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Feedback, Affect, and Mediated Communication: Towards an Explanatory Design Theory

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Abstract. Receiving feedback from colleagues and supervisors via computer-mediated communication (CMC) is part of daily work life and considered to be desirable. Unfortunately, negative feedback in connection with CMC can lead to misunderstandings and negative affect. Against this background, the psychological research field of "perspective-taking" provides options to reduce perceived feedback negativity and, in doing so, to increase the acceptance of negative feedback. With the ability to recognize and reflect human emotions, a new type of technology – so-called "affective technology" – has the potential to provide suitable support for perspective-taking. Aiming at developing an explanatory design theory, we propose a research model by identifying design options for affective technology which lead to perspective-taking in e-mail communication and increased negative feedback acceptance. The research-in-progress paper at hand then outlines the experimental approach planned for testing the presented research model.

Keywords: Affective Technology · Computer-Mediated Communication · Negative Feedback Acceptance · Perspective-Taking · Design Theory · Experiment

1 Introduction

As information and communication technology has become increasingly ubiquitous, computer-mediated communication (CMC) is an integral part of our daily life. Many people communicate online in a broad variety of contexts. Aside from contacting friends, CMC is used for education, health, games, work, and more.

In the work context, feedback – particularly negative feedback – in connection with CMC frequently leads to misunderstandings and negative affect. This might be explained by the fact that emotional expressions and the recognition of emotions lack visual and auditory cues when writing and reading e-mails [4]. As non-verbal emotion expression is faced with many obstacles in e-mails (e.g. emoticons are not only ambiguous, but also regarded as too informal), and verbal emotion expression is less likely communicated [10], the probability for misunderstandings increases. Consequently, feedback via e-mails might get interpreted more neutral or more negatively than intended [4]. Such e-mails may in turn lead to reduced feedback acceptance.

Although research indicates that there is a relationship between disclosing emotions when writing e-mails and reduced misunderstandings [4], to the best of our knowledge, no research exists regarding the question how to increase negative feedback acceptance without there being any need for the sender to actively verbalize or visualize their feelings. Wang et al. [27] have shown that emoticons can reduce negative reactivity even to intentional negative feedback. However, emoticons are often too informal and have to be actively applied by the sender of a message, which requires a certain effort.

Options to reduce perceived feedback negativity and, in doing so, to increase feedback acceptance are provided by the psychological research field of "perspective-taking". Perspective-taking, as the cognitive dimension of empathy, takes place when an individual (the perspective taker) views a situation from the perspective of another individual (the target) to understand thoughts, feelings or behaviors [6, 7]. In other words, perspective-taking is the process of 'putting oneself in other shoes'. Research has indicated that being aware of the self and being presented with cues about the perspective of the target can lead to increased perspective-taking [1, 2, 26].

How technology can be designed to increase perspective taking, and in doing so, feedback acceptance, is a question inherent to design science research and explanatory design theories. Specifically, explanatory design theories should show that "a system with feature X will perform better on measure M than a system without feature X" (p. 7) [15].

Our objective is to create a design theory for the design of so-called 'affective technology' which, with ability to recognize and reflect human emotions, have the potential to provide suitable support for perspective-taking. In accordance with the definition of affective computing [25], affective technology can be defined as technology which can sense and/or generate human emotions such as happiness, anger, or fear. It is an innovative type of technology that can support people in different areas, for example in car driving [18]. In the context of learning, for instance, an affect-aware system can detect boredom, confusion, frustration, or engagement of the learner based on conversational cues, body language, and facial features and respond adequately to improve the learning experience and to increase the learning effect [8]. In the CMC context, affective technologies could be used to recognize the emotions of both the sender and the receiver, and disclose them to both communication partners. As research has indicated that verbal information about emotions is largely interpreted congruently across individuals [23], the perspective of the communication partner might be accessed more easily, and negative affect due to misunderstandings might be reduced.

Thus, we aim to develop an explanatory design theory, proposing a research model, identifying design options for affective technology which lead to perspective-taking in e-mail communication and increased negative feedback acceptance. The paper is therefore guided by following research questions:

RQ1: *Can affective technology be used to disclose one's own affective state to increase perspective-taking and feedback acceptance in CMC?*

RQ2: *Can affective technology be used to disclose the other's affective state to increase perspective-taking and feedback acceptance in CMC?*

2 Related Work

Feedback acceptance is defined as "the recipient's belief that the feedback is an accurate portrayal of his or her performance. Whether or not this belief is itself correct is inconsequential to acceptance" (p. 356) [20]. Feedback acceptance has a diverse set of predictors, including (perceived) characteristics of the feedback provider (e.g. power), characteristics of the recipient (e.g. self-esteem), and characteristics of the feedback (e.g. perceived feedback valence) [20]. With respect to negative feedback – understood as critical comments given to identify areas for improvement [17] – and to emotions, a study of Wang et al. [27] has suggested two predictors that can be influenced by emotion-related stimuli. First, perceived good intention of feedback, is focused on the feedback provider. Second, perceived feedback negativity, is focused on the actual feedback the feedback provider has given. While Wang et al. have argued that the characteristics of the feedback recipient are unlikely to be influenced by means of emoticons, we propose that by having affective technology at hand, characteristics of the recipient, specifically increased perspective-taking, can nonetheless be altered.

