
Supporting Teaching and Learning of Situational Empathy by Technology

Petr Slovak

Vienna University of Technology
Argentinerstrasse 8/187
Vienna, 1040, Austria
petr@igw.tuwien.ac.at

Abstract

Detecting and supporting interpersonal and emotional aspects of behaviour is a growing area of research within HCI. However, most of this work is still based primarily on single persons' data, and there is little research on supporting complex interpersonal aspects such as empathy. To address this gap, the goal of my PhD work is to explore ways in which technology can facilitate learning and teaching of situational empathy, with particular focus on counselling students.

Keywords

Empathy; Feedback; Bio-Sensors; Mixed Methods;

ACM Classification Keywords

H.5.3. Group and Organization Interfaces: Synchronous Interaction.

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Context and Motivation

Situational empathy is an interactional skill allowing us to understand the feelings, desires, ideas, and actions of others during an interaction. It is one of the crucial aspects of life skills and is learned as part of social and emotional skills curricula in medical, business, and educational settings, e.g., [4]. Situational empathy is also of particular interest for helping professions, such as counselling, where learning how to become empathic forms the core part of the training [3].

However, existing curricula use little technology to support learning of such skills, despite its potential to address some of the key challenges faced (such as providing timely feedback); and little research within HCI has focused on supporting social skills training for neuro-typical children and adults to date [10].

My PhD work draws on recent psychology and social neuroscience research to examine a novel indicator of empathy based on synchronisation of bio-signals between people, and its potential to serve as a useful feedback tool for the learning process. I focus on supporting counselling trainees as the application area, studying how empathy is taught in this setting, and if/how feedback based on bio-signals synchrony could support this. In cooperation with a MSc. counselling program, we aim to develop a sensor-based system, deployed and evaluated in actual real-world use.

Research Situation

I am a PhD student at the HCI Group at the Vienna University of Technology. I am in my third year of PhD candidacy, have an approved dissertation topic, and expect to submit in late 2014/early 2015.

Drawing on my multi-disciplinary background in formal computer science (BSc., MSc) and psychology/sociology (BSc.), my research combines the analytic approach with methodologies of social psychology and HCI research 'in the wild'.

Background and Related Work

The PhD topic feeds into a wider area of *supporting social skills learning by technology*, which is of growing interest for HCI, as evidenced by the current work on computerised CBT [2] or supporting autism therapy [5]. We also see an increasing focus on automatic detection of interpersonal aspects in social signal processing (SSP) and affective computing (AC) fields (e.g., [8,11] for reviews). However, most of AC/SSP work is still based primarily on a single person's data rather than on the dynamics of the interaction, it uses mainly video/audio data to detect non-verbal signals, and the "machine analysis of social emotions such as empathy, envy, admiration, etc., is yet to be attempted" [8].

Recent literature in psychology and social neuroscience suggests a complementary approach to such indicators of interpersonal aspects. Of particular interest to my PhD work is a suggested connection between *empathy* and *skin conductance (EDA) synchronisation* of the people within an interaction [7]. Results show that moments high in EDA synchrony tend to be also high in empathy. This creates opportunities for using EDA synchrony as a promising basis for (real-time) feedback systems, supporting the empathy learning process. It is particularly timely to explore this given the maturing of wearable bio-sensors, opening options for real-world applications. Moreover, the focus on EDA synchrony is unique in being inherently based on the interplay of signals of multiple individuals and bound to the interaction (rather than on the individuals' data in isolation), complementing existing SSP/AC work.

However, the connection between EDA synchronisation and empathy has been observed so far for a very

specific situation only—a psychotherapy session led by an experienced therapist [7]—and it is not clear if the link transfers to other settings, such as the counselling students' training contexts. Indeed, the only other study on EDA synchrony suggested a different interpretation in the context of marital pairs, associating EDA synchrony with negative interactions [6]. A substantial part of my PhD work thus aims to reach a better understanding of the possible interpretations of EDA synchrony, how it changes depending on setting, and its potential to serve as feedback on situational empathy.

