HOW DO MEDIA INFLUENCE ONE’S THINKING?
The “Habit Media” in design thinking

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ABSTRACT: This paper presents a preliminary observation of the digital media as “habit media” in designing act. The digital media has become a costumed vehicle for designers for a long time. The author investigated the supports of different media for how a specific media conditioned the design thinking and the reasons behind the behaviors of choice-use of designers’ choice. The results showed that designers using “habit media” could do most part of things they wanted to do; when the media are “habit media”, its inherent restrictions do not limit user’s accomplishment. Once a digital medium is habitually practiced, it can support the functions and characteristics that this medium does not ever possess.

KEYWORDS: Habit media, design thinking, cognitive behavior

RÉSUMÉ: Comment, dans le design, le média numérique, en tant que « média d’habitude », détermine-t-il sa performance ? On constate qu’un média spécifique pose certaines conditions, et ce n’est pas sans raisons qu’un designer choisit certain média et qu’elle s’y habitue. Lorsqu’il utilise son « média d’habitude », il arrive presque à faire ce qu’il désire, c’est-à-dire un média qui dépassera ses limites inhérentes de « média d’habitude ». Une fois qu’on maîtrise le média numérique, ce dernier remplira les fonctions et les caractéristiques qui ne lui sont pas propres.

MOTS-CLÉS: Média d’habitude, réflexion en design, comportement cognitif
1. INTRODUCTION

The exploration of design-related researches is mainly to understanding how a designer thinks and the source of stimulating design creativity. Among the above-mentioned, the research of design media results from that a designer needs to present and assist what is in mind through media, and researchers could see the thinking tracks of a designer by the representations so that the representations which are closely related to creativity and the media which influence one’s thinking external representations are considered key research materials and become the focal point of exploring.

In the trend of the times from the use of traditional media to the emergence of digital media, designers switch their attitudes and points about different media. The basic design methods and process for designers are using different media to display their abstract conceptions at different stages (Liu & Eisenman 2001), then we could see that the weaved use of media properties between different media in design process, and the characteristics of media itself are irreplaceable and restrictive, so in the stage of conceptual design the main think-assisted media are mostly traditional media.

Among the mentioned above, the previous researches of media and representations had focus on exploring sketching phenomena and sketching activities (Cross 1999; Goel 1995; Goldschmidt 1991, 1992, 1994; Purcell & Gero 1998), and found out that because designers used to using pen and paper to draw sketches, the design behavior which was creative still depends mostly on the operation of traditional media, pen-and-paper. And this discovery led to the result that views of researchers were guided to the characteristics what media had in itself, and then researchers used the understanding of existed media (traditional media) as the reference for developing media (digital media); they hoped that the digital media could be used in the conceptual phases of designing (Elsas & Vergeest 1998; Landay 1996; Lim 2003; Gross 1996; Gross & Do 1996). While referring existed media and developing new media, researchers also started to explore the design behavior phenomena of new media under this kind of application, and compared them with existed media for diversity (Lim 2003; Won 2001; Wong 2000). Under those researches, many results show some variables which are closely related to subjects themselves.

In the interview with architects, Lawson (1994) found that the designers mostly used to think design by using pens and papers to draw sketches quickly, and the majority expressed that they would be hard to think without a pen in the hand. Besides, in designing, they all had using-situations that could trigger off their thinking best and their own unique propensities of using media.

When exploring pen-based system, Lim (2003) found that experts had been very familiar with the thinking to different figures and had steady thinking while sketching. Therefore, that the experts used different media to draw
sketches would bring changes in the applications of figures, but would not influence the thinking of figures obviously.

Bilda and Demirkan (2003) found that digital media seem to be sometimes inconvenient in the conceptual phases of designing because it is related to the user’s habit of design and the fluent degree of software. Although the designer was exposed to the various imagery characteristics of the digital media, s/he did not frequently tend to use most of them when s/he was actively sketching. The reason might be that the designers’ habitual activities in the traditional media bring some features of the software might remain unused. This also brings the evidence that the subjects were still novice users of CAD although they had the software training program. And the media used would affect the learning in designing. If the participants were designing in a media that they were more acquainted with (that is traditional media), then “learning effect” seems to be amplified.