Perspective-taking takes place when an individual views a situation from the perspective of another individual [5, 6]. Perspective-taking can be differentiated into a dispositional and situational construct. The dispositional construct refers to the general ability to adopt perspectives of others in various situations [6] whereas the situational construct refers to the degree to which an individual is able to adopt the perspective of another person in a specific situation [7]. In this paper, we focus on the situation-specific aspects of perspective-taking. In the context of feedback, perspective-taking has the potential to reduce aggression after receiving negative feedback [21].

Objective self-awareness and perspective-taking. Research has indicated that being aware of the self can lead to increased perspective-taking [1, 2, 26]. Objective self-awareness theory [9] helps to explain these results: Individuals who are aware of their own existence take a separate perspective from the self. Thus, the individuals see themselves as separate from others – an ability needed for taking the perspective of another person [26]. The influence of self-awareness on perspective-taking could be observed both in the laboratory [26] and in the field [1]. Specifically, in a field experiment, Abbate et al. [1] could demonstrate that perspective-taking is enhanced by showing an individual a mirror (versus a photo of a baby) and, in doing so, to induce self-awareness.

Although other results show that the relationship between self-awareness and perspective taking can be a negative one [12], there is strong experimental support for a moderating variable in the relationship of perspective-taking and self-awareness. When individuals are presented with cues about the perspective of the target (e.g. specific information on the target group), higher self-awareness leads to higher perspective-taking whereas this pattern reverses when no cues are present [1].

3 Hypothesis Development and Design Options

To gain scientific insights with a comprehensible theoretical basis for the design of technology, the “design science paradigm” provides appropriate methods. Within the

design science paradigm, two types of theory have evolved: "design practice theories" and "explanatory design theories" [3, 15, 16, 19, 22, 24]. Whereas the former describes the process of constructing an artifact (how), the latter explains the reasons for constructing an artifact in a specific way (why) [3, 15]. Comparable to structural equation modeling terminology, explanatory design theories consist of an "outer model" and an "inner model" [24]. The outer model comprises design options and measurement items whereas the inner model specifies the relationship between latent design variables and latent dependent variables. Design options can be understood as the characteristics of an artifact. The study at hand pursues the target to empirically propose a starting point to develop an explanatory design theory for the dependent variable perspective taking using two affective technology design features (emotional self-disclosure and emotional cue). Furthermore, aftermath impacts are illustrated utilizing perspective taking as a moderator for negative feedback acceptance making use of a recommended approach [24]. In the course of the section, we derive hypotheses (see Fig. 1).

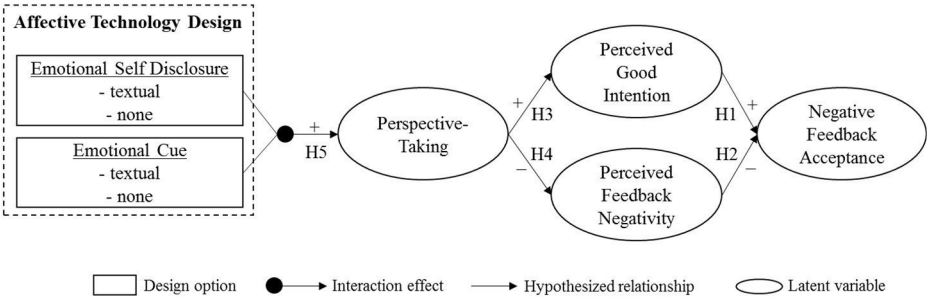


Fig. 1. Explanatory design theory

Perceived good intention of the feedback provider has been indicated to influence feedback acceptance in studies about, for example, leadership [11] and use of emoticons [27]. According to these studies, feedback is more readily accepted when a feedback recipient believes that the feedback provider had honest intentions to help (in contrast to negative intentions such as embarrassment). Thus, we hypothesize:

H1: *Perceived good intention of the feedback provider increases acceptance of negative feedback.*

As negative feedback poses a threat to a desired positive self-image [12], it is more likely rejected to prevent this [27]. As the negative relationship between perceived feedback negativity and feedback acceptance has already been shown by the results of Wang et al. [27], we aim to strengthen these results with our study:

H2: *Perceived negativity of feedback decreases feedback acceptance.*

When negative or ambiguous feedback is given, the feedback recipient has to estimate whether the intentions of the feedback provider were positive or negative [20]. If the recipient tries to understand what the feedback provider was thinking and feeling when they were writing the feedback, deciding that the feedback provider had good intentions might become more likely. This can be assumed because perspective-taking leads to

increased external attributions of behavior, e. g. when observing deviance at the workplace [13]. Thus, negative evaluations of the perspective-taking target are reduced. We therefore assume that perspective-taking is likely to play a relevant role in perceived good intentions of the feedback provider:

H3: *Perspective-taking increases perceived good intentions of feedback provider.*

