Measuring Facial Expression and Emotional Experience under Diverse Social Context in a Negative Emotional Setting

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Abstract

This paper presents an empirical study of the social context effect on facial expressions in a negative emotional setting. In this study participants watched sadness-inducing film clips under different social context (alone, with stranger or with friend) and their facial expressions were coded with the Observer XT using the Facial Expression Coding System (FACES; [1]). According to Fridlund's Behavioral Ecology View [2], the presence of an intimate social interactant may facilitate negative expression. Yet the assessment and evaluation of facial behavior and self-reports of emotion revealed that negative expression did not vary as a function of sociality whereas positive expression was facilitated with the presence of a friend despite the negative valence of the stimuli. Furthermore participants reported being less sad in the presence of a friend. The finding may imply that the effect of the social context may show a different pattern regarding negative and positive facial expression in different emotional settings.

Introduction

Psychologists hold two different views about human facial expression. The belief that certain facial behaviors express or signal emotion has been a predominant account for the past 50 years [3] [4] [5]. It is assumed that there are a number of basic emotions, which are innate and universally the same independent of cultural differences. For each basic emotion, there is a prototypical pattern of facial expression. Once the prototypical facial expression appears, it can be assumed that a certain emotion is evoked. However, some psychologists doubted the existence of an emotion-expression link. Most representative of this is Fridlund's Behavioral Ecology View [2]. He argued that facial expressions are solely tools for communicating social motives to specific addressees, not direct manifestations of the inner emotional state. Empirical evidence for the latter view arises mostly from the observation and measurement of facial movement under the experimental manipulation of social context [6] [7] [8]. Most of the research had been focused on *positive* emotions, reaching the conclusion that people tend to show more positive expressions with the increase of sociality, whereas their emotional experience does not covary with the change of social context. In addition, the identity of the interaction partner may also play a role in evoking facial behavior [9]. The social impact on facial expression in positive emotional settings was further investigated by other researchers [10] [11] with diverse conclusions, but with the main finding that facial expressions involve a complex interplay of three factors: emotional state, sociality of the situation and relationship with the co-viewer. Compared to the variety of studies on *positive* emotions, little work has yet been undertaken concerning the *negative* emotional setting. This is the main focus of this paper.

The methods used for measuring facial behavior in the previous studies can be categorized into three groups: (1) objective measurement using Electromyography (EMG) [12], (2) judgment in predefined categories [9], and (3) coding using facial behavior description systems, for example the Maximally Descriptive Facial Movement Coding System (MAX; [13]), the System for Identifying Affect Expression by Holistic Judgment (AFFEX; [14]) or the most widely used Facial Action Coding System (FACS; [15] [16]). The advantage of using the last type of measurement mentioned is that it is less obstructive and intrusive than EMG and more objective and detailed than pure experience-based judgment. Its disadvantage is also obvious that it is extremely labor-intensive. The Facial Expression Coding System (FACES; [1]) differs from FACS firstly for its theoretical background that the former bases on a *dimensional* model of emotion and the latter is often used to attribution of *discrete* emotions (e.g., basic

emotions). Secondly, FACES involves merely judgment of facial expression on a valence dimension (the second category mentioned) whereas FACS describes the facial muscle movement in detail. The former largely shortens the training time (100 into 20 hours) and coding time (1h into 15min for one-minute video) and was effective enough for the hypothesis. Thus FACES was adopted in this study.

Method

Participants. Each participant was asked to bring a same-sex friend to the experiment, whom the participant had known for at least 3 months. A total of 48 German male participants (24 pairs; M= 25.99 years old, SD = 5.23) took part in the experiments. Half of them had been randomly assigned to positive emotional settings, which belongs to a part of the study beyond the scope of this paper. Participants were unaware of the real motivation for the study and were told that the purpose of the experiment was to investigate the relationship between emotion and visual attention. Each participant received 10 Euros as compensation. One additional male participant was recruited to play the role of a stranger, who had never met any of the paired participants. He was trained to behave in the same manner across all experiments.

Materials. Three sadness-inducing film clips were selected from validated film databases [17]. A pre-test was conducted with German participants. Results revealed a satisfactory capacity of the clips in inducing comparable high levels of distress without eliciting non-target emotions. To assess the participants' emotion, self-reports were obtained with the Differential Emotional Scale (DES) [18] consisting of 30 items related to 10 basic emotions.

Setting and Equipment. Two identical 15-inch notebooks with built-in cameras were placed at opposite sides of a conference table to play film clips and covertly record the facial expressions of participants. Thus participants were given the chance to look at each other's face and were aware of watching the same film clip with more exposure to the co-viewer's facial expression than when sitting besides each other. The experiments were programmed with OpenSesame [19] to guarantee synchronized play on the two screens under conditions of social viewing. Two external loudspeakers were used for playing the sound. Another 15-inch notebook equipped with headphones was placed in an adjacent room to run a visual attention task (see below).