The above-mentioned phenomena reveal that part designers couldn’t think without some particular media, and experts’ design thinking would not be limited to the media that they use (Bilda & Gero 2006); besides, being used to using the media or not would influence one’s point of view and one’s behavior of use.

2. PROBLEM AND OBJECTIVE

Such as the previous works mentioned above, the degree of the influence someone’s general use of media causes on thinking is perceived. Comparing the review of design media with the design behavior, we could find out that under numerous general studies headed different directions the results of the research reveal some restrained phenomena of use behavior indistinctively, but in the previous works this kind of related phenomena is mostly included in unavoidable limited conditions or future study (Lim 2003; Wong 2000). However, maybe in the experiment process of testing the subjects’ utility rate of media, influences the phenomena of experiment in some degree, and changes the results of experiment essentially. But generally most designers usually use their commonly-usage tools to help themselves with thinking and grasping their design (now the think-assisted media could be called the “habit media”), and the media used are generally pen and paper. This brings out a question—why are pens and papers the most commonly used design thinking media? And why do designers have the habit of using their own particular media to design thinking? Is there any influence to the designer? Therefore, the problems of this paper are what influences the habit use of media causes for a designer, and what the differences between non-habit media and habit media are.

This study hopes to contribute from a different perspective to offer other research ideas to explore the relationship between “design media” and “design processes”, and then to rethink and view the relevant interpretation about
design media in the past. In addition, we also wish to detect the causes behind of some media phenomena by finding out the “habit media”. So, based on the problems the author prompts, this thesis aims at thinking what the essence of media is when using digital media as a “habit media” for long-term use of design thinking, and trying to find out the support of different media for the design thinking, the causes behind the behaviors of choice and use for designers by preliminary observation of the phenomena about “habit media”, and the diversity of the different degree of the habit use of media.

3. EXPERIMENT: METHOD AND RESULTS

From the point of view of “habit media”, the author rethinks the “traditional” media and the “digital media” that we usually know of (Figure 1).

**FIGURE 1. THE CHARACTER DEMARCATION OF MEDIA.**

![Diagram](image)

The presently related researches mostly use someone who is “good at’ using traditional media (1)” and “good at’ using digital media (2)” as subjects. But as a matter of fact, (1) is mostly (c), and (2) is mostly (b). Someone who is “good at” using could be divided into two types: one is that a medium is temporarily well-used because someone is in need of it, and someone who uses digital media presently mostly belongs to this type; the other is that a medium is used habitually and joyfully over the long period of time because of someone’s fondness, and someone who uses traditional media presently mostly belongs to this type. By using the mentioned above as a foundation to measure, the subject-choice and the theme of this experiment in this paper would be thought and be carried on according to the classification and the point of view.

3.1. Experimental conditions

According to the above-mentioned result of the character demarcation of media (Figure 1), there are two subjects of this experiment: one has habit traditional media and non-habit digital media (subject A), and the other has non-habit traditional media and habit digital media (subject B). The subjects whose background is related to design are engaged in the career related to design in present phase. There is an investigation into subjects before the experiment, and the investigation is to fill in written papers. The data collected
before this experiment are used to judge that if the subjects have habit media and there are non-habit media which have been contacted and haven’t been contacted for subjects on the media-list. There are different degree of familiarity and different degree of control on the media-list for subjects. The focal points of the investigation on the list are as follows: 1. the utility rate of media; 2. the degree of fondness for media; 3. the necessity of media; 4. the occasion for using media.

