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APPLICATION OF PLACEBO EFFECT INTERFACE DESIGN IN IMPROVING THE USER EXPERIENCE

Shao-Feng Wang
College of Design, National Taipei University of Technology No.1, Sec.3, Zhongxiao East Rd., Da'an Dist., Taipei City 10608, Taiwan
262273724@qq.com

Abstract

The Internet is a virtual architecture of the real world. Traditional designers often transplant real-life experiences into Internet product design to reduce learning costs. The user interface is the language of communication between the two worlds. The user experience can make the virtual world communicate more smoothly with the real world. It is difficult for designers to balance user needs with business needs if they rely solely on traditional life experiences. Because both are competing for users' time. Thus, we can balance the needs of both parties by using the placebo effect to reduce the anxiety of the user waiting. This article takes the loading method of APP startup page as an example, from the perspective of Internet interface design and user experience, to explore how to optimize the user experience and reduce anxiety. Using the questionnaire method and the sounding thinking method to obtain the user's data. The correlation between different requirements was obtained by using the Likert scale and One-factor dependent sample ANOVA. The Kano model was used to classify the data into different levels of requirements. This study has contributed to the study of user experience in optimizing the loading interface.

Keywords
Placebo Effect, APP Launch Page, Loading Method, User Experience, Kano Model

1. Introduction

The Internet has made globalization faster: on the one hand, it is continually disseminating information around the world; on the other side, it is regularly collecting the views of different users, thus forming big data. Big data promotes globalization even more. Future mobile APP will play the role of artificial intelligence (Fogg, 2009), data analysis is like its IQ, and user experience is like its EQ, and the user interface is like its appearance. This paper applies the case method and experimental method to obtain the critical factors of the Placebo effect UI design and solves the emotional deficiency caused by technical problems in the process of information dissemination. According to the Likert scale and the Kano model, the conclusion that the placebo effect interface is beneficial to improve the user experience is obtained, and the application method of optimizing the interface experience using the placebo effect interface is proposed.

In the process of the user completing the functional operation, the factors determining the user experience include subjective factors and objective factors. Subjectively influenced by the environment and state, when users feel that the content is rich and exciting, they feel that time is passing fast; when users think that the content is boring, they believe that time is moving slowly — objectively influenced by technical limitations, natural learning, memory, ease of use and fault tolerance(Orji, Reilly, Oyibo, Orji, & Technology, 2019). Therefore, when designing products with good user experience, not only should we consider functional efficiency, but also consider using some excessive comforting interface to reduce the anxiety of users to alleviate the limitations of technological development.

Factors that objectively affect user waiting time include hardware configuration, network environment, background computing mode, information architecture method, interface loading mode, and so on. Factors that subjectively affect user latency include the physical environment waiting, the maneuverability of the current progress of the operation, the clarity of the operational purpose, and the padding of the blank period. In the case of objective waiting time determination, how to shorten the user's personal waiting time through interface interaction design is the key to optimizing the user experience (Orji, Tondello, & Nacke, 2018). Because distracting the user's attention and attracting users is a means to enhance pleasure effectively.

1.1 The Value of the Mobile App Launch Page

According to the IOS design specification: When launching the APP, a startup page should be designed to fill the waiting time of the user. If the startup page is loaded too long, it

will cause anxiety for the user. That is to say, with the improvement of network speed and the development of technology. The startup load time of Internet products has not decreased but has become more complicated as the functionality has increased. Load time not only affects the user experience but also affects business interests and practical guidance.

Time cost plays a vital role in the process of accessing users on the Internet. On the one hand, the user's anxiety is amplified; on the other hand, it leads to the attention of different products to the user experience. This paper studies how to ensure the user's good experience inertia is the focus of future interface design when technology conflicts with user patience. A large amount of presentation of information streams can cost users a lot of time. How to let users lose patience before staying in the production process is the focus of the designer. According to (Nah & Technology, 2004), users wait for more than one second to have a sense of delay, and 2 seconds have anxiety, so this article takes the APP start page waiting time as the research object. Explore how to use the placebo effect to ease the user's waiting anxiety to improve the user experience.

Although the progress bar loading method is the most honest in all app page launches, we still need to gain attention through visual and auditory methods to reduce the anxiety caused by waiting. The traditional work is modified on the progress bar. For example, the progress bar is very fast in the first half of the optical phase, and the acceleration in the second half is very slow. The actual loading speed is uniform, but the progressive acceleration of the progress bar will attract users to choose to wait patiently.

