

User Experience Studies Based on Expectation Dis-confirmation Theory

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Abstract. In order to measure and predict user experience (UX) more accurately, researchers have proposed a variety of models to integrate various factors affecting user experience. However, the complexity of user experience research is due to the dynamically changing factors of user and environment. The user expectation is not only affected by social communication and media, but also formed by his/her previous experience of similar products. To study user experience in the temporal dimension, we must consider the dynamic nature of user expectation and take the interaction between user expectation and user experience into account.

In this study, we first discuss the definition of user expectation, and then explore how the previous user experiences to existing products influence the present user expectation, and thereby affect the successive user experience on a new design.

Keywords: User experience · User expectation

1 Introduction

User experience (UX) refers to a person's emotions and attitudes about using a particular product, system or service (Wikipedia). User experience includes the practical, experiential, affective, meaningful and valuable aspects of human-computer interaction and product ownership. Additionally, it includes a person's perceptions of system aspects such as utility, ease of use and efficiency. User experience may be considered subjective in nature to the degree that it is about individual perception and thought with respect to the system. User experience is dynamic as it is constantly modified over time due to changing usage circumstances and changes to individual systems as well as the wider usage context in which they can be found. International Standard Organization (2008) defined the user experience as "a person's perceptions and responses that result from the use or anticipated use of a product, system or service". According to the ISO definition, user experience includes all the users' emotions, beliefs, preferences, perceptions, physical and psychological responses, behaviors and accomplishments that occur before, during and after use.

In the light of the definition, we consider user experience a multi-aspect feeling which based on the interaction between the user and the product (Roto 2006b), including the perception of product attributes (such as full-featured, innovative design, etc.), emotional change (such as satisfaction, pleasure, etc.), formation evaluation (such as

easy to use, value for money, etc.), behavioral changes (such as avoidance, re-purchase, etc.) and other aspects (Hassenzahl 2004).

So what factors determines or influences our overall experience in using a product or system? Many researchers studied from the one or several perspectives in the user experience, trying to find the determinants of the user experience; other researchers are trying to establish structure theory and process models from the theoretical level. Norman (2004) divided the product experience into three levels, named as visceral level, behavioral level and reflective level. Hassenzahl and Tractinsky (2006) proposed a user experience model which analyzed three main factors of user experience: the present state of the user, the properties of the system and the context of use (Fig. 1).

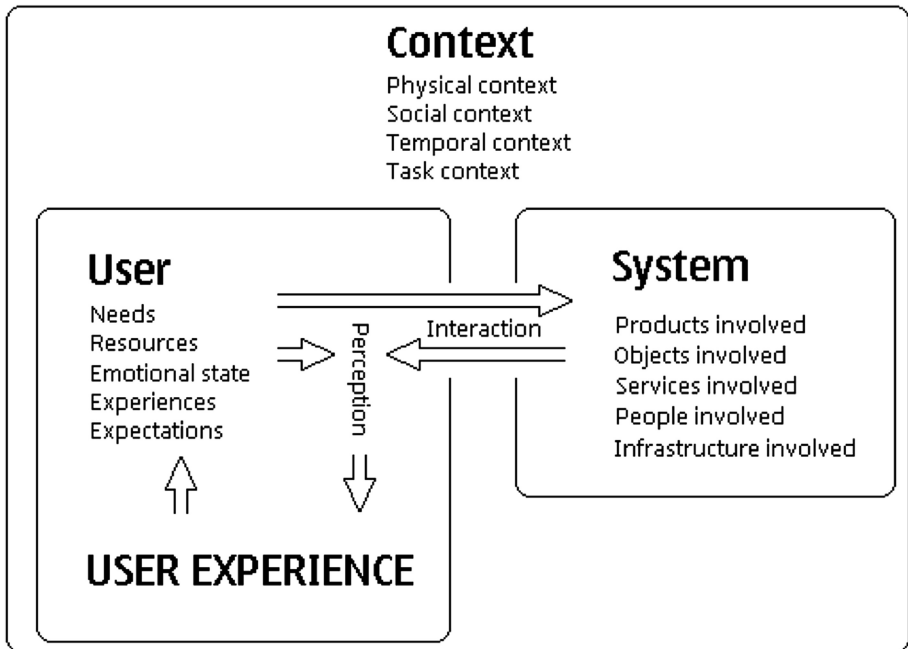


Fig. 1. User experience building blocks (Roto 2006a)

As we can see, these factors truly play a significant role in user experience. Additionally, time also influences the user experience. Single experiences influence the overall user experience. For example, the experience of a key click affects the experience of typing a text message, the experience of typing a message affects the experience of text messaging, and the experience of text messaging affects the overall user experience with the phone. The overall user experience is not simply a sum of smaller interaction experiences, because some experiences are more salient than others. This paper gives a report of how the previous user experience to a similar product affects the existing user experience with the expectation dis-confirmation theory.

