

THE INVESTIGATION OF DESIGNERS' REFLECTIVE PRACTICE ACTIVITY USING VERBAL PROTOCOL ANALYSIS

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ABSTRACT

This paper intends to investigate the cognitive process of designers' sketching activity based on their understanding towards the value of unconscious interaction and cognitive of human behaviour in the everyday products. Using Verbal Protocol Analysis (VPA) as the main approach, four Malaysian designers with different levels of expertise worked on product design tasks in relation to four attributes of unconscious interaction in everyday human behaviour. The VPA data were coded and analysed based on Schon's theoretical framework of reflective practice. At the end of the study, the descriptive analysis of each designers' design activity was presented based on Andreasen's level of abstraction. The result of the study illustrates remarkable strategies differences in the patterns of designer's reflective practice during the conceptual design process. The implications of this study clarify the significance of these approaches in gaining insights into designers' reflective practice activity.

Keywords: Verbal Protocol Analysis, Reflective Practice, Product Design

1 INTRODUCTION

Through design perspective, the unconscious interaction and cognitive of human behaviour in everyday products can be defined as the subtle and peculiar ways that humans react to tangible things and its surrounding environment [1]. However, from a psychology perspective, the interaction can be explained as an automatic process of being effortless, unconscious, and involuntary [2]. In spite of the fact that there is no solid definition, the hypothetical premise is almost nearly identical to that of Alexander's descriptions of 'goodness of fit' and the idea of unselfconscious design [3]. Alexander's theory of unselfconscious design is animated by ongoing fixes and maintenance of the built artefacts or environment by human. According to Alexander, 'good fit' is the aim of virtually every making culture and the constant addressing of 'misfits', which leads to an 'equilibrium of well-fitting forms'. Meanwhile, the 'misfits' are those things that prevent a good fit that are expressed in negative form; which are specific and tangible enough to be talked about. These actions are tacit and follow complex and often unspoken rules. Over time, the unselfconscious designer unknowingly creates significant improvements and changes of everyday products. The contribution from the changes eventually lead to a well-fitting form or outcome even though the process did not require a skilled or highly competent maker. The integration of varying and disparate literature regarding this theory has shown extraordinary potential to contribute to product design development and education (see [1] [4] [5] [6] [7] [8] [9] and [10]). However, the value, applicability and the usefulness of the theory for designers and design education may be questioned, since the empirical evidence in relation to designers' reflective practice specifically regarding the theory is still considered limited. Therefore, the objective of this paper is to investigate the designers' reflective practice activity based on their understanding towards the value of the theory through sketching process through VPA to extend the knowledge about designers' design activity.

2 BACKGROUND STUDY

2.1 Verbal protocol analysis

Cross [11] indicates five common research approaches to study the nature of design activity, namely: (1) interviews with designers (2) observations and case studies (3) protocol study (4) reflection and theorising and (5) simulation trials. Amongst these five approaches, protocol study is claimed to offer the community of design scientists an effective method for the controlled observation and experimental analysis of design problem-solving behaviour. Verbal Protocol Analysis (VPA), which use the think-aloud method in protocol study is also claimed to have been used as a major method for seeking insights into human thought processes in complex cognitive tasks (see [11] and [12]). Moreover, the method has also received the most attention in recent years. It is also regarded as the most likely method (perhaps the only method) to bring out into the open the somewhat mysterious cognitive abilities of designers. Ericsson and Simon [13] are the original disseminators of the VPA method. The pros and cons, as well as the techniques for VPA, are described in depth in their seminal work. The basic strategy of VPA involves getting people who are doing something to verbalise their thoughts and feelings as they do whatever they are doing. This approach requires some ‘training’ of the participants to familiarise themselves with verbalising what is usually an internal dialogue with themselves [12]. VPA also provides a way to identify how users describe themselves as interacting with objects since the verbalising and interaction are rooted in language and cannot be separated from the respondents’ linguistic use in communicating with others. VPA differs from the interviews in such a way that the person does not reflect on what he or she is doing, but rather just says ‘what’ he or she is doing.