Limitations of the physical environment: Due to the objective conditions such as the Internet environment, network speed differences and server anomalies, the control and experience optimization for a given time is still the focus of research (Yan, Chu, Ganesan, Kansal, & Liu, 2012). The most classic case is the smooth experience of Instagram. Even if the network connection is wrong, you would like to give your friends alike. Instagram does not show the operation failure but reminds you that the operation is successful. Because they recorded your operation records in the background, once the network is restored, the action is complete.

1.2 Factors Affecting the Startup Time of the Software Page

In the PC era, only massive games and software will configure the launch page to kill time. With the advent of the mobile internet era, more APPs choose to use the startup page to meet the business needs that affect the startup time as follows: (1) Objective environment: In order to achieve the fluency of the startup, it takes a particular time to overcome the limitations

of hardware and network speed. (2) Subjective environment: display the brand image of the APP, including functions, tastes, connotations, and usage scenarios, to achieve the purpose of strengthening the brand image (3) Business Environment: The user's time cost is commercial value. For example, the placement of the advertisement network economy comes from the time cost, and the APP hopes to use the private time of the user's attention when the product starts to achieve the commercial promotion purpose.

2. Literature Review

2.1 Overview of the Placebo Effect

In 1955, Dr. Henry K. Beecher proposed a "placebo effect," also known as "non-specific effects" or subject-seeking effects. It refers to the treatment of the disease by affecting the patient's psychological state and allowing them to consider the treatment effect (Beecher, 1955) actively.

Technology homogenization makes interface experience a differentiated selling point, and the functions that are difficult to implement in technology often bring anxiety to users. A good interface interaction can tell the user the progress position and the operation guide so that the user is relieved of tension.

2.2 Overview of the Likert Scale

In 1952, the American psychologist Likert proposed the Likert scale for studying the user's perception of things. This method quantifies perceptual attitudes in a numerically rational way, and allows users to “strongly agree”, “agree”, “not necessarily”, “disagree”, “very disagree” through a series of positive and negative questions. Voted in five answers and corresponds to scores of 5, 4, 3, 2, and 1. The final score based on each item represents the total score of the user's attitude. And the high group and the low group are separated, and several issues with the high difference and low component difference are selected by sorting to form the Likert scale.

2.3 Overview of the Kano Model

In October 1979, Noriaki Kano, a professor at the Tokyo Institute of Technology, first quantified the user's satisfaction with the product; in January 1984, he established the Kano model. Among them are the needs of three users: (1) basic demand; (2) expected demand; (3) exciting demand. Through the structural documents to achieve the classification of user needs and the purpose of guiding the enterprise.

2.4 Overview of Research on Waiting Time

In the virtual world, the attraction of the user's attention increases the competitiveness of the product. So the software startup time is not as fast as possible but should provide more advertising, product or traffic information within the acceptable range of the user. How to balance the conflict between startup time and function loading is a critical factor in improving user experience (Chu, Kansal, Liu, & Zhao, 2011).

From the early 8 seconds of the Internet law to the change of the 1.5-second loading recommendation proposed by Baidu Mobile Search Landing Page Experience White Paper 4.0, the user's patience has become less and less, and the product information has become more and more The better. Designers need to balance the needs of both to achieve a good user experience.

Mobile user APP installation time and entry time are important factors affecting user experience. This study uses experimental methods to systematically study the longest APP installation time and entry time acceptable to users. According to the research (Liu Sen, 200120, Liu Sen, He Jingqin, & Li Xinxin, 2016), (1) The longest acceptable entry time into the APP program is as follows: 3802 ms without feedback waiting; In the case of feedback waiting, it is 5263ms; (2) The maximum acceptable time for installing the APP program: 8287ms in the case of no feedback waiting, and 17343ms in the case of feedback waiting. The results of this study have guiding value for the interface design specification for mobile clients. According to (Hoxmeier & DiCesare, 2000), the effects of software startup response affect user satisfaction. 2s is best, 12s is unbearable. At the same time, according to (Galletta, Henry, McCoy, & Polak, 2004) research results indicate that the user tolerates time between 2s and 12s. According to the 2017 Google Data Consumer Behavior Document, when the APP startup time exceeds 3s, 53% of users will quit; when the APP startup time exceeds 5s, 74% of users will quit. However, the reaction is too fast and error-prone, and the user feels uneasy.

