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Evaluating User Engagement Theory

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Abstract

A variety of views of User Experience (UX) have emerged ranging from contextual interpretations of experience to experimental studies. This paper focuses on User Engagement (UE), a restricted explanation of UX that concentrates on judgement of product quality during interaction. It presents a model to explain how users' judge quality according to criteria such as aesthetics, usability and engagement.

Keywords

User experience; evaluation; theory development.

ACM Classification Keywords

H.5.2 [Information Systems and Presentation]; User interfaces -Theory and Methods.

General Terms

Theory, Human Factors

Introduction

The foundations of User Experience (UX) originated from questioning the traditional views of usability [1, 2], suggesting that it does not account for the emotional experience while interacting with a product. Drawing on pragmatism, McCarthy & Wright [2] presented a framework that explained the felt experience of technology, arguing that UX evaluation requires a deep understanding of the context of use. In

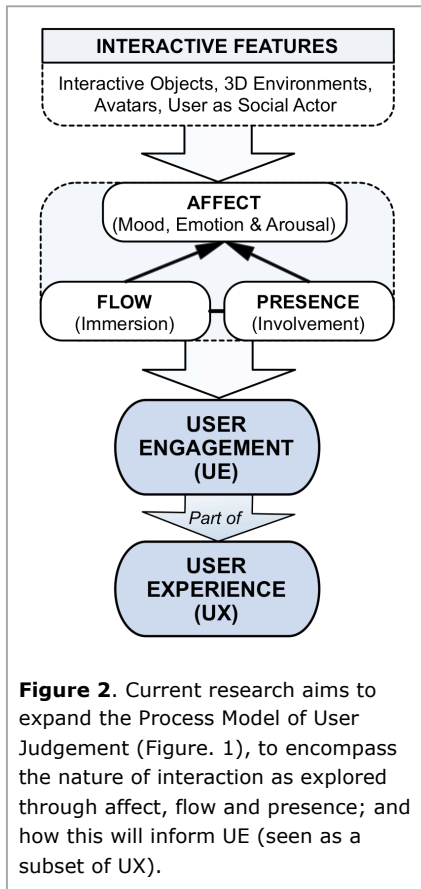


Figure 2. Current research aims to expand the Process Model of User Judgement (Figure. 1), to encompass the nature of interaction as explored through affect, flow and presence; and how this will inform UE (seen as a subset of UX).

contrast, the cognitive view initiated by Norman raised the importance of the emotional response to the aesthetics of interactive products [1]. Measurement instruments were developed first by Lavie & Tractinsky [2004], who defined scales for *classical* and *expressive* aesthetics [3]. Hassenzahl focused upon assessing the underlying constructs of ‘hedonics’ and ‘pragmatics’ as design qualities and their interplay between goodness and beauty, and developed the AttractDiff scale to evaluate these constructs [4]. From a design prospective Kim et al, [5] identified 13 emotional dimensions that relate to various design features, but no framework of aesthetic judgement was produced.

Despite these and many other studies, no consolidated model or theory has emerged to explain how users make judgements related to their experience with interactive products. Cognitive theories of judgement and decision-making strategies [6] demonstrate that user judgement is context dependant and influenced by task and a users’ background [9]. This process-orientated view may provide a new perspective on UX research, as presented in this paper.

Model of Design Quality Judgement for UE

The model we propose focuses on users’ judgement within session, for which we adopt the term User Engagement (UE), a subset of UX. Originating from a series of experimental studies a three-stage process model of user judgement for quality was proposed [8, 9], as shown in Figure 1. It focuses on how judgements of quality criteria (e.g. usability, classic and expressive aesthetics) are determined by the intersection of the user goal or task, the domain or application type and product features. The context of the application (serious or fun), and the users profile (skill and

experience) determine the prioritization of the criteria by which a product is judged. Hence the experience of UE is determined by the quality criteria biased by the application domain and the user’s background. The relative importance of the criteria changes during the session, as demonstrated by the role of aesthetics in early and later exposures to web sites [7].

