

# Gaining insight into the User eXperience

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## ABSTRACT

There is little doubt that we need to better understand the effect that interactive experiences have on their users. The recent stream of research into emotion in HCI has aimed to collect information about the emotions evoked by product use. Methods to collect this emotion data have been firmly rooted in traditional techniques, including self-report. These methods typically collect information on the user's affective state at the end of the experience. This research addresses the need to glean information on the changes in affective state during the interactive experience. A psychological model of appraisal theory has been identified as a potentially useful approach for monitoring emotions arising during product use.

## Categories and Subject Descriptors

H.1.2 [Models and Principles]: User/Machine Systems - human factors, human information processing.

## General Terms

Measurement, Design, Human Factors, Theory

## Keywords

Affect, Appraisal, User Experience, Mobile Devices, Event-based, Emotion Sampling Device

## 1. INTRODUCTION

Everybody's doing it: designing for the user experience (UX). It's not always given the same name, however: for example, in marketing, it's known as the consumer experience. From a practitioners' perspective, UX is concerned with improving the design of anything people experience: websites, applications, products, environments. Experiences are highly valued, and, consequently, many products are now marketed as *experiences* rather than just *products*. "Having a high quality user experience is one of the most important goals for a consumer electronics product." [19:p190].

No matter what "it" is called, across numerous disciplines people are trying to capture it. The user experience field is multidisciplinary, drawing on knowledge and techniques from a range of academic and commercial areas. It has been

described as an umbrella *topic* by some [2, 17], and a '*felt life*' by others [25]. Anderson's umbrella covers 14 disciplines, including usability and interaction design [2]. McCarthy and Wright [24] have proposed a framework of four threads of experience:

1. Compositional - the elements of an experience
2. Sensual - how the design / texture / atmosphere makes us feel
3. Emotional - how emotions colour the experience for us
4. Spatio-temporal - the effects of place and time on the experience

The complexity of an experience makes it a unique event hard to repeat and even harder to create deliberately [12]. The focus for some researchers has been to try to identify the elements of a user experience [e.g. 19, 18]. Others believe that understanding the emotional or affective responses people have to products, services, and systems is essential to creating good designs. [9, 10, 32]. There is however a general consensus that for successful UX design the fundamental knowledge must include what users think and want, how they react, and the hidden reasons for their responses [19].

The research described here focuses on users' affective responses. The challenge is to design an emotion-sampling device to capture event-triggered reactions to a series of discrete situations which, when combined, constitute the complete user experience. The next section provides a brief overview of previous work on sampling the user experience.

## 2. EXPERIENCE SAMPLING

The notion of capturing a record of events in people's lives is not new [33]. In psychotherapeutical situations, participants are asked to complete questionnaires, and keep diaries to register thoughts, emotions and situations whenever they occur [8]. These self-report techniques have been used beyond the study of individuals' behaviour, to situations in organizational settings. Self-recording of everyday life events can be initiated by three types of prompt: interval-contingent; signal-contingent; event-contingent [33].

Csikszentmihalyi and Larson's Experience Sampling Method (ESM: see [14]) is an established self-report technique. Zelenski and Larsen examined emotions in the ongoing daily lives of their participants using ESM: participants reported three times per day for a month on how much they were experiencing various basic emotions [34]. ESM has also been used in studies to examine mood in the organizational context [26]. More recently, this approach has been used to collect data on the users' interactions with ubiquitous computing systems, in the natural context (see [7], which also provides a useful overview of this methodology). Participants are provided with a questionnaire booklet and an electronic pager

which is activated several times a day: upon receiving an 'alert' (random, scheduled or event-based), the subject completes a questionnaire in the booklet. ESM does not require participants to recall their experiences: this reduces the cognitive biases of other recall-based self-report techniques [7]. However, other difficulties can arise, especially with scheduled alerts, which enable the participant to 'collect their thoughts' in anticipation of the next alert. In recent studies, the ESM questionnaires have been ported to mobile, hand-held devices (such as PDAs) for ease of data collection [6, 8].

de Sá *et al.* provide a commentary on the use of mobile, handheld devices for the successful collection of psychological data [8]. Consolvo and Walker used PDAs as a tool for questionnaire data collection when applying the Experience Sampling Method to ubiquitous usability evaluation [7]. Iachello *et al.* used event-contingent experience sampling, to survey people in real life situations about ubiquitous computing (ubicomp) technology [16].

