dialog or documentation. Since inspiration happens on the mindset level, participants observation may disturb designers’ natural process and it is harder for researchers to tell how it starts. That is also the reason why I did not use observation method to see how designers generate design ideas. Comparing with observation, it is much more effective to help designers themselves to conduct reflection on their visual dialog or project documentation, which can provide direct answers and insights between lines. The reflection on visual dialog or project documentation gave subjects enough time to do reflection through thinking about how they utilize stimuli to generate design ideas from research insights, and their explanations and clarifications.

The data from interviews and visual dialog would be completely transcribed, thematically coded and analyzed. Thematically code according to the collected data, and arrange data into matrix structure to analyze. I make designers from 1 to 18 in a column, and have every interview questions in a line. Therefore, in horizontal direction, I can see the answers of one designer to each question. In vertical, I can see the answer of each designer to the same question. Then I can compare what are the same profiles and what are the differences, maybe some treat design more artistic, but some are more scientific. I would also make several typical quotes (reference) to support the statement.

Page 20: Through the literature review, the contribution intend to be:

Knowing the influence of various visual stimuli during idea generation.

Help designer have a better identity by reflecting on ideation process, offer student designers a deep understanding of professional designers' expertise in particular field, and which type of mindset they use to transfer design research to design ideas effectively

Build a guidance for designers to conduct an appropriate selection of stimuli, amongst the overwhelming diversity of available stimuli, to transfer empirical findings (one kind of knowledge) to design implications (another knowledge).

Page 21,22 Reference

Page 23: At last, thank you so much for your time being here to listen to my research. As I recently keep searching the suitable methodology to do such research. My current thinking is to use semi-structure qualitative interview together with analyzing designers’ visual dialog or project documentation. Any feedback are highly appreciated from you. Thank you.

**以前版本：**

Page 11: Regarding to my research hypothesis, my research objectives are as follows:

1. Understand **how** designers select and utilize different (visual) stimuli helping to generate design ideas from research findings, the design thinking and mindset involved in the process, 2. Compare the situation between student and professional designers, 3. Help designer reflect upon their own design idea generation process, explore their mindset involved.

Page 12: For achieving the research objectives, my research questions are as follows:

1. How do designers conduct a selection of stimuli, amongst the overwhelming diversity of available (visual) sources?

2. How different types of (visual) stimuli are used helping to transform empirical findings into design ideas?

1. What might be the difference between student and professional designers on their way to utilize specific (visual) stimuli during design idea generation? What is the difference about their mindset?

Page 13: After the research questions, I talk about research methodology.

Based on the literature review, I learned there are different types of stimuli using by designers, and the positive and negative effect of various stimuli on design ideas performance, and the preferable stimuli the designers are typically known to choose.

The second step is to get my object of study and plan to do a semi-structure interview with 18 designers (including 6 professors in design universities, 6 student designers and 6 professional designers).

At the beginning, I use ‘convenience sampling’ to get the participants. With the research going on, ‘purposeful sampling’ method was used for getting more targeted participants. The interview questions combine core questions together with the freedom to follow up points as necessary which make me get all intended data and unexpected statements. By the way, I also pay attention to gender balance, different nations to make sample more diversity.

Regarding to the data collection, as the interview is one-on-one face to face or online interview depending on the availability and accessibility of interview respondents, I use audio recording which allows me preserve raw data for review and analysis at a later data, but also allow me to focus on the question/answer process at hand. The designer’s visual dialog or documentation are also asked to present, in order to show their design ideas generation through typical design project included in dialog or documentation. Since inspiration happens on the mindset level, participants observation may disturb designers’ natural process and it is harder for researchers to tell how it starts. That is also the reason why I did not use observation method to see how designers generate design ideas. Comparing with observation, it is much more effective to help designers themselves to conduct reflection on their visual dialog or project documentation, which can provide direct answers and insights between lines. The reflection on visual dialog or project documentation gave subjects enough time to do reflection through thinking about how they utilize stimuli to generate design ideas from research insights, and their explanations and clarifications.

The data from interviews and visual dialog would be completely transcribed, thematically coded and analyzed. Thematically code according to the collected data, and arrange data into matrix structure to analyze. I make designers from 1 to 18 in a column, and have every interview questions in a line. Therefore, in horizontal direction, I can see the answers of one designer to each question. In vertical, I can see the answer of each designer to the same question. Then I can compare what are the same profiles and what are the differences, maybe some treat design more artistic, but some are more scientific. I would also make several typical quotes (reference) to support the statement.

Page 14: Through the research, the proposed contribution would be knowing the influence of various (visual) stimuli during idea generation. And the research would also help designers (especially student designers) have a better identity by reflecting upon their own design idea generation process, offer them a deep understanding of professional designers' knowledgeable expertise in particular field, and which type of mindset the professional designer use to transfer design research to design ideas effectively. At last, the research intend to build a guidance for designers to conduct an appropriate selection of visual stimuli, amongst the overwhelming diversity of available stimuli, to transfer empirical findings (one kind of knowledge) to design implications (another knowledge).