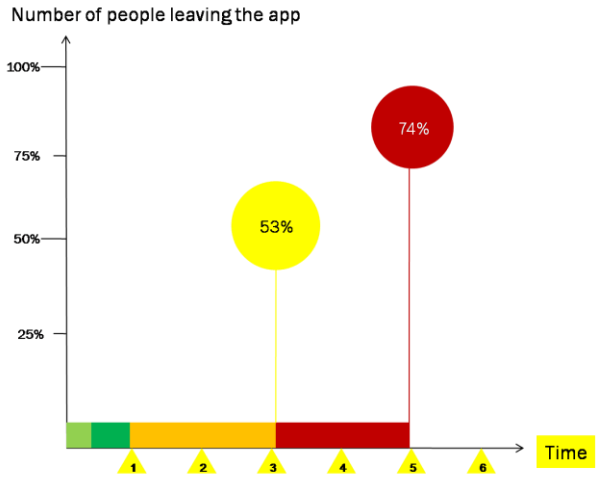

Figure 1: *User Abandonment Rate for App Startup Time*

All of the above research methods are based on scientific thinking. If the technology and network speed are very mature, you can even control the way and time the app page is launched. But a product needs to balance the needs of users and business interests. That is, the user's demand for faster demand and the seller's request for more users are contradictory. Designers need to use design to influence the personal emotions of users when the physical limits are clear and ultimately achieve the purpose of improving user satisfaction.

3. Research Method

3.1 Significance of the Research

2018.8 "Baidu mobile search landing page experience white paper 4.0" proposed mobile phone application startup time of 1.5 seconds. In January 2019, Google announced a new project to improve its mobile search results: the inclusion of page load speed as a reference factor for APP rankings. It can be seen that the startup time of mobile applications will become more and more important in the future. Therefore, this study takes the startup mode of the APP as the research object. According to the standard starting method of the market, the Li Kete scale was used to screen out the pain points, and the pain points were made into Kano questionnaires, and the classification of different needs of users was achieved through distribution. Finally, it provides suggestions and guidance for the enterprise to differentiate and improve the APP function.

3.2 Interviews and Questionnaire Collection

In the APP content page loading, there are six common loading methods: full-screen loading, priority loading, full page loading, quick loading, offline loading, and automatic loading. But they are not all suitable for loading the app launch page. To find the user's favorite loading method, we received 58 questionnaires using the semi-structured questionnaire and the LiKert scale method, as follows:

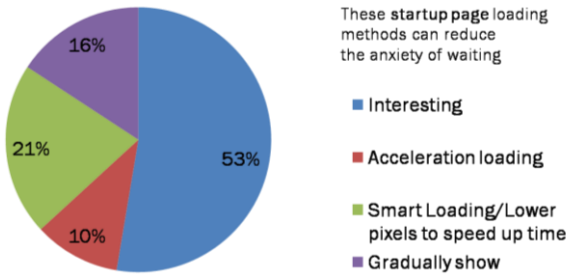

Figure 2: *Ways to Reduce the Anxiety of the App Startup Page*

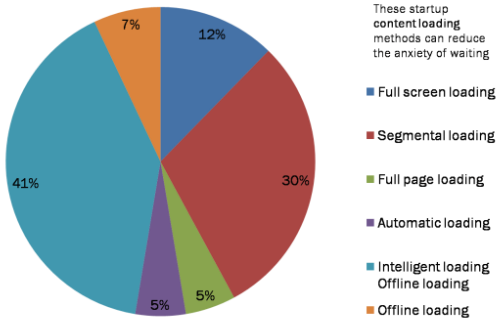

Figure 3: *Ways to Reduce the Anxiety of the App Content Page*

From the perspective of cognitive psychologist Norman: fun (experience interaction), visual illusion (acceleration) belong to instinct level requirements, intelligent loading (reduced quality), priority loading (stage display), offline loading (data caching), Interactive information (help tips) are behavioral level requirements, expectations (predictability), third-party applications, and non-modal loading (controllability) are reflection level requirements. A total of nine loading methods can alleviate the anxiety of the APP page when it starts.

3.3 Prototyping and Testing

In order to find out more about the needs of users, we have prototyped to test the user's attitude towards different loading methods, and have been positively affirmed by voting.