2 Related Works

One of the difficulties of user experience researches is that the user inner state and the environment are changing over time. More and more researchers study user experience in longitudinal perspectives. Karapanos et al. (2009) used the DRM (Day Reconstruction Method, namely the users record usability problems and feelings by diary documentaries) to record and qualitatively analyze six mobile phone users within 8 weeks. The regression analysis of different stages of the user experience has revealed that factors playing the major roles in different stages of the user experience are different: early stage of the user experience is mainly affected by the impact of the hedonic properties of products, while the later stages of the user experience depend on the pragmatic values of products.

Karapanos et al. (2009) divided the product (or service) life cycle into three periods, namely orientation, incorporation, and identification. In each period, there is a key factor that decided the merits of the user experience.

- (1) In the orientation period, when user gets more familiar with the product, the feeling of freshness gradually declines, and problems come out. Key factors affecting the user experience are the attraction of the product and user's learning cost.
- (2) In the incorporation period, dependence helps the product integrate into people's daily life scenes gradually. During this period, availability and effectiveness are more important for the formation of the user experience.
- (3) In identification period, people's mental recognition of the product gradually increases. It requires products to meet users' social and emotional needs, individuality, self-highlighting, and community sense. Thus, the degree of products' social and personalization mainly affects user experience (Fig. 2).

Hassenzahl (2004) also pointed out that some aspects of user experience are based on the intuitive feelings, such as satisfaction after using.

Other researchers studied the user's perception from the perspective of the individual attributes of user experience. Mendoza and Novick (2005) made a longitudinal study of software usability with school employee during eight weeks. They analyzed the crux of the availability and the change of user confusion degree. While the time of using the product increases, that the degree of user confusion declines and the proficiency is on the rise. They believed that the current research on usability paid too much attention to problems encountered by novice users while ignoring many important issues emerging in late period. The researchers should thoroughly analyze problems encountered by users of all time.

The formation of user experience is mainly the accumulation of past events (i.e., experience) and the outlook of unhappened events. Happened and unhappened events superimposed on the happening events on temporal dimension, and users' behavior to achieve goals will guide and restrict the formation of experience. These interrelated events form a specific experience. In time series, the formation of an experience, whether conscious or unconscious, is an important node in the event. Events are the pauses of experience. It can be described as a specific interaction process for a