Because this experiment mainly explores a designer’s state of applying media in ordinary design thinking, it puts emphasis in the conceptual design stage. The theme is “Tied-up Media”, and there are four short stages in all. Subjects select a design brief freely in each stage, and select one medium freely to use. The used design brief and the used media couldn’t be used again afterward (Table 1, 2). The experiment process is to request subjects to proceed to think design, and the time isn’t limited and the places of the experiment are chosen freely. When the experiment starts, subjects could collect the needed information for input. The only actual limitation related to the representation of design (output) is that subjects could choose only one media to proceed to design in a stage. The key point of the experiment is that subjects have to be in a natural state of designing, and the experiment takes the time that designers accomplish the conception of design or the design couldn’t proceed for the short-term end. After the experiment ends, there will be in-depth interviews of all related data. The focal points of the interviews are as follows: 1. how well the subjects satisfy; 2. the afterthought of using media; 3. the statements of designing conception and the behavior in the process; 4. the afterthought of comparing one medium with other media; 5. the reasons for the order choosing.

**TABLE 1. SAMPLE OF THE PROCEDURES OF EXPERIMENT.**

<table>
<thead>
<tr>
<th>Stage 1</th>
<th>Design 1</th>
<th>Media 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 2</td>
<td>Design 2</td>
<td>Media 2</td>
</tr>
<tr>
<td>Stage 3</td>
<td>Design 3</td>
<td>Media 3</td>
</tr>
<tr>
<td>Stage 4</td>
<td>Design 4</td>
<td>Media 4</td>
</tr>
</tbody>
</table>

**TABLE 2.**

<table>
<thead>
<tr>
<th>Topic/Design Brief</th>
<th>Design Media</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function x Concept</td>
<td>Traditional / Digital</td>
</tr>
<tr>
<td>1 Waiting Stop x “Vegetation”</td>
<td>Pen-and-Paper</td>
</tr>
<tr>
<td>2 Public Lavatory x “Animal”</td>
<td>Model materials</td>
</tr>
<tr>
<td>3 Unit of Container Suite x “Natural Phenomena”</td>
<td>Sketch up</td>
</tr>
<tr>
<td>4 Scenic Bridge x “bone”</td>
<td>3Dmax, MAYA, or Rhino</td>
</tr>
</tbody>
</table>

Participants could use related tools which are not involved in external representation. EX. Rulers, Compasses, Glue, Cutters.
This experiment puts emphasis on the assistants of conception in designing rather than on the expressiveness of images with media. Therefore, different stages have their unaffiliated set of design briefs in this experiment, "Tied-up Media", to assure that subjects in this experiment are in a state of designing. The set of design briefs takes small scale and simple functions as the principal thing because the time of thinking conforms to the length of one stage of the experiment more. To avoid that subjects leave out or completely imitate the conception because of the influence of similarity among briefs, types and character of different design briefs are distinct.

The method of data collection is time-stamped video recording, and the key point of collection lies in the reach of design output; besides, the input that is used to stimulate thinkers is not limited. The data of this experiment include the design outcomes, the data from screen video capture, the data of panoramic photography, and the record of the interview.

3.2. Assessment of the experiment data

What follows are the focal point of observing and analyzing for this experiment:

- The order and the reasons of media' choice.
- The design thinking and operation process under the use of different media.
- The differences and the influences between the thinking modules of using media to different degree in design process.
- The level reached of design, or the time needed for movements: if the subjects spend more time to try to find out the characteristics/functions of media. This would be carefully distinguished the pause of thinking from the try at characteristics/functions.
- The ways to use the existed characteristics/functions of media: Probing into that what thought a designer acquires with what function, and what the outcome of the thinking is.

3.3. Results and analysis

The brief results (Table 3) and analysis of this experiment are as below (Table 4) (Subject A has more than two years of design-based education, and Subject B has more than five years of design-based education):
TABLE 3. RESULTS.

Subject A.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Stage 1</th>
<th>Stage 2</th>
<th>Stage 3</th>
<th>Stage 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Media</td>
<td>Public Lavatory</td>
<td>Scenic Bridge</td>
<td>Container Suite</td>
<td>Waiting Stop</td>
</tr>
<tr>
<td>Utility Rate</td>
<td>P-60 %</td>
<td>S-50 %</td>
<td>M-40 %</td>
<td>D-10 %</td>
</tr>
<tr>
<td>Fondness</td>
<td>P-80 %</td>
<td>M-80 %</td>
<td>S-50 %</td>
<td>D-10 %</td>
</tr>
<tr>
<td>Necessity</td>
<td>M-70 %</td>
<td>P-60 %</td>
<td>S-30 %</td>
<td>D-10 %</td>
</tr>
</tbody>
</table>

