The Emotion Sampling Device (ESD)

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ABSTRACT

The emotion sampling device (ESD) has been developed in the light of ever-increasing interest in the area of affective computing, and out of a need to better understand the effect that electronic products have on the emotions of their users. A study of emotion theory and current sampling techniques revealed a need for a method of a different nature, one that does not rely upon the traditional forms of emotion representation. Therefore, the ESD aims to satisfy this need, being a tool that can not only accurately sample the multi-faceted human emotional experience, but also blend seamlessly into our world in the true spirit of ubiqitous computing.

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, Experience, Interface Design, Mobile Devices, Event-based, Emotion Sampling Device

1. INTRODUCTION

Development of the ESD follows an earlier study to consider theoretical models from psychology which could be effectively applied to the field of emotion sampling. The following aims have been present during the development process:

- to identify to what extent the theory can be applied to experience sampling;
- to improve the experience sampling process through the use of event-based reporting;
- to develop the emotion sampling device and its ability to collect emotion information from a heterogeneous population;
- to map ESD information to traditional representation styles and to incorporate these styles into the ESD.

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The emotion sampling device has thus far been developed in a laboratory setting and will soon undergo initial testing to verify its core architecture and to begin to validate the first two aims listed above.

2. FEELINGS, EMOTION AND COGNITION

As previously stated an earlier study had identified emotion theory not previously used in the area of emotion sampling. In support of the use of this method we take reference from the work of Lang [cited in 1: 125] who concluded that emotion and its processes manifest themselves in the visceral, behavioural and verbal states. Norman [3] develops this further to suggest that the visceral and behavioural states exist in the subconscious space, while the verbal state exists in the conscious space, and only there do we achieve emotion. With this in mind, we have identified a conceptual model of emotion processing to describe the transfer from feeling to emotion and the importance of cognition in the emotional process. This model, shown in Figure 1, underpins this research and provides placement for our approach.

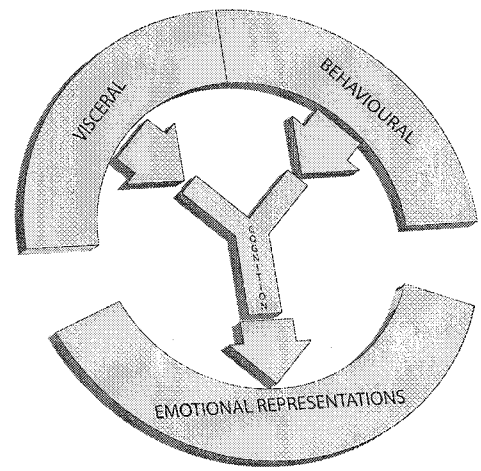

Figure 1. Conceptual Model of Emotion Processing.

3. APPRAISAL THEORY OF EMOTION

From the analysis of existing methods, we have identified evidence to suggest that that there is a space following the cognitive process, but before representations are applied, in which a new method could be placed. Methods used to sample emotion in the pre-cognitive space require extra abstraction to fill in the blanks that would normally be filled by the process of cognition, and thus only succeed to measure *feeling* not *emotion*. Post-cognitive methods can be biased by a subject's knowledge of emotional expression and the bearing of the

method towards specific representation types such as language or imagery.

As such there is a requirement for a method that sits as close to the cognitive 'centre of gravity' as possible. A technique adopted from psychology, Appraisal theory, does this by requiring cognition but without the use of the commonly-associated emotion representation objects such as words (happy/sad), images (pictures of people smiling/frowning) or gestures (smiling/frowning).

Emotional appraisal theory attempts to define emotion as being based upon a series of appraisals which can thus lead to an emotional outcome. According to Lazarus [2], a common set of appraisals, in different combinations, produce multiple emotions, and each of the distinct emotions is posited to be directly associated with a distinctive *pattern* of appraisals

The questions for the appraisal of an emotional event do not require specialist language constructs and as such should be available to most users. The appraisal process involved in reaching an emotion can take a number of forms. For example, joy and sadness are elicited by events appraised as relevant to the appetitive motives, and relief, distress and disgust are elicited by events appraised as relevant to aversive motives [5].

Smith and Ellsworth [6] state that anger involves an appraisal of the situation as being unpleasant, the responsibility of another person, and as requiring substantial effort. A list of 17 determinable emotions, along with their appraisals identified by

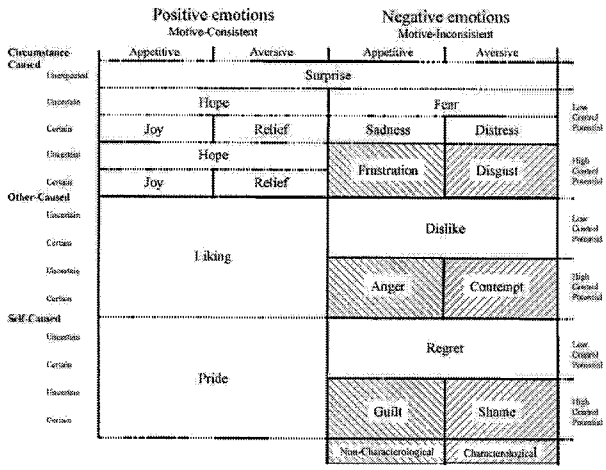

Figure 2. The Emotional Appraisal System [4]

Roseman *et al.* [4], can been seen in Figure 2.

Perhaps the most primary benefit of the output of emotional appraisal theory is that it can be applied to any representative form as it takes the core post-cognitive information before any structure has been added. In this sense it can be thought of as a large number of bricks that have been made into a wall, but before the wall has been painted.

4. THE EMOTION SAMPLING DEVICE

The ESD consists of either a PDA or mobile phone which runs a mobile Java application and provides the user with a series of appraisal questions from which a basic emotional profile can be defined.

The emotion sampling software system is capable of being ported to any device supporting the mobile Java architecture. This development decision was taken not only due to the increasing number of mobile devices present among the population, but also to allow for the creation of device-specific and brand-specific variants. A further aim of the use of mobile technologies is to produce a device that is capable of sampling user emotions during moments of emotional interest. These moments of emotional interest commonly involve the following elements:

- A precipitating event, stressor or trigger of internal or external origin.
- An appraisal of the event's meaning relative to the individual, including some degree of cognitive processing before, following or during the experience of affect.
- Subjective experiences along an intrinsic pleasure/pain axis associated with various dimensions of the precipitating event.
- Defined changes in motor action.
- Complex autonomic-physiological changes, most notably blood pressure, heart rate and skin conductance.

The software is currently in use for developmental testing across a number of mobile phones and personal data assistants. Further development will test the system's ability to accurately retrieve data from large, varied user groups who may or may not possess expert knowledge of such systems. The emotion sampling device provides its user with the ability to record their emotions at the moment that they experience an emotional event. It avoids the use of large scale metrics and as a result succeeds in being a light-weight system capable of blending into its environment. Future development of the device will lead to the inclusion of various representation styles such as colour and shape.

5. ACKNOWLEDGMENTS

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