Figure 4: *Prototype Design*

The following results are for the percentage of votes before and after improvement for a particular program. After adding interesting effects, 89.5% of votes were obtained; 82.5% of votes were added after adding optical illusion; 89.5% of tickets were added after smart loading, 89.5% of tickets were added after priority loading, 75.4% of tickets were added after third-party application, and votes were increased after expectation (predictability)54.4%.

3.4 Data Analysis and Evaluation

For the six improvements, we used the Likert scale to collect data before and after the improvement. Six analyses were performed using One-factor dependent sample ANOVA statistics. It was found that all six improvement methods were $P<0.05$, indicating that the placebo effect had a significant effect on improving the user's waiting for the experience.

Since different APP startup page loading methods are suitable for different usage scenarios, we used the Kano model questionnaire to study the user's recognition of varying loading methods. A total of 58 valid questions were collected in this questionnaire. The results are as follows:

Table 1: *Kano Model Survey Questionnaire Analysis*

Loading method	**Classification Result**	**SI**	**DSI**	**Loading method**	**Classification Result**	**SI**	**DSI**
Interesting	A	70%	-4%	Offline loading	I	40%	-6%
Optical illusion	A	60.4%	-3.8%	Modeless loading	A	44.9%	-4.1%
Priority loading	A	41.2%	-4%	Interactive information	I	42.6%	-8.6%
Third-party app	I	50%	-10.1%	Expectation	A	58.9%	-5.9%
Smart loading	I	42.9%	-6.1%				

4. Research Result

The user's feeling of waiting for the APP to start is divided into two parts: one is the objective experience, which is the actual waiting time, and the other is the subjective experience, that is, the time to feel waiting.

Objective perception (actual waiting time) is limited by technology and environment, and it is difficult to make significant changes in a short time, but it can be realized by optimizing software code and information architecture. Subjective feelings (feeling waiting time) are influenced by the environment and emotions (Ma, Chen, & Lin, 2018). How to shorten the user's feeling of waiting time is the key to solving the problem.

4.1 Ways to Reduce the Objective Waiting Time

Optimization of the startup interface information architecture can reduce load time. Specifically, it includes (1) pre-caching, (2) flexible layout interface, (3) reducing HTTP request, (4) optimizing image table and other files, compressing code, and the like.

4.2 Reduction of Waiting Time

(1)The instinct level includes fun (experience interaction) and visual illusion (acceleration). On the one hand, using special effects to make loading interesting can distract users. Design elements include copywriting, animation, color and sound. On the other side, the use of optical illusions to achieve acceleration purposes, such as rotating faster icons or faster and faster progress bars.

(2) Behavioral levels include quick loading (reduced quality), priority loading (stage display), offline loading (data caching), and interactive information (help prompts). These are operations performed by the APP background according to different network conditions, which can hide waiting, reduce waiting time, overcome negativity, and reduce user frustration.

(3) Reflective levels include expectations (predictability), third-party applications, and non-modal loading (controllability). Setting the expected time and completing it early can give the user an unexpected benefit. At the same time, the user should be made aware of the loading progress of the APP, thus achieving cognitive predictability and controllability, and increasing user enthusiasm.