Subject B.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Stage 1</th>
<th>Stage 2</th>
<th>Stage 3</th>
<th>Stage 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Media</td>
<td>Public Lavatory</td>
<td>Scenic Bridge</td>
<td>Container Suite</td>
<td>Waiting Stop</td>
</tr>
<tr>
<td>Utility Rate</td>
<td>S-100 %</td>
<td>P-90 %</td>
<td>M-30 %</td>
<td>D-10 %</td>
</tr>
<tr>
<td>Fondness</td>
<td>S-90 %</td>
<td>M-80 %</td>
<td>P-70 %</td>
<td>D-40 %</td>
</tr>
<tr>
<td>Necessity</td>
<td>P-90 %</td>
<td>S-70 %</td>
<td>M-40 %</td>
<td>D-0 %</td>
</tr>
</tbody>
</table>

P: Pen-and-Paper, M: Model materials, S: Sketch up, D: 3Dmax.

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The results and analysis are mutually compared with the subject matter of interview and observation, and the outcome of comparison would be discussed into five parts in Section 4.
4. DISCUSSION

4.1. The degree of familiarization and the degree of control

The results show that there are “habit media” for different people because the chosen media has the functionality to expand the user’s imagination (space), and this is concerns the degree of familiarization and the degree of control. The higher the familiarity the higher the utilization rate, and the higher degree of control means relatively ease use. The better it is for the operation, the more easily it is to be used, but this doesn’t positively correlate with the degree of control; the higher degree of control allow designers to have relatively more thinking space, and the “habit media” results from a high degree of familiarization and control for the user. Designers could do most of the things they want do by using the “habit media”; when the media used are the “habit media”, restriction is not a limitation. When the digital media is habitually practiced, it could also support the functions beyond its nature.

4.2. Forms of media vs. attribute modules of design thinking

Figures that possess concepts in the conceptual stage could be called “sketch”. This shows that the conceptual figures which are generated in digital media are all “sketches”. The difference between the digital sketch and the traditional sketch is the way it is formed, and the ways of forming sketches is decided by the “central concepts” of media themselves. The central concept of one medium will form the operation prototype. For example, the modeling that uses the relationship as the concept makes Rhino possess the variables of parameters and the connections of units, and the modeling that uses the construction as the concept makes 3dMAX tend to edit and compose the objects. From the conceptual operation of media in developing concept, we could see how the “operation types” of media influence a designer’s thinking modules:

[Traditional media] - “Pen” of drafting → “Linear” thinking
- “Sheet materials” of modeling → “Face thinking

[Digital media] - “3D software” of modeling → “Block” thinking
→ “Associative” thinking

Therefore, we could see that the “operation type” of one medium will influence a designer’s thinking attribute at the moment. One medium in itself possesses its applied thinking module of usage, and the user needs to transform his/her thinking module into an applied module when using the medium to carry on tasks successfully. Therefore, if the user is unfamiliar with the medium in the stage of trying, his/her attention will focus on familiarizing him/herself with the medium and then the user will be unable to switch the thinking module to the applied thinking module successfully and spontaneously; in addition, the thinking module at this time is in a forming state of constructing and
transforming step by step. In the situation that the user has known well and has adapted to the medium, the speed of thought switching will become faster. Under repeated experiences, the thinking module that the medium need have been formed in the user’s brains, and at this time it may be said that users have a high degree of control over the media. The repeated usage that is continued over and over would result in the degree of familiarity with the medium raising gradually for the user. Whether the user is using the medium or not, when his/her thinking module of usage for the medium is normally used and has the highest frequency of appearance, it may be said that the designer forms a specific habit of thinking and possesses “inertia thinking”.

4.3. Attention vs. the space of mental image

The reason that someone has the habit of using some media is that the media could expand the user’s space of imagery, and this situation is related to the allocation rate of attention in the user’s thinking space; at this time the user uses those media with a confident degree of control. Assuming that mental image could be regarded as a space which is quantifiable, the space of imagery would be a part of thinking space. Among the above-mentioned, the attention possesses the function of “enlarging the space”.

