

Emotion Issues in HCI: Working Definitions and Gold Standards.

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The goal of this paper is to begin a conversation about two key issues regarding emotion in HCI. First, working definitions of emotion must be included in communications. These definitions provide a framework for asking questions, designing methodologies, and interpreting results. Second, gold standards for assessing the quality of human computer interactions should be established. Conceptualizations about the nature of these gold standard(s) should be included in discussions about emotion in HCI.

Keywords: Emotion, HCI, Research frameworks

1. INTRODUCTION

Applications that seamlessly interact with humans require an intelligent system that identifies and “understands” subtle cues about a person’s internal state. In addition, intelligent systems must use this affective information along with cognitive information to behave or respond appropriately. One factor hindering the development of intelligent cognitive-affective systems is the lack of systematic methodologies for studying the expression and perception of emotions. In order to develop appropriate methodologies for studying emotion in HCI it is critical to establish a framework for understanding emotion and standards for assessing successful interactions. The two main goals of this paper are: first, to discuss how researchers in HCI can create a framework for working with emotion and second, to address the conceptualization of a gold standard for human-computer interactions.

2. WORKING DEFINITIONS OF EMOTION

Although several definitions of emotion exist, we can still create a framework for assessing emotions in human – computer interactions. Larsen and Fredrickson [7] advocate for the use of a working definition of emotion(s). With a working definition of emotion we can construct a framework to ask experimental questions, design methodologies, and interpret results. Larsen and Fredrickson’s [7] assumptions about emotion are: (1) emotions are multifaceted processes that unfold over time, (2) emotions manifest themselves in multiple channels, and (3) emotion channels are loosely coupled and may interact in complex ways. Assuming such a working definition provides a theoretical basis for the methods used to elicit, recognize and respond to emotions. For example, emotion manifestations are a multifaceted process that includes antecedent events, emotion prototypes, action tendencies, and measurable responses [8]. Thus, the only parts of this process we can evaluate in HCI research are the measurable responses (i.e., body movements, voice tone, facial expressions) but not the actual emotion [1] [2] [5] [10] [11]. Therefore, understanding how emotions relate to this process may allow us to select appropriate sensors to detect an emotion and possibly allow computers to elicit emotions. If the wrong affective channel or combination of channels is used for detecting a specific emotion the system may fail (i.e., the human – computer interaction may be unsuccessful).

Larsen and Fredrickson [7] consider three additional issues when constructing a working definition. Are emotions (1) discrete and / or dimensional, (2) states and / or traits, and (3) event related and / or diffuse? For example, data from our lab suggest positive emotions (joy, content, and pride) are discrete and can be recognized by observers at different rates in whole body movement [4] [6]. If emotions are conceptualized as discrete, emotion elicitation techniques and the ability to recognize specific emotions in a particular channel may vary with emotion and may not be the same for all emotions.

3. GOLD STANDARDS

Including emotions in human-computer interactions may make interactions more human like but it may not remove all errors or make the interactions perfect. The same stimuli in the same context may induce a particular emotion and action tendency in one person but not the next. By what gold standard should the quality of the interaction be judged? Should affective interactions be nearly as good as humans, as good as humans, or better than humans? If human interactions are the gold standard we must also ask, how good are humans at conveying, detecting, and responding to emotions? Literature on this issue tends to focus on specific information channels. For example, Bassili et al [3] suggest humans can accurately detect six basic emotional facial expressions 70% - 98% of the time.

There are additional complexities in defining a gold standard for correctly recognizing emotions. First, we generally have access to more than one channel of affective information. We need to understand how different channels are coupled and how these couplings affect the recognition rates. Second, a gold standard for emotion recognition may not fit all emotions. For example, data from our lab suggest that in whole body movement observers recognize negative emotions more easily than positive emotions [4]. This suggests that if emotions are conceptualized as discrete, different emotions may have different gold standards, and the gold standards might vary depending on the information channel. Finally, Picard [9] suggests that we should expect recognition rates to be different for person-dependent or person-independent systems. If the computer knows the person it is interacting with (person-dependent), we should expect the recognition rates to be better than when the computer has no prior knowledge of the person. This suggests that we also need to consider the effect of learning.

4. CONCLUSION

This paper addresses the importance of creating a working definition of emotion and developing gold standards for assessing affective interactions. A working definition is essential to create an effective framework for asking experimental questions, designing methodologies, and interpreting results. Gold standards for defining how “good” human – computer interactions are must be defined and should account for multiple channels of information and person-independent or person-dependent systems.

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