

Proposal for Design Support Application Based on Extended ADT Model

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Abstract

Understanding the user's situation is very important in the design process. There are many ways to understand a user's situation – a designer might observe a user's situation or a user might record their own situation in Human Centered Design (HCD) file. However, the latter of these methods has not been very popular mainly because of the burden it place on the users. This research proposes a new smartphone-based design support application, named “HN camera”, which can be used to record the users' situation, without any additional burden on them. This application is based on the ‘Extended Alethic/Deontic/Temporal (ADT) model’ concept. A user or a designer can understand and record the user's situation based on the Physical factor, the *Kansei* factor, and the Cultural factor using HN Camera. The application was used in visualizing and analyzing tourists' travel as a service design. Through this, the effectiveness of the proposed application was clarified.

Keywords: Support design, Observation, Service design, Application, Smartphone, Extended ADT model

1. Introduction

As users' situation with various products and services become more complicated, it is all the more difficult to clarify the user's potential needs through some questionnaire surveys alone. Understanding a user's situation is very important in the design process. There are many ways to understand a user's situation – a designer might observe a user's situation, or a user might record their own situation in a Human Centered Design (HCD) file.

According to Matsunami, our needs are divided into overt needs and potential needs. Overt needs are clarified (=verbalized) with a questionnaire survey. However, potential needs are difficult to clarify through such a questionnaire survey. Group interview, in - depth interview, and behavior observation are useful to clarify potential needs [1].

Consequently, many studies about the possibility and value of observation have already been conducted in HCD design field, and the significance of this observation process increases not only in the design education but also in the work process in design companies [2]. In particular, digital cameras have become compulsory equipment in the observation process in the design field as they can be used easily record information with high quality. Furthermore, not only designers but also anyone in general can record observation results with smartphones equipped with high-quality cameras, and share the recorded information with others using Social Network Service (SNS) etc.

Previous researches about idea-creation in the design field have reported that a designer's living experience abroad as an internal factor that has positive influence on interpretation and use of information as an external factor [3]. This means that these learned experiences in different environments are related in finding and interpreting some problems, and were involved in the idea-creation process. For these reasons, there are many cases where the observation process based on the user's viewpoint is incorporated into the design process. In the service design process, the way of finding and interpreting of problems varies, depending on the perspectives of the service provider and the service user.

Based on this background, Kang's research team has been working to improve the quality of observed information by incorporating the Alethic/Deontic/Temporal (ADT) model [4, 5]' into the design process. In addition, HN Camera, which is an application to support the observation process using smartphones, has been developed by Kang's research team.

The purpose of this research is to examine the effectiveness of this application in the observation process, based on consideration of the case study where the proposed HN Camera application was used for visualizing user's various needs during a tour of Hokkaido in Japan.

2. Literature reviews

2.1 Different viewpoint on observation process

As previously mentioned, the observation process helps designers to create a new idea to solve a problem in our daily life. According to James and Brown, it is very important in a creative process to have a different viewpoint in observation. *Ashikawa's* research team reported that personal characteristics influence the process of knowledge activation in creativity work. A different viewpoint in the observation process reveals unexpected users' needs such as potential needs. However, the personal viewpoint, which is formed through one's various experiences, is hard to change suddenly. These previous researches highlighted the importance of different personal viewpoints in the observing process.

2.2 Extended ADT model

According to the *Suto's* ADT model, which was developed based on the relationship with an artifact, the designer, and users, there are three layers in the design model: 1) Main layer reflects the user's possible states and operations; 2) Top layer reflects the designer's intentions; and 3) Base layer reflects physical laws. It means that the user's behavior is affected by physical laws and is restricted by designer's intention. Designers need to observe the relationship between cause and effect in design. In other words, designers must observe the user's experience, based on the relationship with physical laws and the user's behavior.