2.2 The reflective practice activity

According to Schön [14], the reflective practice can be defined as a development of one’s knowing-in action habits, which is guided by the explicit reflective. Design, as defined by Schön is a ‘reflective conversation with the situation’ where a problem in design is actively set or ‘framed’ by designers, who act (make ‘move’) to improvise the perceived situation. In other words, the main premise of the reflective practice is the idea that a designer subjectively interprets the design task and the situation he or she is in [15]. The paradigm of reflective practice of designers was constructed by merging designers’ design activity (actions) with the ability to make the right decisions. Particularly, a designer is actively constructing a view of the world based on his or her experiences, supported through the execution of ‘move-testing experiments’ (involving action and reflection). During the process, the designer will first name the relevant factors in the situation, framing a problem in a certain way, making moves toward a solution, and reflecting those moves. Adapted based on Schön’s theory, Valkenburg and Dorst [15] develop the mechanism of reflective practice; the four design activities and their interplay which were coded using four graphical representation, as follow: (1) naming (oval) (2) frame (rectangular) (3) moving (triangle) and (4) reflecting (circle). The purpose of the mechanism is to simplify Schön’s theory and implements it into protocol data for better description of designers’ activity and understanding their reflective practice (see Figure 1). The mechanism provides a way to distinguish and coding the separate activity involved in designers’ reflective practice systematically.

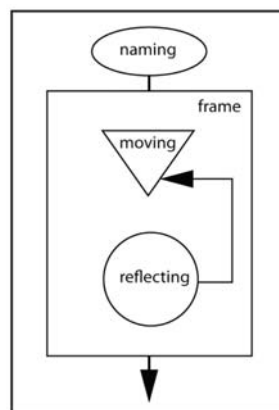


Figure 1. The mechanism of reflective practice

3 RESEARCH METHODOLOGY

In this study, four designers which were classified according to their level of experience and expertise (e.g. intermediate designer, expert designer, novice designer and student designer) were selected to participate in the VPA experiment. Each of them was given four polar images that depict the subtle and creative ways in which people interacts with a product (see Figure 2). Adapted from literature [6], the polar images were categorised into four attributes of unconscious interaction in everyday human behaviour, as follows: (1) image A: adapting attribute (2) image B: signalling attribute (3) image C: reacting attribute and (4) image D: conform to others attribute. Thus, there are four sessions of experiment participate by each designer according to the four attributes.



Figure 2. The polar images

During the experiment, they were asked to generate conceptual ideation sketches based on their understanding, analysis and reflection on each polar image. Moreover, there were also asked to think aloud, i.e. to verbally describe what they are thinking while they are working on their conceptual ideation sketches. The whole session of experiment was recorded (both visual and sound) by the experimenter to prevent any missing information during the experiment.

4 RESULTS AND DISCUSSION

At the end of the VPA session, there are four video data produced from each designer. Each video data has been critically processed and prepared. It involved editing and merging two different angles of video to become a single well-prepared video data using the AVS Video Editor Software. The purpose of this process is to ensure that the designers' sketching process on A3 size paper, body language, and intonation can be viewed simultaneously even from different source of a perspective view. Based on the video data, protocol transcription contained vital information about the interaction during sketching activity for each VPA session was obtained (see Figure 3). The protocol transcription was categorised into five sections: (1) time section where every precise timing for each designer's activities were being transcribed (2) protocol section where every verbal expression of designer were being transcribed (3) designers' activity section where designer's activity was being define generally (4) reflective practice activity section where designer's reflective practice was being critically identified based on Valkenburg's mechanism of reflective practice and (5) reflective practice chart section where designer's reflective practice was being coded according to its particular shape as a graphical representation. We descriptively described the results based on Andreasen's [16] levels of abstraction, as follow: (1) abstract level (2) semi-concrete level and (3) concrete level.

MOHD HAMIDI ADHA MOHD AMIN, DESIGN STUDENT WEDNESDAY 18 DECEMBER 2013, IDEATION 4				
Time	Protocol	Designers' Activity	Reflective Practice Activity	Reflective Practice Chart
00:01	This is g aboutthe user itself unconsciously to understand the glasses structure...why they didn't put it at the shirt's pocket or...anywhere else...	Gathering information	Reflecting problem	○
00:19	...ok, sep. it seems easier to put it at the neck, some people make it as style	Gathering information	Reflecting problem	○
00:24	But...how to educate people to hang their glasses properly.	Gathering information	Reflecting problem	○