**备选内容：**Design ideas could be generated from empirical finding or serendipitous inspiration. While empirical findings including product examples, experiments, observation and so on; serendipitous include subliminal, natural, other phenomena and so on. I hereby do not discuss the design ideas generation from serendipitous aspect, but from empirical finding. Because the results **derived from or relating to** experiment and observation can make designer ignited with design inspirations, more targeted to resolve the practical problems, but also ensure the evidence obtained enables designer to answer the initial question as clearly as possible。

*定义：Stimuli are something external that influences the design activity, such as examples of products, pictures, written document and so on. Designers use their experience, skills, and different external stimuli helping to transform empirical findings into design ideas. The design ideas generation from stimuli aspect has been proved to be very significant and valuable during initial stage of ideation.*

Moreover, it has been discussed that designers use different types of stimuli in their surroundings helping to generate design ideas such as text, visual stimuli, verbal or conversational stimuli, audible, tangible stimuli and so on. And stimuli normally have dual effect on design performance. The effect can be positive---stretch the solution space but also the negative---limiting ideas to replicating parts of existing examples.Moreover, there are some papers talking about looking end user as primary trigger, and what types of stimuli designers prefer to use as inspiration source.

At the same time, I found that design ideas may be elicited/generated from two main sources: the first is from empirical findings including product examples, experiments, observation and so on; the other is from serendipitous aspect including subliminal, natural, other phenomena and so on. I hereby do not discuss the design ideas generation from serendipitous aspect, but from empirical finding and other knowledge aspect. Because the results **derived from or relating to** experiment and observation can make designer ignited with design inspirations (Zhao, 2013; Oygur & Janetta, 2011; Carlos & Petra, 2011), more targeted to resolve the practical problems, but also ensure the evidence obtained enables designer to answer the initial question as clearly as possible (De Vaus, 2001), and ultimately affects the design process. it helps define the challenge, and the way problems solved (Singer, 2003). After that, I did some more literature review in this area to confirm my choice.

“The gap exists between the field data and design ideas. This creative leap across the **divide (transfer from a kind of knowledge to another kind of knowledg)** is very difficult, and more structured methods are needed to **guide** the process of **envisioning** 视觉化design from fieldwork outputs.”

For a more specific design topic in design ideas generation area, next part isto seewhat is in general the current state of research in this area? From this table, I can see that different paper focus on different aspects of design ideas generation. Some discussed the ideas generation **in different professional area** such as interaction design, fashion design, architectural design, **mechanical** design and so on. Some papers identified **the end users** as the **primary** **trigger** 触发器 for design idea generation. Moreover, some researches discuss **when** inspiration and design ideas emerge/generate. Cross thought that inspiration comes when hard work **sessions** are **alternated** with periods of **mental relaxation**.

Some other studies showed **the influence factors** during generation of design ideas, such as designers’ emotion. And there are also researches focusing on **what stimuli** trigger the **awareness** or formation of design ideas. Moreover, the research also indicated there is less research how designer process empirical findings to generate ideas. Therefore more attention needed to about how they understand their individual ideation processes, especially from aspect of stimuli. And this topic has something in common with my previous research about design ideas generation from visualization aspect. It is valuable for me to continue to research from stimuli aspect because it is more accurate and focus, about function of helping to translate empirical findings into design ideas.

Furthermore, from the review, the generation of design idea is a process that is rooted 根植于in individual knowledge and is often considered a **precedent-based** 基于先例的type of **reasoning** 推理, where knowledge is continuously transformed to produce new knowledge. During design idea generation, designers use their background experience, skills, as well as different types of external stimuli in their surroundings include **pictorial, verbal, audible or tangible.** With more research in this area, the result showed that the designers seem to give an **exaggerated** 夸大的 (替换:too much) importance to a **restricted** number of stimuli, such as visual stimuli, when they could take advantage of other available resources. For instance, some designers might see end user as primary trigger to generate ideas-the user center design, and designers are known as having a **preference** 偏好for visual stimuli, which **provide** **straightforward** 直接的and **intuitive cues** 直觉的that do not require translation between different **perceptual** **modalities形态**.

And most researchers have examined when and what type of stimuli designers might be using during design ideas generation. Nevertheless, it is still not clear about how the different types of stimuli are **retrieved** and transformed during idea generation phases. The knowledge transformation between designers preferred stimuli and design ideas need to be clarified so that designers know whereand how to make use of stimuli to generate innovative design ideas more effectively. It is important to consider the value of widening the search for different stimuli typologies and representation modalities as cues to creative problem solving. Therefore, it is my research topic to study how designers preferred stimuli may contribute to generating design ideas and enhancing designers’ creativity.

Understanding the different approaches of student and professional designers on design ideas generation matter can potentially help to support them in a more efficient search, retrieval and usage of available stimuli.

The overwhelming amount of possible stimuli a designer can search for an d use adds to the complexity in understanding how inspiration influence the outcome of a solution.

Understanding what and how stimuli student and professional designers use can help to support designers in a more efficient search, retrieval and usage of available inspirational sources.