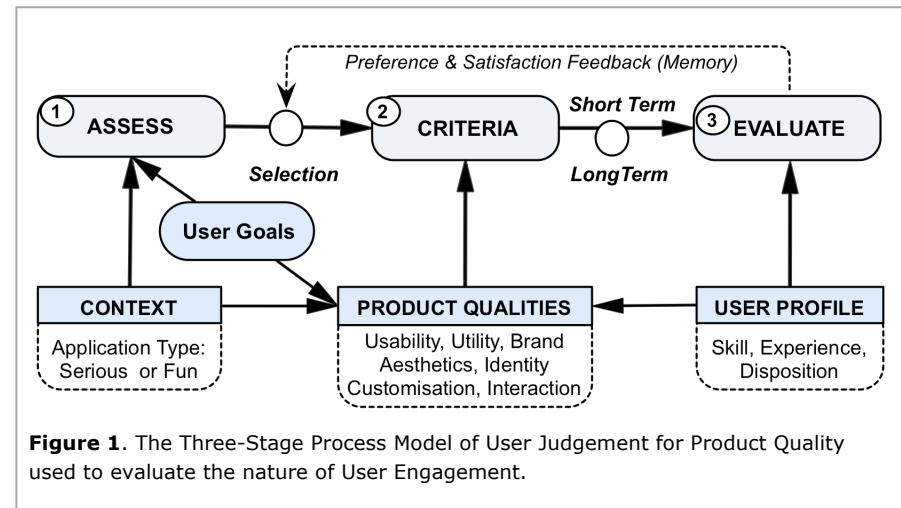


Figure 1. The Three-Stage Process Model of User Judgement for Product Quality used to evaluate the nature of User Engagement.

Previous versions of this model did not explicitly account for the interactive nature of UE, so our current research is aiming to expand the model in order to encompass the emotional influences upon user judgment during interaction. Drawing on psychological theories, such as affect, arousal, engagement, flow and presence, Figure 2 expands the UE component in figure 1 to propose a process model of judgement influenced by affect and users’ goals.



Figure 3: The three sites used in the study to explore affect, flow and presence. The top is Google Art Project website that offers an immersive 3D experience; below is the Louvre website offering an audio interactive animated guide. The National Gallery website at the bottom provided limited interactivity and acted as a control.

UE Experiments

The principles of affect (mood and emotion), flow (immersion) and presence (involvement) [10, 11, 12] are known to affect human behavior and judgement, yet how these principles influence user engagement is poorly understood. In a recent study we compared UE in websites that belonged to the same domain but differed in interactive features. Three art gallery websites were evaluated, where two sites employed either an interactive guide or 3D effects, while the third site provided a traditional design with only menu-link navigation style interaction (Figure 3). It was expected that the more interactive designs would promote higher positive affect, flow and presence. The attitudes, experience and overall preference of 40 users were compared across the 3 sites with repeated tasks using a triangulation of methods including in-session and post-session questionnaires, post-test interviews and video observation for facial expression analysis.

Initial findings showed that affect improved after initial exposure with repeated tasks, and higher affect ratings were elicited by the more interactive websites, yet no inter-site effects were found for the post-session evaluations of flow, usability and overall preference. Aesthetic ratings were partially related to changes in affect after interaction. These findings suggest that interactive features increase UE as measured by affect; however, its impact on long-term UX where judgements of other product qualities (content, utility, etc) may dominate is part of our continuing research.

Conclusion

This paper has argued for a cognitive view of UE as a judgement process that is focused upon understanding the underlying mechanisms of decision-making about

product preferences, and quality assessments. This contrasts with approaches that aim to elicit psychological constructs, which describe UX as either explicit or tacit memories [4]. The UE framework forms a basis for future expansion that embraces the influences of affect, flow and presence on interactive experiences and how such experiences might be determined by high-level design features such as avatars and 3D environment. It considers the wider impact of context, usability, aesthetics and the influence of the individual user difference. An agenda for future research is highlighted below.

Theory Development

Our current model accounts for UE as a synthesis of judgement on usability, content, aesthetics, customization and brand, with the recent addition of interactivity in the form of affect, flow and presence. Experimental evidence has demonstrated how the priority order of judgement criteria influences the application domain (e.g. serious use or fun) and users' background (e.g. design oriented users prioritize aesthetics). However, we need to test a larger sample of products in different domains to gain a deeper understanding of judgement biases created by the context. Another future aim is to expand the UE model towards a wider picture of UX in order to understand why users adopt and continue to use particular technologies over multiple sessions and extended time. Further research will broaden the UE model to account for the whole UX, from beginning to end [9, 13] and how it may change over time.

Methodology Development

Previous UX methods have focused mainly upon post-test questionnaires where users recall their memory of

an experience. Karapanos et al [14] developed a drawing tool for the elicitation of longitudinal UX although this was applied post-experience relying on reconstructed memory. Affect, arousal, flow and presence, are feelings that occur in the moment, making them difficult to capture retrospectively. We are experimenting with a triangulation approach that adapts and combines existing methods, for within session capture of affect such as facial analysis from video recordings, observation of behavior, posture and verbalization; and post session questionnaires, video replays and de briefing interviews stressing free memory recall and open comments.

The challenge is to develop effective techniques that can capture the 'in-the-moment' experiences, as they occur in situ, and track how these may change over time. Surveys, diary studies and experience probes can be used to capture and evaluate the changing patterns of UX over longer time periods.

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