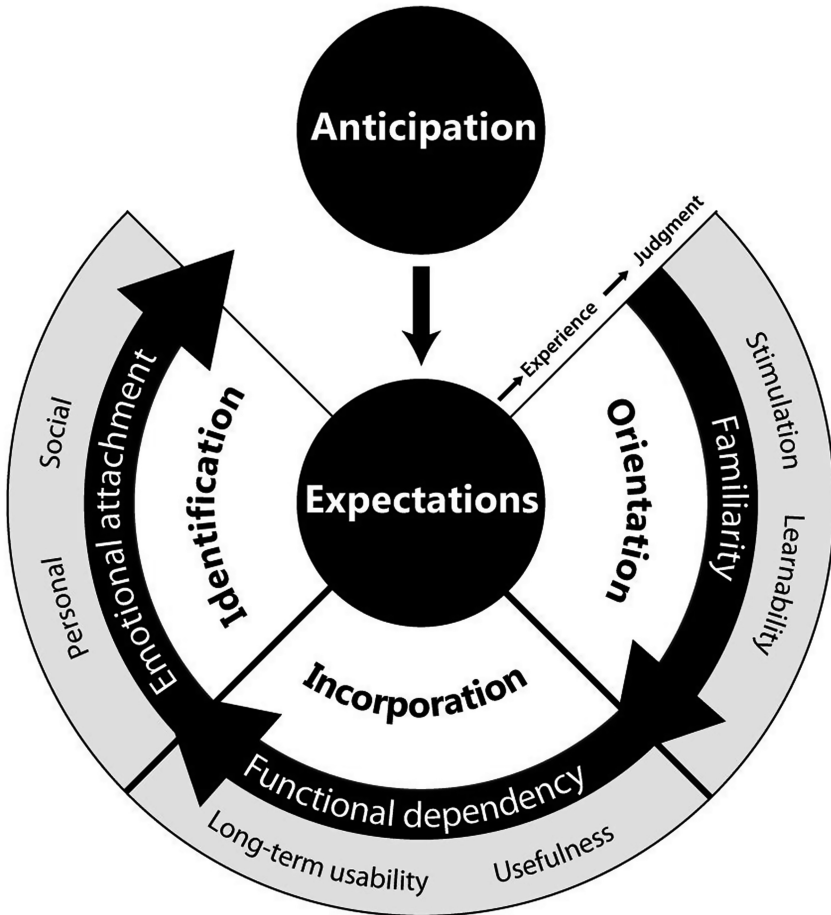


Fig. 2. Temporality of experience model from Karapanos et al. (2009)

particular task. The end of each event will be accompanied by a real-time experience. Homogeneous parts of those events are retained from similar experiences and eventually form an overall experience (Sun and Wu 2014) (Fig. 3).

In business, customer satisfaction plays an important role in service evaluation. Researchers believe that there are a number of factors that affect customer satisfaction: customer expectations, customer perception of quality, price, customer perceived value, etc.

Oliver is the first scholar who takes the expectation into the research of the customer satisfaction analysis. He takes the expectation of service quality as the base point of evaluation after purchase, and puts forward that customer satisfaction is the function of customer expectations and “expectation dis-confirmation”. Oliver’s “expectation dis-confirmation” is the difference between perceived quality and expected quality. When customers perceive the qualities less than their expectations, they tend to feel disappointed, and otherwise they feel rejoicing (Zhigang et al. 2011).

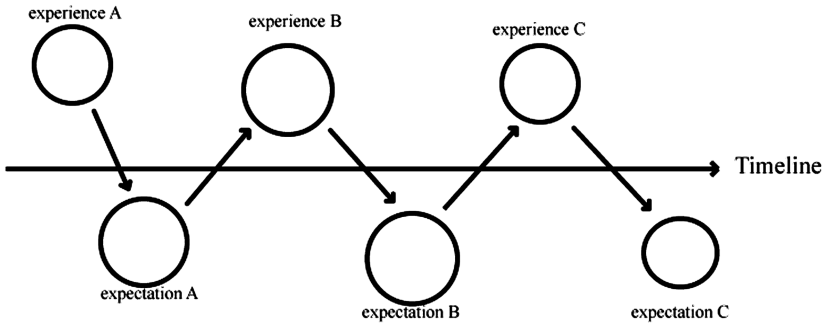


Fig. 3. User experience and user expectations interaction

3 Experiment of Dis-confirmation Effect of User Expectation

3.1 Experiment Materials and Variables

We choose online shopping apps as experiment material. We also select the following 8 variables to analysis the interaction between user experience and user expectation (Table 1):

Table 1. Variables to evaluate user experience and user expectation

Design feature of the app	Consumers perceived shopping app appearance and aesthetic feeling, refers to the overall image and the wind
Usability of operation	Website search engine and excellent mobility can help consumers simply and easily find the information or product they want when self operation
Product quality assurance	The degree of consistency with the online store selling products operators promise
Network security	Consumers in the shopping site in financial payment and the privacy of personal information on the safety degree of feeling
price advantage	Online store to save a lot of costs, customer expects to buy cheaper products through the online store
Convenience	Internet to break the boundaries of space and time, consumers can buy things online fast
Network interaction	Online stores and consumers continue to dialogue, mutual communication, and through the continuous feedback and correction get to know each other and improve the efficiency of the service, turn to a timely response to customers
Personalize	Online store provide personalized service for every customer, according to customer preferences, history, and identification

3.2 Tests and Data Collection

Step 1: To compare with previous findings, this paper takes the existing methods of questionnaire.

Step 2: Before the formal experiment and questionnaire, we post the questionnaire to 15 students, in order to test the variables. There is 37 questions in the original questionnaire. Four failed questions are removed.

