
Freaky: Collaborative Enactments of Emotion

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Abstract

The field of CSCW is increasingly drawing on theories and approaches from feminist philosophy of science. To date such efforts have focused on understanding users and their practices. We present a research prototype showing that feminist theories can lead to novel design solutions. Freaky is a mobile, interactive system that collaborates with its users in the enactment of emotion. Informed by the feminist literature, the system introduces a novel approach to emotion: designing for human-machine co-production of emotion.

Author Keywords

CSCW; feminist philosophy of science; performativity; emotion; hybridity; reflection.

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

General Terms

Design

Introduction

Feminist philosophy of science has already had a significant impact on HCI. Feminist commitments to empowerment, social justice, and scientific objectivity have been drawn upon to offer new paradigms and

research directions [[1], [6], [13]]. In CSCW, feminist approaches and frameworks helped analyze new collaborative practices in social computing [[8], [14]]; the role of gender in digitally-mediated peer production [4]; differences in attitude and engagement among men and women in online reviewing communities [9]; the motivations, ideals, and activities of feminist hackerspaces [5]; and how to study and support the organization of social movements [3].

As evidenced by these research efforts, CSCW has fruitfully engaged feminist theories to understand socio-technical relations. However, these theories have yet to be engaged directly in technical and design work, i.e. in the design and development of an interactive system. We address this omission by conceptualizing, designing, and prototyping a mobile interactive system called Freaky.

Freaky

Our design aim with this project has been to explore how humans and machines can come together more fully in the enactment of emotions: what would it mean for machines to help enact our emotions? Whose emotions would they be? What would our part be? Would this blur or redraw the boundary between humans and machines?

We explored these questions through research through design [15]. The design case consisted of conceptualizing and prototyping Freaky: an interactive, mobile system that helps its users experience and understand their emotions by sensing and responding to the user's heart rate. Freaky is equipped with a machine learning derived model of fear: a computational model that takes as input real time heart rate data and classifies the data in one of two categories: fear or non-fear, based on statistical similarities between the real

time data and prerecorded data of people experiencing fear.

We engaged the feminist concept of performativity to understand how interactive systems perform emotion based on such algorithmic classifiers. Performativity shifts the focus to the actions, the doings, and the practices that can be said to enact reality. Initially developed in the context of gender [2], performativity represents an apt tool to investigate how certain social and technical phenomena are enacted and how they might be related [10]. Concretely, in the context affective interaction, we have investigated how machine perspectives on human emotion (i.e., the output of machine learning classification models) are related to lived emotion, i.e. the socio-cultural-biological phenomenon. Our analysis brings into relief similarities and differences between machine perspectives and human emotion and offers ways of connecting the two in interaction as a means to provide a space for the hybrid, human-machine, co-enactment of emotion. We have presented the analysis at DIS'14 [11]; here we provide an overview of the concept, technical construction, and relevance for CSCW.

Technical Specs

Interaction Modalities:

- input: user heart rate, ambient temperature, light, pressure, acceleration
- output: sound, vibration

The system consists of a chest strap (that it used to measure users' heart rate) and a 12"x7"x6" plastic shell that contains the technical components (computational platforms: beagleboard and arduino microcontroller; sensors: light, temperature, pressure, accelerometer;

vibration motor; headphones; 6x1.5V batteries; voltage converter). The user wears the chest strap, while Freaky's body, contained by the plastic shell, is placed in a carrier attached to the body:



Figure 1: Freaky – cast surface (left) and with user (right)

Hybrid Human-Machine Enactments of Emotion

Sensing capabilities and statistical inference make possible the construction of digital representations capable of 'inferring' human emotion, i.e., classifying sensor input, such as user heart rate, into emotional labels, e.g., happy [12]. Leveraging such technologies, we conceptualized Freaky as an artificial companion with its own understanding of human emotion. We designed the interaction with Freaky as a ritual through which Freaky's perspectives into emotion may be generatively weaved into the users'.

Freaky is endowed through interaction design with its own fear and fear-associated behaviors. For example, when Freaky classifies the user's physiological data as fear it becomes scared; it manifests it by vibrating and intensifying the audio output. Freaky may thus be thought of as experiencing parts of the users' experiences through human-machine emotional

contagion [7]. To further orient the interaction towards connecting the system's perspective to the user's experience exploring similarities as well as discrepancies between the users experience and the system's perspectives, Freaky's physical design features a familiar and, at the same time, unusual shape and surface (Figure 1). These physical characteristics are intended to give the users a sense that Freaky might have peculiar insights into and influences on human emotion.

Freaky's manifestation of its fear and its links to the users' physiology, raises the question: "whose emotions are being expressed?" and in turn: "how do these manifestation influence/shape the people experiences that encounter the system, user included?" Through the overlaps as well as the differences, the synergies and the dissonances between machine and user emotion, the user has the opportunity to reflect on her own, by continuously being prompted to sort her experiences together with and against Freaky's.

We designed three modes of interacting with Freaky:

- in "normal" mode, Freaky produces continuous audio output generated in real time based on the user's heart rate. This gives the user the opportunity to link changes in the sounds to her body's reactions. The mixing function we used to generate the sound is nonlinear, in order to avoid repetitions which may lead to user disengagement.
- Freaky goes into "freak out" mode when the model of emotion predicts the label "fear." The system begins to act scared: it starts vibrating and the audio output intensifies and takes dark undertones.

- “calming down” mode: to return to “normal,” Freaky requires attention from the user. Petting, protecting, or holding Freaky will comfort it. These actions are also likely to affect the users’ emotions and experiences. Comforting Freaky is not a linear process, which invites the users to explore different ways to comfort the system and prompts her into reflection on what may have caused Freaky’s reaction: what does she feel? what does Freaky sense? can one meaningfully separate the two? did Freaky’s very presence contribute to her reactions?

Relevance for CSCW

To date, CSCW has fruitfully drawn on feminist scholarship to understand people and their practices. The main contribution of this work is to extend the growing body of feminist research in CSCW to include system design and prototyping. We offer Freaky as a much-needed exemplar demonstrating that feminist theories can open new design spaces: approaching emotion as a collaborative, human-machine enactment.

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