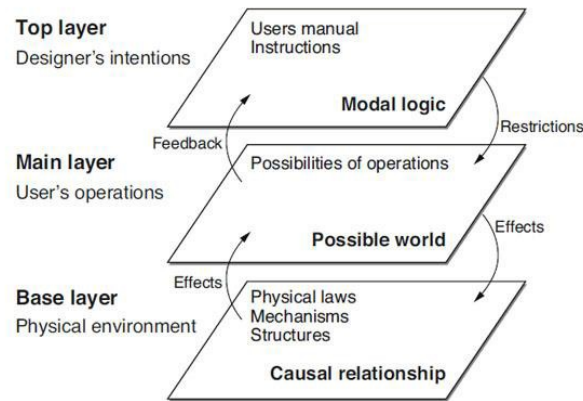


Fig. 1. : ADT Model

In ADT model, user's behavior is affected by physical layer as base layer. However, our behavior is strongly concerned with our emotion situation. Moreover, our behavior is closely related to our culture. Based on this idea, the extended ADT model concept was proposed [Fig.2].

In the base layer, restriction from environment is described. These restrictions are based on three factors: physical factors, emotional factors and cultural factors. The top layer represents designers' intentions which might differ, depending on the individual. The outcomes of their work are shown on the main layer. The circles on the main layer indicate the set of possible solutions of each designer. Design works should convey designers' intention under restriction from environment.

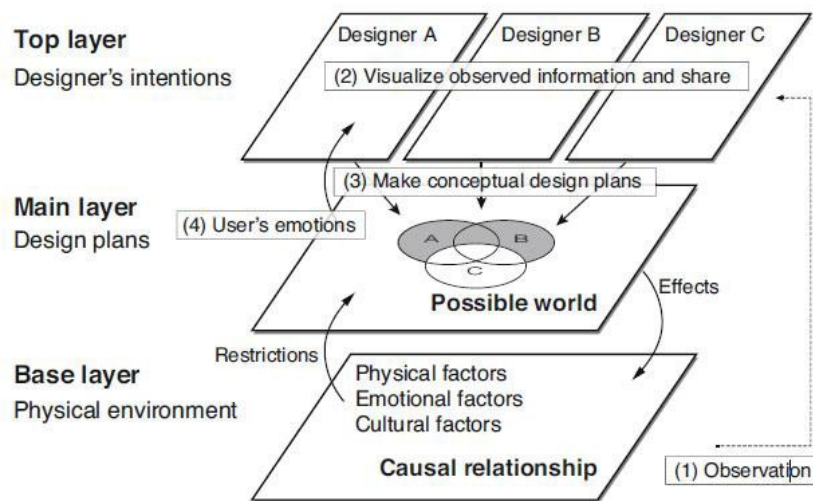


Fig 2. Extended ADT model

3. Proposal for HN Camera

HN Camera has the advantages of digital camera, smartphone camera and instant camera. They are easy to use without any special experiences, can record repeatedly, and offer the convenience of connection to SNS using the internet. By using a mobile photo printer, the recorded information is printed out immediately, and the printed photos are easy to use for the KJ method for creating design concepts as well (Fig.3).

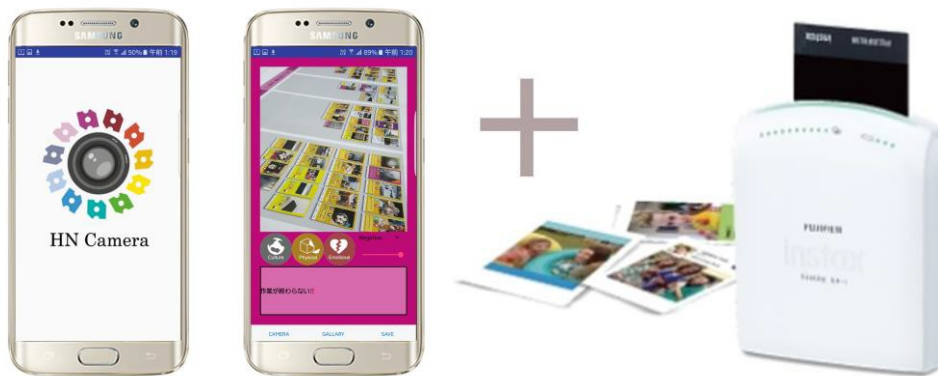


Fig.3 HN Camera and example of the obtained image

If a user notices some information when conducting an observation, he/she can record this information, evaluating the physical, emotional and cultural factors immediately. When the user does not have enough time to record the information, he/she can later pick up photos from his/her gallery folder of smartphone and record it slowly. Each detailed explanation is shown in the following Fig. 4, 5 and 6.