Figure 3. Sample of transcription

4.1 The reflective practice activity of Designer A (adapting attribute)

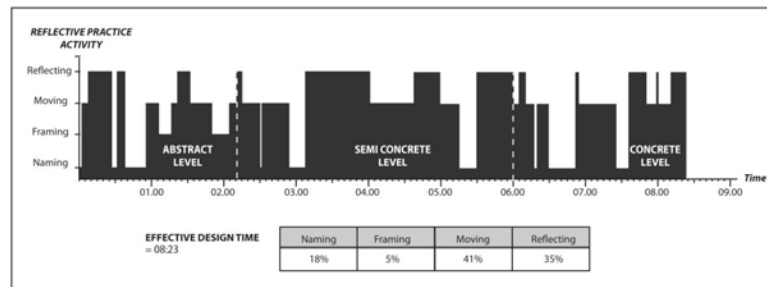


Figure 4. The design activities against the time of Designer A

Figure 4 shows the relative time spent by Designer A on the design activities. The main activity of Designer A is ‘moving’ (41%); by discussing the related issues, comprehend the user’s interaction in using the mobile phone charger, and making a list of mechanical solutions from the existing mobile phone charger through sketching. During abstract and semi-concrete level, Designer A’s moves are mainly ‘discussing’. Only after comprehending the mechanical solutions from existing mobile phone charger, Designer A’s moves become concrete, and focused on generating detailed design ideation. Meanwhile, Designer A spent 35% of the time on reflecting. The reflection moment always occurs specifically when Designer A was trying to comprehend the user’s interaction in using mobile phone charger, mechanical solution from existing design ideation and developing the detailed design ideation. Moreover, only 18% of the time was spent by Designer A on ‘naming’. During the VPA session, the naming moment occurred when Designer A indicated the differences of mobile phone brands in the market, the common place and purpose to use the charger, the mechanical terms of solutions from existing design ideation, and the relevant design elements during the design development. However, the time spent by Designer A on ‘framing’ is rather insignificant (5%), and it is more important to note that Designer A frames two design problems sequentially during the VPA (e.g. messy cable and misplaced pulled-out cable). The identification of these two design problems help Designer A to comprehend the ‘misfit’ of subject in Image A and led to the solution development.

4.2 The reflective practice activity of Designer B (signalling attribute)

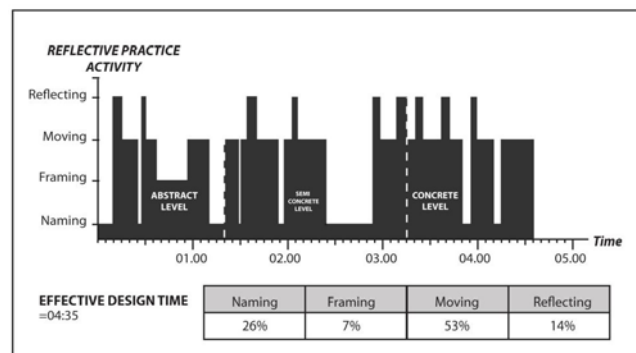


Figure 5. The design activities against the time of Designer B

Figure 5 shows the relative time spent by Designer B on the different design activities. The main activity of Designer B is ‘moving’ (53%); by comprehending the parking meter structure as depicted in image B through sketches during the abstract level. However, when entering the semi-concrete and concrete levels, Designer B ‘moves’ to focused on develop the design form and generates detailed design ideation. Moreover, Designer B spent 26% of the time on ‘naming’. The significant ‘naming’ moment occurred when Designer B indicates his conceptual design ideation; to design a parking meter that is integrated with indicator. However, the ‘naming’ moment occurred repeatedly when Designer B was trying to point at relevant design element in his sketches during the semi-concrete and concrete levels. Meanwhile, only 14% of the time was spent by Designer B on ‘reflecting’; by reflecting on his sketching styles and detailed design ideation. In contrast, only 7% of the time was spent by Designer B

on ‘framing’ the design problem; no appropriate system provided to signal others if the parking meter was malfunctioned.