Whatever the context of use, and mode of delivery, the ESM formats require users to label their emotions. In the next section we examine the problems of emotion identification and labelling, and suggest an alternative solution.

### 3. AFFECT AS INFORMATION

According to Plutchik, an emotion is not simply a feeling state, but a complex chain of loosely connected events [27]. Thus a series of discrete situations which evoke short emotional reactions can become the cause of a more enduring emotional state [1]. Hassenzahl and Tractinsky [13] considered the notion of collecting information on users' emotional states as consequences of interactive experiences. In the recent stream of research to identify the emotions evoked by technology, most emotion studies have focused on this approach, which can be referred to as 'affect as information' [4].

Plutchik observed that several emotions may be experienced at the same time [27]. A difficulty also arises because using language to report emotions introduces ambiguity, it does not make it easy to describe mixed emotions, and the meaning of emotion terms is often obscure [27]. Plutchik commented that we often resort to metaphor to attempt to describe emotion, because, for example, many people are not sure about the differences between fear and anxiety, guilt and shame, or envy and jealousy [27].

Chen also reflected that subjects cannot usually duplicate their affects through their verbal descriptions [6]. They are likely to lose track of their experiences and the feeling of affects before they can completely describe them. Also, the snapshot of those feelings fade away before they can be reported; when answering questionnaires by retrospective recollection, subjects tend to miss subtle dimensions of consciousness [6]. Furthermore, retrospective methods to collect users' emotions cause problems because when reflecting on their experiences to formulate a response to a retrospective questionnaire item, people give more weight to peak moments and they strongly attend to how an episode ended [14].

There is also the issue of emotional intelligence, and the ability to both identify and label emotions [11]. A person may initially recognize the occurrence of an affective experience, but they then must distinguish between the emotions so that they can give it a label verbally. Ubiquitous digital appliances are now available to a heterogeneous user group, with ever

increasing wide backgrounds, literacy levels and skills [3]. Although it is obvious that a good user experience will begin to reduce the digital divide [5], in order to capture the quality of user experience with digital products, representative samples of users from this heterogeneous user group will be needed as participants, and some users may not have the self-awareness required to report their affect information.

To overcome these difficulties, we have identified appraisal theory as an alternative approach [15]. The use of cognitive appraisals removes the need for emotional awareness and the verbal labeling of emotions [11], and acknowledges the possibility that a person may be experiencing a mix of emotions at the same time [27]. Also, cognitive appraisals occur with each discrete situation [1], resulting in event-driven data collection, which captures the emotions brought about by a sudden change in circumstances.

We believe that in order to gain insight into the interactive experience, we need to capture people's experiences *during* their interactions with digital products, i.e. 'affect as experience' [4]. The next section explores the potential of appraisal theory to enable us to do so.

### 4. AFFECT AS EXPERIENCE

The 'affect as experience' approach sees emotions as dynamically experienced, and constructed in action and interaction [4]. It moves the focus to helping people to understand and experience their own emotions, and leads to new design and evaluation strategies for devices [4].

Appraisal theory has the potential to identify emotions *during* product use. The theory is based on the premise that the distinct emotions are produced by evaluating events in the environment as positive or negative. Although cognitive appraisals of events are granted to sometimes be unconscious, the emotions that result from those appraisals are typically viewed as necessarily conscious. However, with the use of cognitive appraisals there is no need to identify and label these emotions.

The appraisal model developed by Roseman *et al.* uses a series of questions whose answers lead along different pathways to identify 17 different emotions [29]. A common set of appraisals in different combinations appear to be involved in the production of multiple emotions, and each of the distinct emotions seems to be directly associated with a distinctive *pattern* of appraisals [23]. The model is presented elsewhere [15], but the appraisal questions would be as follows:

- Did you expect the event to happen?
- Did you want the event to happen?
- What caused the event to happen?
- How much control did you have over the event happening?
- What was the probability of the event happening?
- Did you want the event to stop or continue?

We present these questions as a translation of the analytical questions from the psychological model. It is felt that the accessibility of these simple questions, and the presentation of scales for the user's responses, will provide people with a tool which is both simple to use and easy to respond to. There are no psychological 'barriers' for the user to worry about. For example, most people often censor their own thoughts and feelings for the consumption by others [27]. Culture, education and age can also influence a person's responses; the

need to present oneself in a favourable light would easily distort the data collected via self-report.

