The missing link?: using Appraisal Analysis to decide when HCI is emotional

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1. Introduction
We live in an ‘experience culture’ where emotional intelligence, emotional labour and emotional management are seen as critical to working life, commercial enterprises and products (8, 15). Users expect not just usability, but experiences, matched to their aesthetic expectations, emotional states, and interaction goals. Systems may improve if designed to recognise user behaviour that relates to emotion, and /or if systems respond to, or communicate emotion. We must define our terms and identify how and when emotions are used in interaction, in order to consider the system design issues. The Appraisal Analysis framework offers a possible way of distinguishing and categorising emotional interactions.

2. Defining emotion
Emotions are complex neuro-physiological systems with visceral, behavioural and reflective levels operating on biological, neurological and psychological systems (17) and interacting with cognition, memory, problem-solving etc. (14).

Terminology is confused, with ‘emotion’ or ‘affect’ used to describe events such as:
- personality traits, such as neuroticism or sociability;
- moods such as being sad or happy;
- disorders such as depression;
- basic emotions, such as sad, happy, etc. (9);
- causes of feelings, such as hunger or pain;
- sustained or fleeting feelings, such as pleasure or rejection.

Picard uses ‘Affective Computing’ to describe systems that use any of the broad spectrum of emotions and distinguishes between ‘inner experiences’ and outward ‘emotional expressions’ (16). Norman uses ‘emotion’ for underlying levels and ‘affect’ for reflective levels of emotion (15). In addition there are thousands of words and metaphors related to specific emotional states that are commonly used with no definite correlation to individual perceptions and experiences of emotion.

3. Multimodal communication
Human communication is dynamic, complex and rule based, and embedded in its context of meaning, time and physical space. Humans incorporate their background knowledge of individuals and their differences as well as using different multi-sensory modes to recognise and display messages. Multimodal aspects include (1, 12, 13):
- appearance;
- movements of body and face;
- voice (speech and paralinguistics);
- touch and smell;
- use of space and time.

We use verbal, non verbal and collaborative channels in face to face discourse, and when constrained by new technologies, people tend to try and compensate eg. by use of punctuation and emoticons in email (7). We need to understand communicative constraints in HCI, their importance and how best to design to facilitate enjoyable, effective interaction.

4. When is interaction emotional?
There are a number of schemes to assess modal and multimodal behaviours (11, 3), but these do not clearly link behaviours to emotions. Although interaction can be classified as having emotional valence and intensity (3) there is danger in assuming that multimodal behaviours can be linked to specific emotional inner experiences, which we cannot (yet) reliably identify or measure. Prevalent beliefs
associating specific body language with specific emotional states often have a flimsy theoretical basis or are urban myths (6). In fact multimodal behaviours are used in discourse for a number of reasons, with rules for narrators and listeners, and variations depending on factors such as personality, age, sex, culture, social dominance etc. Not only do multimodal expressions demonstrate inner emotional states, but they convey factual information and other discourse markers. For example:

- pointing to show movement or position of artefact referred to in dialogue;
- shivering to show physically cold;
- louder voice to show dominance;
- smiling to show social approval or acknowledgement of social rules;
- tension to show anticipation of conflict;
- shaking head to show negative appreciation;
- postural shifts or rate of head nods to manage turn taking.

5. Adapting the Appraisal Analysis Framework to assess multimodal interaction

Systemic functional linguistics (SFL) (10) considers how people communicate in context, using meaningful stretches of utterances as their unit. The Appraisal Analysis Framework (18) is an extension of SFL, still under development, with most work so far concentrated on textual analysis although some work on multimodal analysis is emerging. Two core concerns are addressed: how speakers adopt and indicate positive or negative attitudes and how people negotiate positioning with dialogic partners. Positioning is related to the attitudinal stance; dialogistic engagement; and inter-textual positioning. Within attitudinal positioning are three aspects:

- affective/emotional state and response, including whether negative or positive; if referring to the author or not, and relation to emotional categories;
- ethical judgements including consideration of implicit and explicit politeness and morals, and assessments of behaviour in relation to social norms;
- aesthetic appreciation of objects or people and their composition forms or values.

6. Case study

We conducted an experiment which included collecting video footage of users interacting with an adaptive affective computing system, (achieved using Wizard of Oz methods) and we identified units of behaviour that we called ‘affectemes’ (2, 4). During analysis of our experimental data we tried using the Appraisal Analysis framework to identify episodes where users showed emotions during HCI, and attempted to categorise them.

7. Results, discussion and conclusions

Whilst emotional states and responses did occur, simplistic assumptions, such as smiles mean happiness or frowns mean anger were not appropriate. Appraisal showed that most of our users’ behaviour related to ethical judgements, aesthetic appreciations and dialogistic positioning.

| TABLE 1: affectemes and their appraisal (for one participant’s 10 minute interaction sample) |
|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
|                                  | Affective state / response | Ethical judgement | Aesthetic appreciation |
| Number of affectemes | 84 | 14 | 15 | 2 | 58 | 0 |

This is a novel attempt to correlate non verbal, emotion related behaviours to context in an HCI scenario using the Appraisal framework, to analyse and make sense of observed behaviours. This method adds structure and objectivity to identifying emotions in HCI. More work is needed to establish how reliable and useful this approach might be. A major concern in HCI is to build liking and trust for applications and to reduce frustration. The Appraisal method uses context to assess the target of evaluation, which may be very useful here. Instances where the computer is the target of judgements or appreciations might be particularly significant for designers.

Systemic grammars have been successfully used for the development of and natural language generation systems (5). Appraisal Analysis can identify multimodal user behaviours that relate to systemic functions in HCI, including the role of user affect, in order to improve our understanding of user interactive behaviours and to develop more acceptable multimodal interfaces.

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References