Perspective taking has been shown to correlate negatively with aggressive reactions after receiving negative feedback [21]. Thus, when perspective-taking is high, perceived feedback negativity should be reduced:

H4: *Perspective-taking decreases perceived feedback negativity.*

Abbate et al. [2] showed that perspective-taking is influenced by an interaction between self-awareness and cues regarding the state of the perspective-taking target. When individuals' looks were disclosed by placing them in front of a mirror (high self-awareness condition) and were given cues about the target (cue condition), they showed higher perspective-taking than when one or both of these conditions were not met. Instead of using a mirror as a form of self-disclosure, we show participants their real-time emotional strain for inducing self-awareness and thus, perspective-taking. Congruently, we cue the emotional strain of the target to participants. Hence, our design-options are shown in Table 1 and we hypothesize the following interaction effect:

H5: *Disclosure of the own emotional state leads to increased perspective-taking when the communication partner's emotional state is cued.*

Table 1. Affective technology-based design options for increasing perspective taking and negative feedback acceptance

	Self-disclosure	**Cue**
Textual	Real-time assessment of feedback recipient's emotional strain is disclosed textually at the right side of the text insertion field as either low, moderate, or high (e.g.: "low emotional strain").	A text-field displayed at the left side of the messages from the feedback provider states: "high emotional strain".
None	No emotions are textually displayed for feedback recipient.	No emotions are textually displayed for feedback provider.

4 Method

4.1 Design, Participants, and Procedure

Design: To test our hypotheses, we want to conduct a fully randomized 2 (emotional self disclosure: textual vs. none) x 2 (emotional cue: textual vs. none) between-subjects laboratory experiment in a simulated work context.

Participants: We plan to recruit 80 students from our local university. To ensure the motivation of the participants we indicated the chance to win a reward of 25€.

Procedure: After participants receive an explanation about the alleged purpose of the experiment, they, in the self disclosure condition, put on the mood ring and are seated in front of a computer workplace in individual rooms. In the next step, to increase the credibility of the experiment, participants see the following information on the computer screen: "As we want to reward participants who have written the three best essays with 25€, another student will tell you how they evaluated your essay. Afterwards, you will have the opportunity to reply to their evaluation to improve your chances of getting the reward."

Afterwards, the use of the e-mail program is explained. Participants in the self disclosure and cue conditions receive additional explanation that they can view their own emotions/their communication partner's emotion in the e-mail program. From this point forward, the self disclosure manipulation (recipients' emotional strain) and/or the emotional cue manipulation (feedback providers' high emotional strain) are displayed continuously until the e-mail program closes. The emotional cue manipulation is used as cue for a higher stress level. For participants in the control group (emotional disclosure: none & textual disclosure: none) there is no textual information on the level of their own or the feedback provider's level of emotional strain.

The experiment itself consists of five different phases. First, all participants are asked to write an essay about fake news in social media sites. Additionally, they receive the information that they have ten minutes to complete this task, have to write at least 150 words, and that another student will subsequently evaluate their essay after they have sent it via the e-mail program. After ten minutes, participants have to send their essay to their fictive communication partner. Second, participants are given the information, that their fictive communication partner is evaluating their essay right now and will respond soon. In the meantime, participants complete a questionnaire collecting different variables. Third, participants receive the following e-mail from their fictive communication partner:

"I did not like your essay and think it has a plethora of weaknesses: your arguments are rather weak and your train of thought is hard to understand.".

Fourth, participants are given five minutes to answer to this e-mail and are told they have the opportunity to improve the chances of winning the 25€ by replying to the feedback. Afterwards, the e-mail program gets closed and participants complete the manipulation checks, and the scales for perspective-taking as well as feedback.

4.2 Measures and Data Analysis

Perspective-taking: We use a perspective-taking scale adapted from Grant & Berry [14]. An example item is "I imagined how my communication partner was feeling".

Feedback measures: Feedback acceptance, perceived good intentions and perceived feedback negativity scales are adapted from Wang et al. [27].

Manipulation checks: We ask participants whether they have seen their own/their partners' level of emotional strain.

Self-awareness and cue manipulation: In the disclosure self manipulation, the participants wear the Moodmetric ring[1] that collects data on electrodermal activity. The design-options are presented to as described in Table 1.

Data analysis: To test the effectiveness of our hypotheses, we aim to make use of different statistical tools. Specifically, we will utilize multiple regression analysis to protect our data from unwanted confounding effects, ANOVAs to see if the experimental groups show different values in the dependent variables more frequently than random, and PLS to test the whole postulated research model.

5 Limitations and Outlook

With the proposed paper, we will contribute to research on feedback as well as design science. Furthermore, we will inform practitioners on how affective technologies can be used and designed in at work to raise the acceptance of computer-mediated negative feedback. However, some limitations have to be noted. First, as we do not assess any neurophysiological measures because they could confound with the manipulation of the self-disclosure design-option, including these measures would be a promising road for future research. Second, we focused on feedback acceptance in the context of perceived good intention and perceived feedback negativity. Future studies could address additional variables such as sender credibility or message formality. In the next step, we plan to recruit participants and conduct the experiment in our laboratory.

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[1] http://www.moodmetric.com

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