Statement of the Problem, Goal, Methods

The goal of this PhD work is to explore *if and how technology can support learning of situational empathy*, especially in the context of counselling students. I aim to address two sets of questions, and outline the corresponding goals below:

(RQ1) *Can EDA-synchrony serve as an indicator of situational empathy in counselling contexts? And if so, how can we take advantage of this?*

(RQ2) *What are the key issues in teaching and learning situational empathy in counselling? Is it possible to address these with technology?*

G1: *Understand the interpretation of EDA synchrony in the context of empathy learning process in counselling. (in progress)*

This goal focusses on understanding possible interpretations of EDA synchrony, also developing the methodology to explore the link between empathy and EDA synchrony in more detail. I am interested in answering questions such as: Is EDA synchrony linked to situational empathy (or other interpersonal aspects)



Figure 1: Example of the combination of video and sensor data used for the qualitative video analysis. The graph depicts the moment-to-moment changes of synchrony during the course of the session. The vertical bar indicates current timeline position in the video.

in these situations? Is the signal robust enough to provide a good basis for feedback in training situations? What are the methodological approaches we can use, given that situational empathy is difficult to 'measure', and challenging to study in controlled settings?

The methodology approach I am exploring aims to compare the differences of EDA synchrony in naturalistic interactions across contexts that are likely to differ in empathy: interaction of friends vs. practice counselling sessions of students vs. sessions with expert counsellors – exploring if we can use synchrony signal to (at least) differentiate between these settings. In addition, we tap into the changes in situational empathy within the interactions by triangulating various methods: qualitative video analysis, detailed self-reflection of participants (something counselling students are well trained in), and the judgement of external raters, drawing on the interpersonal judgement methodology in psychology [1]. The goal is then to map such observed changes in situational empathy to changes in the synchrony signal to generate possible interpretations of EDA synchrony, and inform its potential for use as a feedback on situational empathy.

RG2: The set of goals explores the design space of teaching empathy for counselling students, studying existing practices, iteratively developing an intervention system while drawing on results of RQ1, and evaluating it in-situ.

Understand how is empathy currently taught. (finished)
The goal is to examine existing practices and challenges with particular interest in identifying those that can be addressed by technology. I draw on field observations

of relevant teaching courses, interviews with counselling students/tutors/lecturers, as well as an extensive review of the literature around teaching empathy in different domains (education, medical, business, everyday life skills).

Design and develop the feedback system. (in progress)

The goal is to decide how is the EDA data processed and interpreted, and how this is mapped to feedback. This builds on the outcomes of studies conducted to date in G1, followed by iterative development in cooperation with the target case-study group. Primary methods include interviews, design workshops, and focus groups, with resulting prototypes tested in actual use in teaching counselling students.

Evaluate the developed system 'in the wild'. (planned)

One of the key challenges of the project is how to evaluate the effects of the system on learning empathy within existing teaching processes. I plan to deploy the system in-situ for longer periods, analysing the uptake, and use qualitative methods such as in-depth interviews with participants and teachers to explore effects. If time and funding permits, I would also like to draw on quasi-experimental methods, aiming to gather initial evidence for (at least partial) causal claims.

Dissertation Status

To date, I have conducted a mixed methods study testing the plausibility of EDA synchrony interpretation and application in everyday settings (20 pairs of friends). The results support the potential to use EDA synchrony in real-world applications and its link to empathy, also providing a better understanding of how to interpret (and thus feedback) the EDA synchrony. A full paper submission in review for CHI'14 [9]. I have

also finished a review journal paper [10], identifying key aspects technology can focus on for teaching social skills in counselling as well as other domains.

We are currently developing a system to support real-time feedback and post-hoc reflection of practice counselling sessions for the students, in cooperation with the head of MA counselling program at University of Nottingham. The system will draw on the EDA synchrony signal, with the goal to both explore its usefulness (e.g., 'offering' a fragment to reflect on for the learners), as well as to test the relation of synchrony to students' experiences of the session (e.g., will fragments selected as most empathic by the students share any specific patterns in synchrony?). We expect to deploy the first pilot system by the end of 2013, and follow with a longer term evaluation of the system in the second half of 2014.

Expected Contributions

The outcome of my PhD work will contribute a better understanding of possible interpretations of EDA synchrony, and explore its potential to support learning of empathy in the context of counselling. These results also open broader implications for HCI research, such as using EDA synchrony as a complementary approach to detection and analysis of social signals within AC and SSP (as well as the methodology to do so); and providing initial pointers to technology support of social skills learning for neuro-typical adults and children.

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