Step 3: There are two android apps (app A and app B). Before the formal experiment, we conduct a pre-test in order to compare the user experiences of the two apps. Then 60 young students who have never used these two apps before participates in the formal experiment. They are divided into two groups. The first group uses the apps in the order from app A to B. The second group tests in the reverse order as a control group. Before using the apps, the two groups are asked to fill in the questionnaires to give the current expectations. Then after using the first app, the two groups fill in the questionnaires once again and participated in the interviews to report their experiences of the apps and the updated expectations for the next app. After using the next app, the user experiences of the last one are measured. The data of two groups have been compared to find the changes of user experience and user expectations.

Data Collection. We selected 105 university students in Shanghai. A total of 105 questionnaires were distributed, among them 96 were fully completed, and 60 were valid questionnaires. After analyzing the data collected, we visualize the results in Figs. 4, 5, 6 and 7.

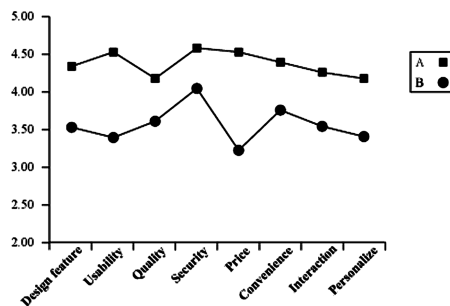


Fig. 4. User experience comparison of A and B

As shown in Fig. 4, the user experiences of app A and app B are compared on eight dimensions. It is indicated that the user experience of app A is better than the app B. Figure 5 shows that after using app A or app B, user expectations are changed. It is indicated that app A improves the user expectation to the next app, while app B reduces the user expectation to the next app. Figure 6 shows the experience of using app B after using app A and the experience of using the app B without using app A before. It is apparently that the user experience of app B after using app A is worse than the

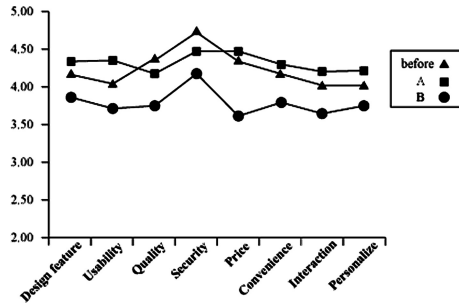


Fig. 5. User expectation comparison of A and B

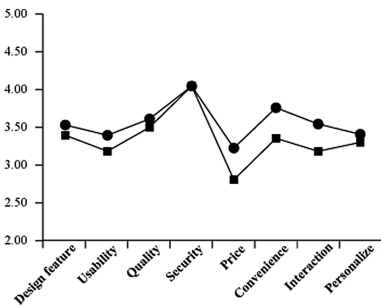


Fig. 6. User experience comparison for B

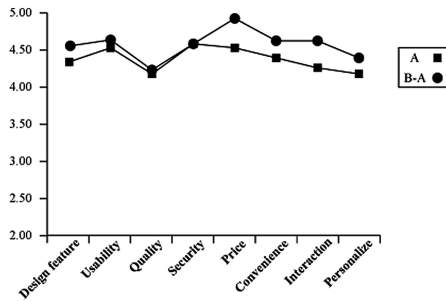


Fig. 7. User experience comparison for A

experience of using app B directly. Figure 7 shows the user experience of using app A after using app B and the experience of using app A without using app B in advance. It is indicated that after using app B, the user experience of app A is better than the experience of using app A directly.

4 Results and Conclusions

The experiment shows that the existing user experience will affect the subsequent user experience by changing the user expectations in between. Good user experiences will raise user expectations for the future uses of products, and poor user experiences will reduce user expectations to future uses of product.

User experience is now the core competitiveness of services and products. User experience determines the entire satisfaction of products.

Evaluation of user experience is not only judged by the perceived value, but the diffidence between perceived value and user expectation. That is what the study of user expectations contributes to user experience research. When the perceived value is larger than user expectation, user experience is positive and the product is satisfactory.

When perceived value is less than user expectation, user experience is negative and the product might fail on the market.

Former similar products will directly affect user expectations to new products. Therefore, to do a good experience design, designers must investigate what similar products the targeted users have already used and make sure that the new product goes beyond the users' expectations.

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