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eMoto: emotionally engaging interaction

Received: 30 October 2003 / Accepted: 27 April 2004 / Published online: 5 August 2004
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Through the *eMoto* design, we intend to emotionally engage users both cognitively and physically using a tangible interface, allowing for affective gestures that are mirrored in the expressions produced by the system. A questionnaire sent to 66 potential users showed a need for richer emotional expressiveness in text messaging in mobile phones than what is available today. Emotions are expressed not only through what is said, but also through body gestures and tone of voice—mediums not available in this context.

eMoto is an emotional text messaging service built on top of a SonyEricsson P900 mobile terminal. The goal of this service is to provide users with means to emotionally enhance their SMS messages. The user first writes the textual content of the message and then adjusts the affective background to fit the emotional expression she wants to achieve. The adjustments are done through affective gestures (Fig. 1) that will render an animated background acting as an emotional expression to the user's text message (Figs. 2, 3, 4, 5 and 6). The P900 terminal is used with a stylus pen. We have equipped this pen with two sensors that will recognize the affective gestures: an accelerometer and a pressure sensor. In a first prototype, the extended stylus is connected to the serial port of a stationary PC, which in turn communicates with the P900 terminal—in the final prototype, this will be a direct wireless communication channel between the stylus and P900 terminal.

In this specific design, our aim is to let users consciously express their emotions. This should not entail a simple one-to-one mapping of emotions to specific expressions. Instead, we build the interaction on the fact that emotions should not be seen as singular, discrete states, but instead as processes that blend into one another. Through creating the interaction model based on

Russell's circumplex model of affect [3] (Fig. 7), we could create a system that allows users to choose emotional expressions that best suit their messages. Without explicitly naming each emotion in the interaction, we maintain open interpretations of emotional expressions. In Russell's model, emotions are seen as a combination of *arousal* and *valence*. By combining two basic movements that together can render an infinite amount of affective gestures (Fig. 8), the user will move around in this circumplex plane. Technically, we have made the plane 100 times larger than the screen of the mobile phone (Fig. 9). This, in combination with the affective gestures, will have the user experience a kaleidoscopic effect when choosing between the vast amounts of emotional expressions. We call this *the affective gestural plane model*. The two basic movements for construction of affective gestures are *natural but designed expressions*, extracted from an analysis of body movements [1]. The arousal of emotions is communicated through movement, where intense shaking of the stylus will increase arousal and a more swinging movement will imply lower arousal (Fig. 8). To navigate to emotions with negative valence, the user has to increase the pressure on the stylus, while less pressure will transfer the user to emotions with positive valence (Fig. 8).

The affective gestures are closely connected to the affective feedback that the user receives as visual output. The characteristics of emotional expressions found in the analysis of body movements are represented through colours, shapes and animations in the design of the affective feedback. Colours are used to express arousal, where red represents emotions with high arousal and blue is calm and peaceful [2]. The shapes of the animated objects in the areas containing high arousal are small and can, therefore, render animations and patterns that are energetic, quick and spreading. Moving around the circle towards less energy and calmer expression, the shapes get bigger and more connected, rendering slower and more billowing animations. Shapes placed on the positive side of the circle are softer and more round, while shapes placed on the negative side are more

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Fig. 1 The tangible interface; interacting through affective gestures using the stylus



Fig. 4 One way of expressing a little excited, through a red/orange background and a few, small, round objects with fast movements in the background



Fig. 2 One way of expressing quite relaxed, through a green/yellow colour and animated objects that are quite big and connected in their shapes



Fig. 5 One way of expressing more excited than in Fig. 4, through a deeper red colour in the background and with even larger and more animated objects



Fig. 3 One way of expressing more relaxed than in Fig. 2, through deeper green colours that are closer to one another and larger animated shapes



Fig. 6 One way of expressing tired/bored through dark blue colours, big, connected shapes and slow animations

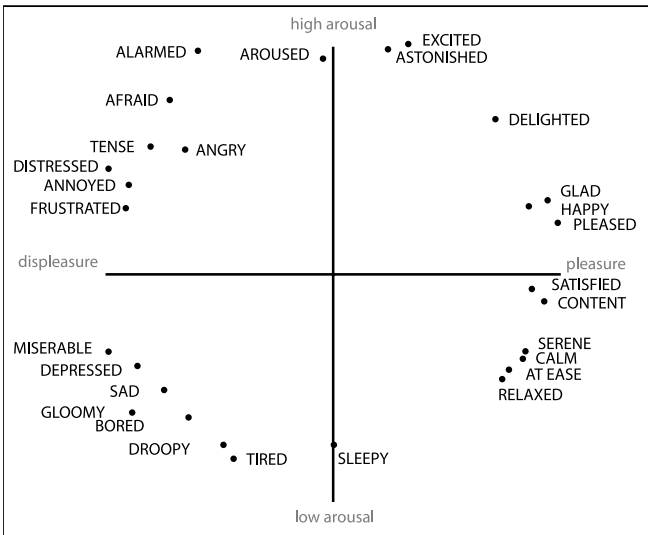
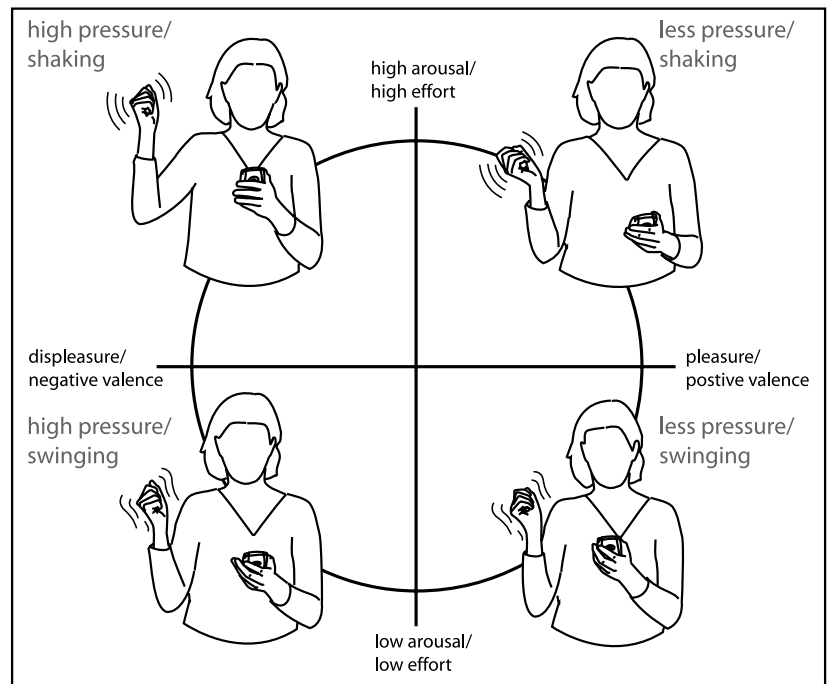