4.3 The reflective practice activity of Designer C (reacting attribute)

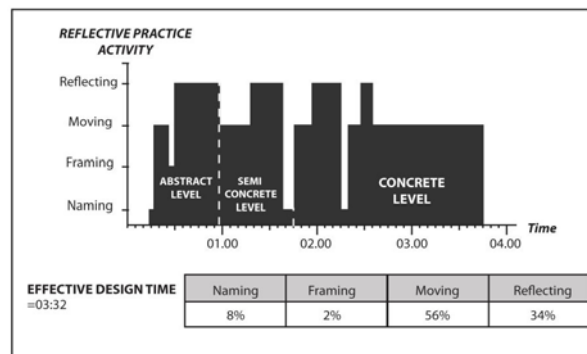


Figure 6. The design activities against the time of Designer C

Figure 6 shows the relative time spent by Designer C on the different design activities. Designer C spent most of the time on ‘moving’. Designer C’s ‘moves’ are mainly sketching to develop the design ideation during the concrete level. However, Designer C also focused to sketch a figure of human gnawing a pen in order to comprehend the scenario in Image C, especially on the abstract level. Moreover, 34% of the time was spent by Designer C on ‘reflecting’; by mostly reflecting on potential design solution which happens during the abstract and semi-concrete level. Furthermore, only 8% of the time was spent by Designer C on ‘naming’. Through all the three level of abstraction, Designer C ‘naming’ three relevant design elements in this study (e.g. the focus of the study, the concept of design ideation, and the design features). However, Designer C spent only 2% of the time on ‘framing’ the design problem; gnawing a pen will damage the pen’s structure.

4.4 The reflective practice activity of Designer D (conform to others attribute)

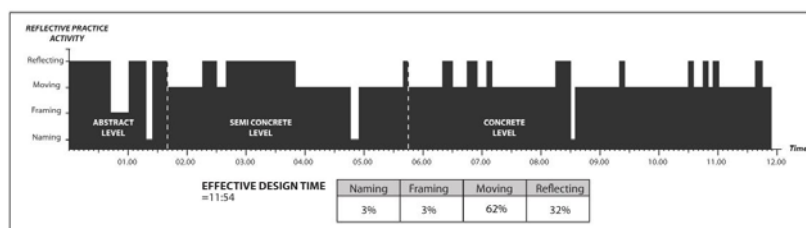


Figure 7. The design activities against the time of Designer D

Figure 7 shows the relative time spent by Designer D on the different design activities. Designer D spent most of the time on ‘moving’ (62%) during the semi-concrete and concrete level. During semi-concrete level, Designer D’s ‘moves’ are mainly focused to comprehend the basic proposition of his design ideation through sketching. Only when entering the concrete level, Designer D ‘moves’ to sketch a detail design ideation. Moreover, 32% of the time was spent by Designer D on ‘reflecting’; by reflecting on the basic proposition of his design ideation, which is mostly happening during the semi-concrete level. When entering the concrete level, Designer D pays more attention on sketching, mostly in silence and did not verbalise much on his reflection during the process. However, only 3% of the time was spent by Designer D on ‘framing’ and ‘naming’.

5 CONCLUSIONS

Through this study, we conclude that the results provide a good insight of designer’s design thinking on conceptual ideation level towards the four attributes of unconscious interaction in everyday human behaviour, as depicted in the polar images. The results also help to justify the value of looking critically at every minute factor that exists in human interaction and behaviour, including the realms of the unconscious and embodied human interaction. By doing that, the designers’ ability to find the fit between human values and construct an innovative design solution shall increase.

We also conclude that using graphical representation as a code; the behaviour patterns of four mechanisms of designers' reflective practice during sketching activities can be clearly identified and explored. Reflective practice and thinking, as described by Schön [15] will lead to new interpretations and present opportunities for new solutions in the process of sketching as performed by the designer. As reflected in this study, designers produced a conceptual ideation that solved the 'misfit' as follows: (1) mobile charger with automatic roller in its body to solve the messy cable management; (2) a parking meter with a digital screen indicator for signalling purpose when the product is malfunctioning; (3) a pen with chewable cap, purposely to provide comfort from the biting reaction; and (4) sunglasses with hanging cable and built-in mp3 speaker.

We hope that this study helps design practitioners, educators, and design students to provide them with an alternative technique of using VPA as a comprehensive approach to look at the realms of designers' reflective practice, especially on how the data can be coded, analysed, and presented according to the design task assigned. By embracing this methodology, a study related to assessing design thinking can be exponentially expanded.

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