The questions can be presented to the user via an Emotion Sampling Device (ESD): the user can access the ESD software via a mobile phone or PDA. When the user experiences a positive or negative event during their interactions with technology, they can report the event by answering this simple set of questions. The software monitors their response pathways to identify the set of emotions evoked by the interactive event. The resulting data will provide a view of the ongoing interaction, including both peak and negative moments during the use period.

The user will have been interrupted by the occurrence of the event, which provides the opportunity for an event-contingent report: it is human nature to want to speak about affective events soon after they have happened. They can report the event, and then answer a few simple questions about it before returning to their interactive experience. They will not need to reflect on the event to the extent of having to identify how they felt, what they felt, and what they will say on a questionnaire. The ESD thus offers a simple and straightforward tool to monitor the user experience. The next section considers the need for an appropriate method to enable researchers to assess users' interactive experiences.

## 5. ASSESSING USER EXPERIENCES

The need for event-contingent experience sampling, to survey people in real life situations about ubiquitous computing technology has been identified [16]. The move from desktop-based, stationary use settings to mobile uses in dynamic contexts has caused usability engineers to rethink their evaluation approaches [21, 31]. Understanding usage environments requires designers to step out of the lab and follow people where they use these applications [16].

However, although field-based evaluations seem like an appealing, even indispensable, approach for evaluating the usability of electronic appliances, field work does present difficulties [21]. For example, mobile devices are designed for individual use within a personal body space and therefore, observing the interface actions of the user is physically arduous [22]. Furthermore, home application usage, such as interactive TV, occurs in private environments [28], making access to users difficult, if not impossible. Researchers who have studied the use of home technology have remarked that establishing contacts with home users is more difficult and that different methodologies were needed to gather information [20].

Dormann observed that there are aspects of personal choices and values that cannot be easily subjected to the usability engineering approaches for task-based systems [10]. In a study of mobile device use, Sarker and Wells identified a stage within the use process which they call Assessment of Experience: they found that users appear to assess their experiences on at least three dimensions: functional, psychosocial, and relational [30].

This expansion of usage factors beyond the typical usability evaluation areas of effectiveness, efficiency and satisfaction has also been addressed by Scholtz and Consolvo's ubiquitous computing evaluation framework [31], which subsumes the usability factors within Interaction, one of 9 Evaluation Areas, which also include Appeal. When dealing with applications which produce emotional experiences enjoyed for their own sake, it is important to acknowledge

that individuals differ in the way they apprehend and react to emotions [10].

The issue of data collection in field-based studies may be effectively addressed with the ESD, which is currently at the prototype stage. Whilst other researchers continue with their attempts to encapsulate aspects of UX in a definitive document, we believe that a valid, alternative, starting point is to use the ESD to attempt to gain insights into what UX means to individuals in real life. By collecting profiles of users' interactive experiences, we hope to be able to contribute to the theoretical debate with data from real users, using real products, in real usage environments.

## 6. DISCUSSION

Returning to the debate on whether UX is a *topic* or a *felt life*, it sometimes seems as though we have stepped back in time to the early usability debate, when we considered whether product usability could be achieved with a checklist of attributes. Back in the 90s, usability was approached from both 'bottom up' (product attributes) and 'top down' (quality of product use). Whilst it may be possible to identify specific factors which affect visual appeal [32] and then check for their existence, it would be far harder to generate design principles for the completely successful user experience.

We seem to be revisiting an old debate with a new generation of devices. For however long this 'new' discussion lasts, one fact will remain: people will love, hate or simply tolerate the electronic products in their pockets, homes and cars. We need to capture the love/hate/tolerate moments during product use, to gain some insight into the hidden reasons for users' responses [19]. We hope that the Emotion Sampling Device will help to find the hidden reasons.

## 7. REFLECTIONS

With regard to UX Principles, we believe that each person's experience differs: it consists of different elements depending upon the person and the type of experience. We assume that any combination of elements can form an experience, and that it is primarily important to capture these elements, rather than trying to complete a specification based on elements that a user may not feel are at all relevant.

Our Policy for dealing with UX is one that aims to identify the important contributing elements in the first instance, and then to amplify/accenuate these elements of the experience. We accept that a much more personal touch must be taken when dealing with something that is inherently personal, and that it is perception that must be modeled, not background groupings that must be satisfied.

Our Plan would be to educate experience designers in the art of designing for personal priorities, rather than specification lists. Time should not be spent on fulfilling specifications from the designer's view: these elements may be of no concern to the user. Instead, designers should concentrate on identifying specific elements relevant to human concerns, and aim to increase the success of these elements.

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