When a user is in condition of fumbling about one unfamiliar medium, the user’s attention would be mostly be concentrated on knowing the medium well, and it focuses on forming new thinking module. This leads to the reduction of the space which could be used to deal with other things. In the situation that has been adapted to and familiar with the medium in hand, the user’s thinking modules would be shifted at a faster speed, and the operation of the medium would be almost subconscious and intuitional immediate reactions (reflection), so the space which could be used to deal with other things becomes more and most attention could be paid to the conception in design, and then the imagination space allotted would be magnified in addition.

Thus it can be seen that for the general public pens and papers are almost their “habit media” and relatively unfamiliar digital media are only “general media”. Generally speaking, something that could be “medium” possesses the function of assisting someone think, so the differences between “habit media” and “general media” are the degree of “attention” and “automation” influenced by familiarity.

4.4. Inertia thinking vs. creativity

Habit media form and influence on users’ thinking inertia potentially, and at this time the users’ thinking would tend to follow some way to run. Then creativity arises from the breaks in inertia and the unexpected stimulus. Among the common usage of media, the transformation of the functions of media with
personal style and interpretation is also belong to a kind of personal creativity, and this included in the most space of imagery could magnify, stimulate, and concentrate on thinking. The common usage of media would enable the user to be unaware of lapsing into a thinking inertia, so thinking inertia would be more difficult to trigger off creativity, but the thinking space that unoccupied from common usage could be used to magnify imagination. Generally speaking, habit media would bring the users’ thinking inertia, but their thinking space would be larger; non-habit media wouldn’t bring the users’ thinking inertia, but the thinking space would be relatively smaller. The rise and fall between the inertia of thinking or not and the magnitude of thinking space mutually influence the creativeness about media, so the media of high creativeness are which could form relatively larger thinking space and possess no inertia or the weak connecter of inertia.

4.5. The transformation under common usage

The types of media existing could transform the attribute modules of design thinking, and the modules of design thinking formed could transform the existing functions of media. The former is related to personal intentions and the degree of control; the latter is that a user could think outside the box of using a medium, outperform the dimension of the medium itself, and apply the limitation to be another tool.

5. CONCLUSIONS

Previous research on digital media application and traditional study on design behavior and characteristic discuss mainly about comparatively summary and general phenomena. This paper, however, views media studies from a specific angle of habit media, probing the phenomenon and the cause behind media use as application behavior research. Although application study have gradually matured and previously research have shown respectable achievements, the interaction between application study and media study have not renewed to contact and scan for its central issue,” how do we further increase (or cause) the designer’s creativity”.

Media of different operation concepts just belongs to different kinds of media, so it can be subdivided into multi-media under wide items of traditional media and digital media. Media possesses its own characteristic and concept and can influence people to form different design thinking. So it possesses a possibility of changing original thinking, thinking multiplicities, and increasing thinking stimuli. From this viewpoint, if we use traditional media as a standard to improve digital media, the users who know and use digital input ways (mouse, keyboard) gradually will need to adapt to new changes instead.
The degree of difference between digital media and traditional media will reduce, and even they will become the same media and possess only difference in function and acquirement, but can’t renew or extend different operation concept effectively. Therefore, the evolution of media in itself will reduce doorsill and increase the needs which people want, and that will achieve the popularization and convenience of use. And to some degree, the easy and effective representation will reduce the exclusion of use and raise the degree of good feeling greatly because people have tendencies to adaptation and habit. However, what is worth noticing is that the general use of modern digital appliances also brings out the changes and the multiplicities of the habit of use, and this would influence the thinking directions of media application behavior. Instead of forcing one medium to simulate other media, we should find out and probe into what could conform the medium to intuitional use and the habit of behavior of users at the moment further.

The common usage of media could predict that which new media will survive and popularize eventually and would become a part of routine and traditional media, while interesting new concept application media could stimulate one’s imagination and thinking in the initial stage. Maybe developing the new concept application media is one of the directions to stimulate creative thinking.

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