1 Introduction

The emotional aspects of human communication depend significantly on non-verbal signals or body language. By contrast, human telecommunication is characterized by a sense of disembodiment. However, machine-mediated communication permits the acquisition, transmission, and graphical display of data about a user’s physiological state. Here we explore novel forms of body language, not normally available in face-to-face interaction.

2 Visualizing Affective Signals

The physiological parameters, blood volume pulse (BVP), respiration (R), and skin conductance (SC), are related to human affective state [Picard 2000], correspond with felt bodily sensations accompanying emotional arousal and/or stress, and can be measured with non-invasive sensors (see figure 1).

Much work in affective computing aims at machine understanding of emotional states from sensor data. Here we instead directly visualize the real-time physiological data and tap the powerful capabilities of human vision [Arnheim 1969]. Simple, intuitive displays were designed which correlate with felt sensations (figure 2). The BVP signal is expressed as an expanding and contracting red disk, which resembles a beating heart. The R signal becomes a rising and falling blue column; like an abstract lung inflating and deflating. The SC signal is expressed as an abstract skin patch which floods with blue drops as the user perspires. The displays are intended to act as artificial expressions of a user’s bodily experience. Combined with contextual knowledge, they permit users to estimate each others’ affective states.

Sensor data digitized using the Procomp+ system (Thought Technologies Ltd.) is exchanged via TCP/IP sockets using a client/server model. Each local client samples the three signals at 20 Hz, and sends data in real-time to a server. Clients also access the server for data from other users and control the live display.

3 Experiment: Online Kanji Lesson

We study an example interaction, in which one person teaches another how to write several Chinese characters (kanji). The lesson takes place over the Internet via shared whiteboards and an audio link. Preliminary results have shown that the artificial expressions convey salient information to both student and teacher. Under the conditions of our experiments, the SC is the easiest signal to interpret: SC increased noticeably with level of anticipated or actual effort for both users. The teacher has quickly learned to make use of the SC display to adjust pace and difficulty of the lesson.

4 Conclusion

Attending to felt bodily sensations can aid in recognizing and reducing stress. The hypothesis guiding our future studies is that paying attention to shared vital signals will increase empathy, the awareness both of our own and others’ emotional states. This could have numerous beneficial effects for online interaction.

References


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