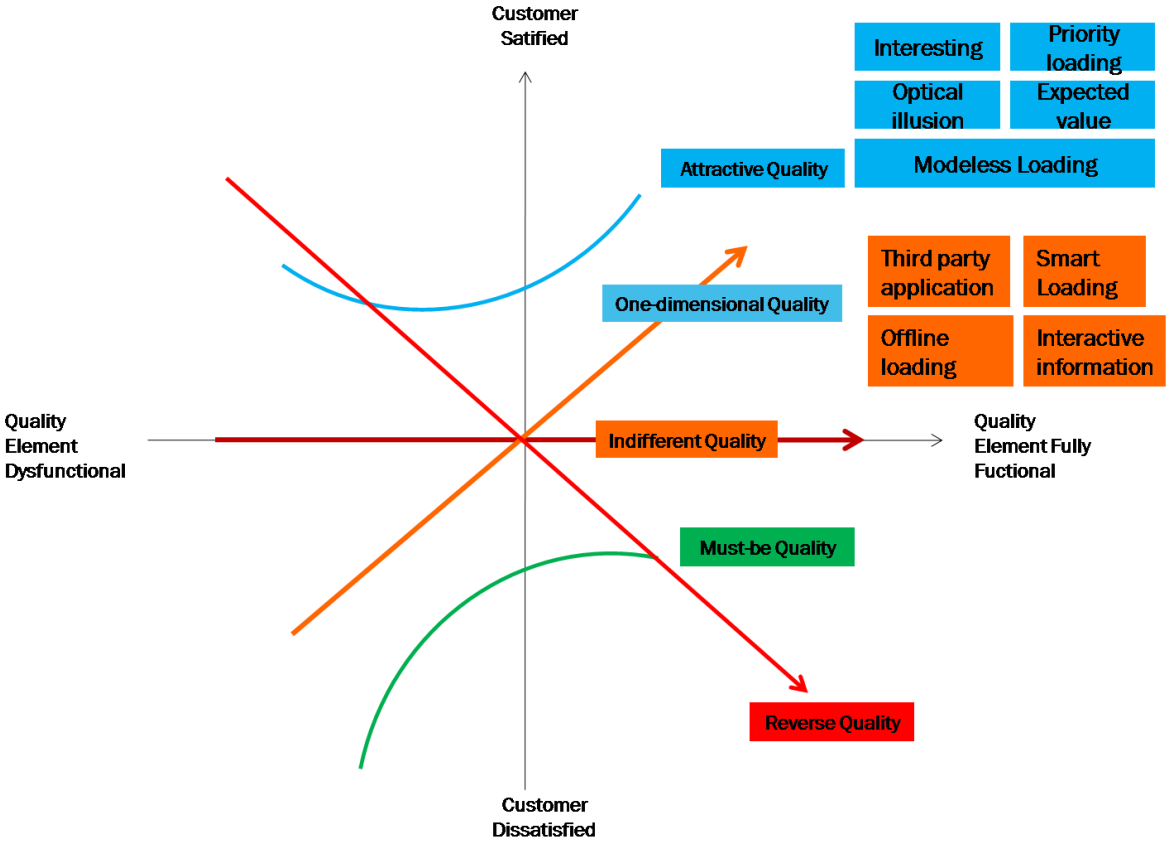

Figure 5: *Kano Model Analysis Result*

According to the questionnaire, for the user: fun, visual illusion, expectation value, priority loading, and non-modal loading are attractive qualities; third-party applications, smart loading, offline loading, and text interaction are Indifferent Quality qualities.

For apps with controllable start-up time, start-up time can be used to promote the brand, guide operations and deliver ads. Users' patience can be extended by fun, visual illusion, expectation, and text interaction. For APPs whose startup time is not available, travel priority

loading, non-modal loading, third-party applications, smart loading, and offline loading can be used to distract the user's attention to reduce anxiety.

5. Conclusion and Discussion

In the virtual world of the Internet, the competition for and guidance of user traffic is a future trend. The APP startup page plays a role in the past and the future. Because on the one hand it shows the first impression of the APP; on the other hand it guides the user's subsequent operations. However, the APP's occupation of user time and the user's requirement for APP efficiency have caused anxiety of waiting. In this regard, on the one hand, the objective waiting time can be reduced by improving the hardware and software facilities; on the other hand, the subjective waiting time can be reduced by the placebo effect.

Of course, with the advent of the 5G era and the evolution of hardware, the time for APP page launch and content loading will no longer be affected by technology, and more emotional considerations should be considered. There are still some scenarios in this study that are not regarded as comprehensive. For example, for apps that users have to use, they will become more patient, and the app itself will pay more attention to their own needs. For example, Instagram, Twitter, and Messenger are all solid colors without animation, highlighting the content, and removing it. Excessive decoration, retaining the principle of a simple interface.

In summary, this article obtained a positive correlation between placebo dependence and user experience through a single factor-dependent sample ANOVA. The homeopathic effect of the KONO model can be used to improve the user experience in three ways. (1) Distracting attention, for example, using interesting animation and visual illusion effects; (2) loading hidden waiting time in the background, predicting the user's behavior trajectory through the non-modal interface to complete tasks ahead of time, such as offline loading and intelligence Load; (3) increase the expected value of waiting through interactive design, such as information guidance. In short, the placebo effect can reduce the anxiety of the user waiting because it can hide a time or distract the user's attention, to optimize the user experience.

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