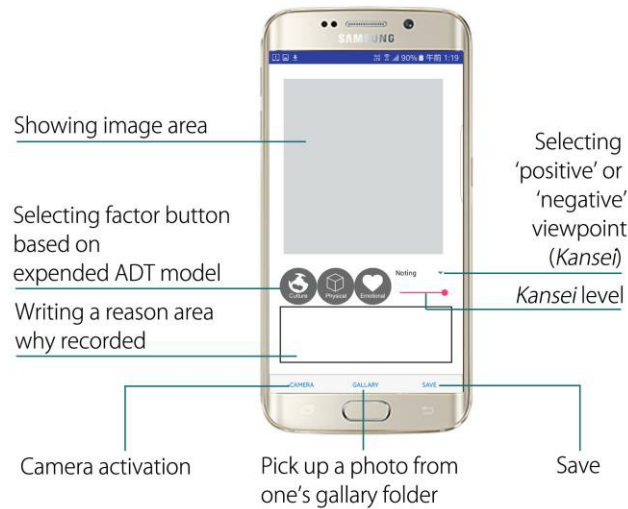


Fig.4 Each detailed function of HN Camera interface

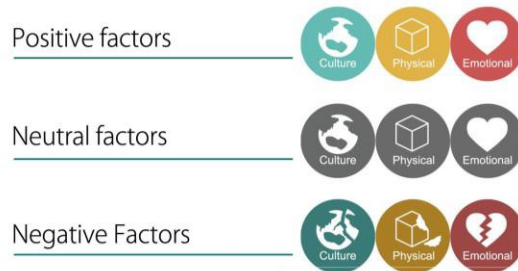


Fig.5 Different color buttons based on Extended ADT model

When the user notices some information from observation, he/she can tag using physical, emotional and cultural factors. And, each factor can be checked and evaluated as positive or negative using the different color buttons (Fig.5). Moreover, he/she can write some reasons about why he/she wanted to record the situation, and can check and evaluate as positive or negative using the different colors (Fig.6). These different color images are saved and help the designer to easily grasp a whole evaluation construction.



Fig.6 showing the evaluator's Kansei and Kansei level with color

4. Experiment using HN Camera

Based on the request from the Hokkaido southern area (Hakodate, Nanae, Shikabe, and Mori), the evaluation experiment was conducted with four groups (18 persons) to understand the tourists' actual situation as they visit Hokkaido southern area, and visualize their various needs. The study made use of not only questionnaire method to clarify the conscious and verbal information, but also HN Camera application to visualize the rich information provided by tourists during their sightseeing Hokkaido southern area. The Fig. 7-10 show the results of the evaluation experiment.

The results from this experiment were discussed with some public officers of Hokkaido southern area and managers of hotels and restaurants in Hokkaido southern area. They answered that the results using HN Camera with time-checking was very helpful to grasp tourists' situation. Especially, they evaluated that the organized images with different colors and tagged with three factors based on the extended ADT model concept was very useful to understand tourists' needs as compared to the questionnaire method alone. Moreover, they answered that the number of recorded information in a place is important to understand the current service situation, and develop or create new attractive service design.

