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# Emotion Sampling and the Product Development Life Cycle

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## Abstract

In this paper we discuss our development of the Emotion Sampling Device (ESD). We introduce the major properties of the device and advocate the need for a tool that can be effectively incorporated into product development lifecycles to inform the usability evaluation process as well as other areas of product design. As well as providing an insight into the properties of the ESD and to what extent these properties make the ESD an ideal tool for the measurement of user experience, we will place the tool within a well known lifecycle and illustrate how it can augment the information available to developers.

## Keywords

User Experience, Emotion Sampling, ESD, Affect Measurement, Appraisal, Event-based, Interface Design.

## ACM Classification Keywords

H.1.2 [Models and Principles]: User/Machine Systems – *Human Factors, Human information processing*

## Emotion Sampling

In a world where products are so diverse we need user experience evaluation methods that can have universal meaning, whilst not losing their clarity. These new methods must integrate with the contemporary digital lives of both those using the products and those who

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develop them. They must permeate social strata and be meaningful to each person whose experience they measure. There exists one particularly problematic area of experience evaluation: the measurement of the distinct emotional outcomes of our experiential encounters. This is primarily due to the process of emotion formation, which results in a highly personal, internal experience which can often be confusing, particularly because several emotions may be experienced at the same time [8]. This may result in a respondent being unable to conceptualise their multi-faceted emotional experience, leading them to subset their emotional reaction in a way that best enables them to classify the experience through the use of emotion labels.

In an attempt to model the emotional space we draw upon the work of Lang (cited in [3]: 125) who identified the visceral, behavioural and verbal states as main centres of emotion manifestation, and Norman [7] who notes that the visceral and behavioural states exist in a subconscious space while the verbal state exists in a conscious space. From this we consider a conceptual model of emotion processing and find, centrally important, the process of cognition which links the conscious and subconscious spaces.

With an insight into the emotional process we have turned to Cognitive Appraisal Theory (CAT) to provide the tools to solve the common problems associated with the measurement of emotions. Roseman's Emotional Appraisal System [9], as seen in figure 1, defines a number of dimensions for the appraisal of an emotional event.

The appraisal model uses a series of questions whose answers lead along different pathways to identify 17 different emotions. The model is centred on asking

subjects to rate the causes of an emotion, rather than engaging in self-reflection. In this way the user is not required to refer to abstract emotional labels and instead comments on more tangible aspects of experience such as the level of control they experienced over the event or whether the event was consistent with their motives. These are questions which may appeal to many users because they make use of standard language components which are easily understood and responded to.

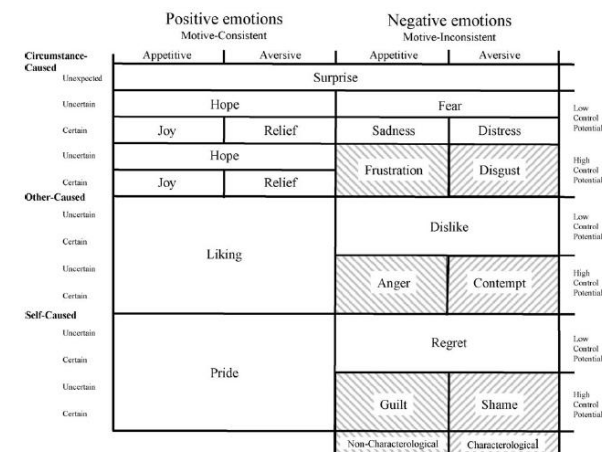


figure 1. The Emotional Appraisal System [9]

In this sense Appraisal theory allows for the development of a tool capable of retrieving accurate results from heterogeneous user groups by removing ambiguous questions and metrics with little meaning to the user.

### Sampling in the Product Lifecycle

The product design community has been considering hedonic aspects of products for several years (eg [5]). Many researchers and practitioners advocate the consideration of emotions in the design of interactive products: *emotional design* [6]. In the recent stream of research to identify the emotions evoked by technology, most emotion studies have focused on the approach of collecting information on users' emotional states as consequences of interactive experiences [4]. Such an approach has been referred to as 'affect as information' [2]. We believe that in order to gain insight into the interactive experience, we need to capture people's experiences *during* their interactions with products, i.e. 'affect as experience' [2]. The 'affect as experience' approach sees emotions as dynamically experienced, and constructed in action and interaction; this moves the focus to helping people to understand and experience their own emotions, and leads to new design and evaluation strategies for devices [2].

The usability engineering community has also begun to move beyond the narrow, instrumental view of product quality to designing for both hedonic and pragmatic design [4]. More recent usability evaluation studies have considered both design aspects. For example, the framework of *ubiquitous computing evaluation areas* (UEAs) [11] presents suggested metrics and conceptual measures for evaluating new technologies. There are nine UEAs: attention, adoption, trust, conceptual models, interaction, invisibility, impact and side effects, appeal and application robustness. Whilst the traditional usability measures of effectiveness, efficiency and satisfaction fall within Interaction, the more contemporary user demands for pleasure and enjoyment are identified in Appeal (fun, aesthetics,

status). This evaluation approach can be seen as 'affect as information' [2].

Evaluation of 'affect as experience' [2] was addressed in a study of the Use Process for mobile, handheld devices [10], which identifies the assessment of experience on three dimensions: functional, psychosocial, and relational. Favourable assessment of these three outcomes was found to reflect a positive experience of using a device, which in turn would influence users' adoption of the device.

Whether it is 'affect as information' or 'affect as experience', the need to collect this data is equally important at all phases of the product development process. As such, we submit that the ESD can be successfully incorporated into the development lifecycle and that it may be used to inform developers at all stages. In the case of the Spiral model of development [1], from inception to requirements definition, the ESD could be used to evaluate a current product prior to development of a new version or update. In the case of a new development, it could be used to evaluate otherwise existing products. When developing prototype versions of a product, the ESD can be used within the practices of common usability evaluation to add an information level beyond that of effectiveness. The ESD can also be used once development is complete, during the integration and maintenance phases to ensure that the product is successful and to monitor how the experience it provides the user may alter over time.

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