

The Influence of Expressive Images for Computer Interaction

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INTRODUCTION

The soul is divided into an immortal part, located in the head, and a mortal part, distributed over the body. Philosophical and intellectual loves of beauty are located in the immortal soul. Other “regular” emotions are located in the mortal soul. (Plato as cited in Koolhaas, 2001)

Emotion is one of the lovely gifts from nature. It is present not only in humans, but most species present sorts of emotions and expressions in daily behaviors. However, only human beings ask for explanations. Research into the mystery of emotion can be traced back to Heraclitus (500 BC), who claimed that “the emotional state is characterized by a mixture of body parameters such as temperature (hot/cold) and sweat amount (wet/dry)” (as cited in Koolhaas, 2001).

In the 21st century, technology has achieved a standard that Plato never dreamed about, but emotion is still an unsolved question. Although science needs more time to work out the mechanism, it does not keep emotion out of human communication.

With the commercial success of the Internet, more people spend their time with their box: the computer. Designing an attractive user interface is not only the objective of every software developer but also is crucial to the success of the product. Methods and guidelines (Newman & Lamming, 1995) have been published to design a “vivid” user interface. One of the most important methods is to add expressive images in the display (Marcus, 2003). For example, when a user finishes some operation, an emotional icon or *emoticon* (an industry term

introduced in the 1980s by Meira Blattner) will pop up to communicate “well done” to the user.

Two widely accepted methods exist for displaying emotional feelings in software interfaces. One is the use of emotion-oriented icons; the other is using complex images, for example, a cartoon or a facial image (Boucouvalas, Xu, & John, 2003; Ekman, 1982).

Emotion icons cannot communicate complex feelings, and they are not usually customized. As the industry matures, perhaps emoticons will be replaced by expressive images as sophisticated as the computer-generated Golem of *The Lord of the Rings* movie fame.

Expressive images present emotional feelings to users. What internal factors (e.g., image intensity or people’s mood) may influence the perceived emotional feelings? Will external factors (e.g., display duration) influence the perceived emotional feelings as well?

In this article, we are particularly interested in discussing the factors that may influence the perceived emotional feelings. Our conclusions are based on the findings from a series of experiments that demonstrate an empirical link between the level of expressive-image intensities and the perceived feelings. The detected factors include the following:

- Expression intensity
- Wear-down effect (display duration effect)

The test results demonstrate that increasing the expressive-image intensity can improve the perceived emotional feeling. However, when the intensity is increased to an extreme level, the perceived

emotional feelings fall. The experiment results also indicate that the perceived emotional feelings are not affected by the length of time that users are exposed to the expressive images.

BACKGROUND

Emotion is not a concept that can be easily defined. Izard (1993) describes emotion as a set of motivational processes that influence cognition and action. Other researchers such as Zajonc (1980) argue that emotion is a particular feeling, a quality of conscious awareness, and a way of responding.

A widely accepted fact about emotion is that emotion can be classified into different categories and numerous intensities. One classification method divides emotions into elation, desire, hope, sadness, anger, frustration, and so forth (Koolhaas, 2001).

Emotional expressions not only present one's internal feelings, but also influence interpersonal feelings. Moffat and Frijda (1994) demonstrated that expressions are a means to influence others. Fridlund (1997) found that expressions occur most often during pivotal points in social interactions: during greetings, social crises, or times of appeasement. According to Azar (2000), "Thinking of facial expressions as tools for influencing social interactions provides an opportunity to begin predicting when certain facial expressions will occur and will allow more precise theories about social interactions" (p. 45).

The influences of emotions on the public domain have been examined for many years. Emotion is a powerful tool for reporters, editors, and politicians. The 9/11 New York attack may not have been experienced by all personally; however, most of us felt the same fear and pain when we saw the scenes. Strong links between the emotion of news and the importance individuals assign to issues have been suggested by a number of theories (Evatt, 1997).

Is emotion an important tool online as in daily life? Recent research argues that there is in fact a high degree of socioemotional content observed in computer-mediated communications (CMC; McCormick & McCormick, 1992; Rheingold, 1994), even in organizational and task-oriented settings (Lea & Spears, 1991). Even first-time users form impressions of other communicant's dispositions and per-

sonalities based on their communication style (Lea & Spears, 1991).

Multimodal presentations (e.g., animation, voice, and movie clips) for Internet communication are more popular than ever as the processing speed and bandwidth continues increasing. These new presentation styles make emotion expression easier to transmit than before.

Will users prefer emotional feelings to be presented pictorially on the computer interfaces? Will the expressive images influence the perceived feelings?

We have carried out a series of experiments to investigate these questions (Xu & Boucouvalas, 2002; Xu, John, & Boucouvalas, *in press*).

Xu and Boucouvalas (2002) demonstrated an effectiveness experiment. In that experiment, participants were asked to view three interfaces (an interface with an expressive image, voice, and text; an interface with an expressive image and text; and an interface with text only). The results show that most participants prefer the interface with the expressive image, voice, and text. A significant number of participants preferred the interface with the expressive image, voice, and text much more than the text-only interface. This means that with the expressive images, the effectiveness of the human-computer interface can be considerably improved.

Xu et al. (*in press*) presented a perceived-performance experiment, which demonstrated that emotion can affect the perceived performance of individuals. In that experiment, participants were asked to answer questions in an online quiz. A computer agent presented 10 questions (e.g., "What percentage of people wear contact lenses?" and choices A, 15%; B, 30%; C, 20%; D, 50%) to the participants. When the participants finished answering the questions, either the presenting agent himself (self-assessing) or a new agent checked the participants' answers (other-assessing). No matter what answers each participant provided, all were told that they answered the same 5 out of 10 questions correctly. For the other-assessing scenario, the assessing agent presented no emotional expressions positively related to participants' answers or emotional expressions negatively related to participants' answers. The results from the other-assessing scenario demonstrated that significant differences exist when comparing the positively-related-emotion situ-

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