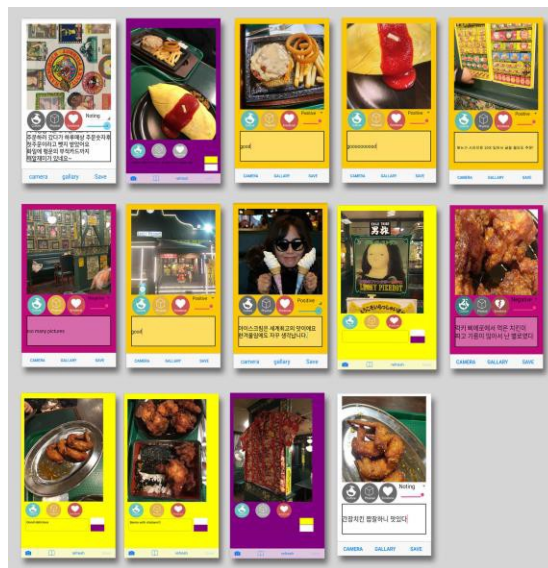


Fig. 7 A part of example of recording of a restaurant in Hokkaido without time check



Fig. 8 The recorded example of Hokkaido tour without time check

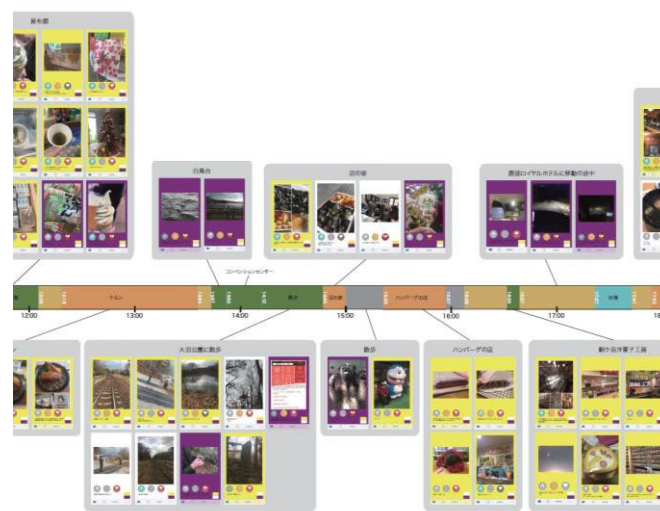


Fig. 9 Some part of the recorded example of Hokkaido tour with time check

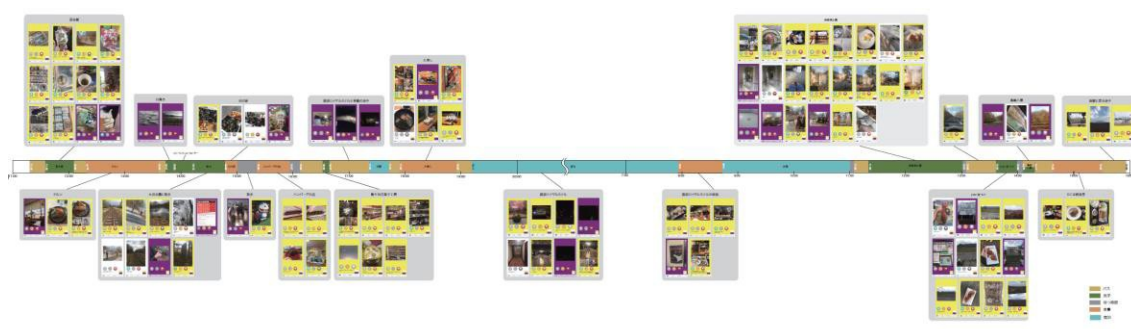


Fig. 10 The recorded example of Hokkaido tour with time check

5. Summary

Understanding the user's situation is very important in the design process. Actually, user's needs in the service design field such as travel was said to be harder to visualize and clarify than product design, using only questionnaire method. However, it is easier to understand and grasp the user's situation or various needs by using HN Camera

application based on the extended ADT model. Especially, taking a photo during travel is a very natural behavior for users, so participants did not feel any additional burden in recording some information using HN Camera in evaluation experiment. As a result, the effectiveness of the proposed application was clarified. In the future, our proposed application will be developed through further experiments.

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