Fig. 7 Russell's circumplex model of affect [3]

Fig. 8 The affective gestural plane model



angular and sharp. The emotional expressions are stronger along the outer border of the circle while weaker towards the middle; this is represented through less depth in colours and fewer animated elements (Fig. 10).

A user study of the affective output has just been completed. A few expressions need to be redesigned, for

example, negative emotions with high arousal were rendered in too bright colours and some of the shapes were too depictive and thereby hindered users from reading their own interpretation into them. The big picture, however, showed a great interest in this new way of communicating emotions and that users perceived most expressions as intended.

Fig. 9 The kaleidoscopic effect of the interactive feedback when navigating the affective background circle

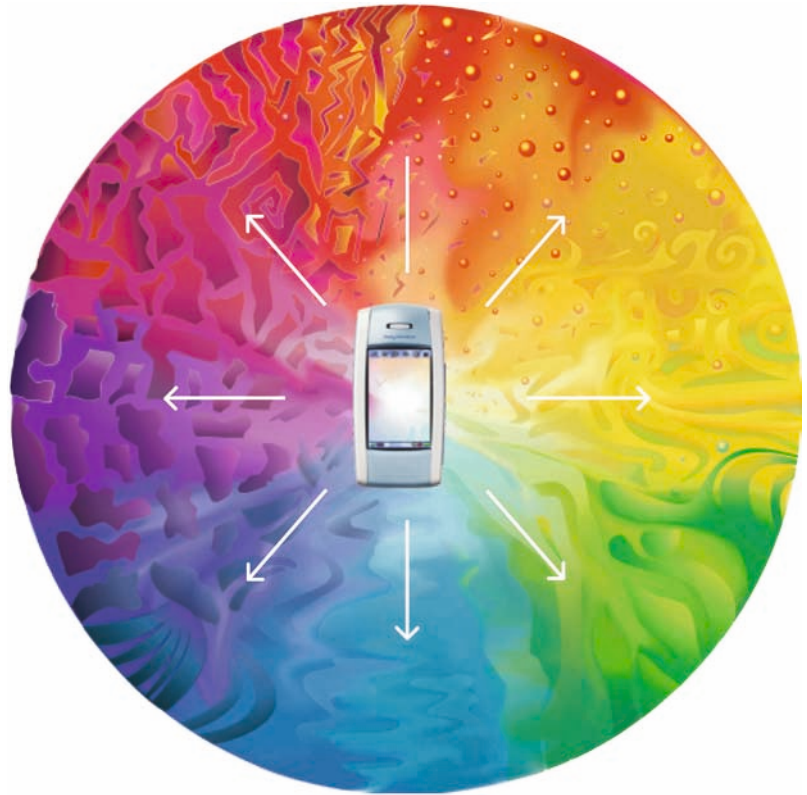
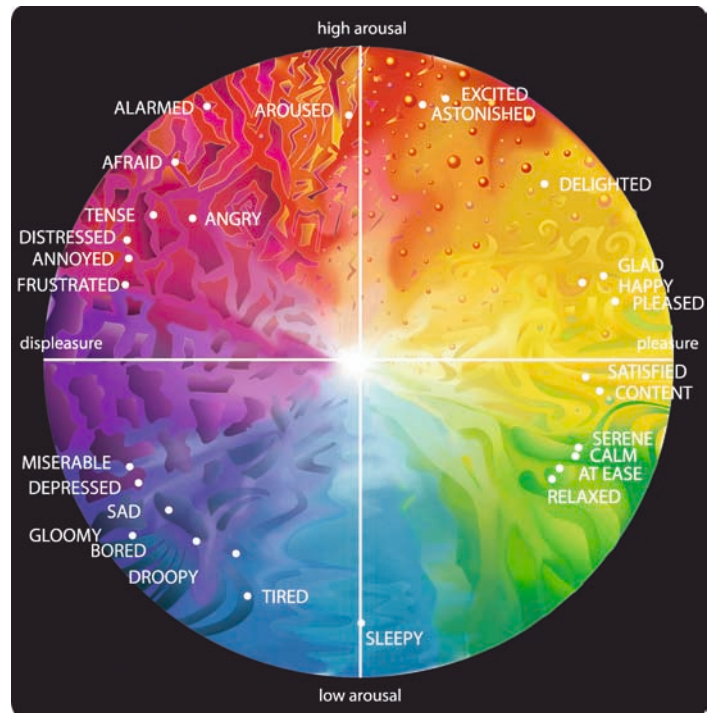


Fig. 10 The affective background circle, showing how the colours, shapes and sizes of objects vary together with Russell's circumplex model of affect



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