Procedures. Each participant completed 3 film viewing sessions involving different social context (alone, with stranger, with friend) in a counter-balanced order with 2 visual task sessions between the film sessions as intersessions. Participants were instructed not to talk when watching the film clips. After each film-viewing session, participants rated their emotional experience with DES. At the very beginning of the whole experiment, participants viewed a neutral film as a baseline. The difficulty of the visual attention task was controlled to an acceptable level to avoid emotional artifacts and to allow the aroused emotions from last film session to diminish.

Experimental Hypothesis. According to Fridlund [2] sad faces in negative emotional settings may manifest the motive to seek for "succor" or request for "restitution". Thus it was hypothesized that the expressiveness of the facial display would vary as a function of sociality, namely the intensity of sad faces should show an increment between participants having a co-viewer (stranger or friend) and those viewing alone. Also, based on the findings that the identity of the co-viewer may have impact on the facial behavior of the subject [9], the facial behavior was expected to be more expressive in the friend-condition than in the stranger-condition.

Coding Facial Behavior

The video recordings were coded using Facial Expression Coding System (FACES; [1]). Raters were trained to detect facial behaviors that are emotion-related rather than serving other functions. They were asked to judge its expressed emotion valence and intensity and to note the respective duration. Previous validity studies indicate that FACES ratings are related in predictable ways to EMFACS, facial muscle activity (EMG), reports of experienced emotion and other psychophysiological measures [20].

Two graduate students were trained to code the facial expressions of the dummy subject (stranger) during each video clip using Noldus Observer XT 7.0. Raters coded with the same predefined coding scheme:

1) Facial expression: valence (positive or negative); duration (start time, end time); intensity (4-point rating scale).
2) Communicative behavior: glance at co-viewer (count).
3) Overall assessment of the whole video: dominant emotional expression (categorical: one of the six basic emotions); overall expressiveness (5-point rating scale). The overall assessment made by coders was only used for a manipulation check rather than qualitative or quantitative behavioral analysis.

Ratings were made with the volume turned off in order to prevent contamination of ratings due to speech content. The coding process was largely simplified due to the statistical module provided producing descriptive statistics of the observations. The software generated a summary of the frequency, duration and intensity of observed facial behavior. The inter-rater agreement was calculated using the intraclass correlation coefficient (ICC; Model 3.1) [21]. With satisfactory inter-rater agreement in the training phase, the raters continued to rate the videotapes of real subjects and achieved adequate inter-rater reliability ranging from 0.64 to 0.94. The scores on frequency, duration and intensity of positive or negative expressions were averaged from the two rater scores.

Conclusion

As an alternative to FACS coding, FACES has offered an effective and efficient means of assessing facial behavior based on dimensional emotional theories and required relatively less training and coding time. Together with the Observer XT, the coding process has been simplified into an affordable range, with all the data digitalized and prepared for further analysis.

Generally, an audience effect was found on positive expression in spite of the negative valence of the film stimulus, whereas negative expression did not vary as a function of social context (see Figures 1, 2 below). The facial expression and the self-reported emotion were not correlated under any social context. It may be inferred that in a social interactive context, participants seem more likely to "prevent" themselves or others from being affected by negative emotions than to "share" a negative emotional experience with the social interactant. Participants tended to report less experienced distress with the presence of a friend than when in the other two conditions. This observation may be explainable by the facial feedback hypothesis [22] [23] that facial movement did influence the self-report of emotion or by an emotional contagion effect [24] from other-smiles. More detailed discussion of the findings will be included in the presentation.

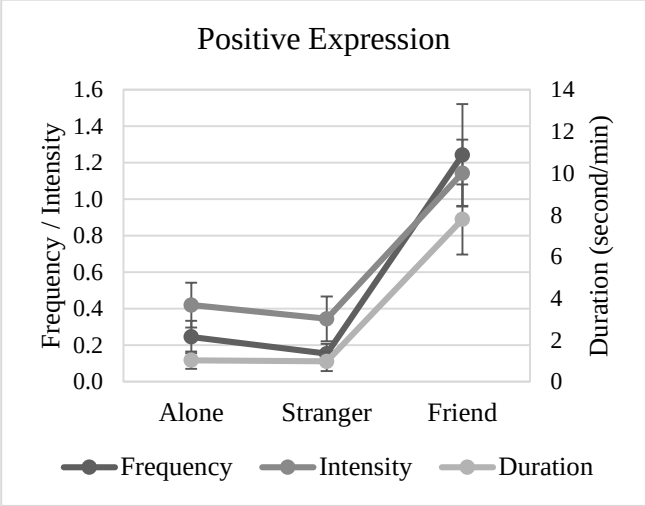

Figure 1. Mean frequency, duration and intensity of positive expression as a function of social context. Error bars represent standard error of the mean (SE).

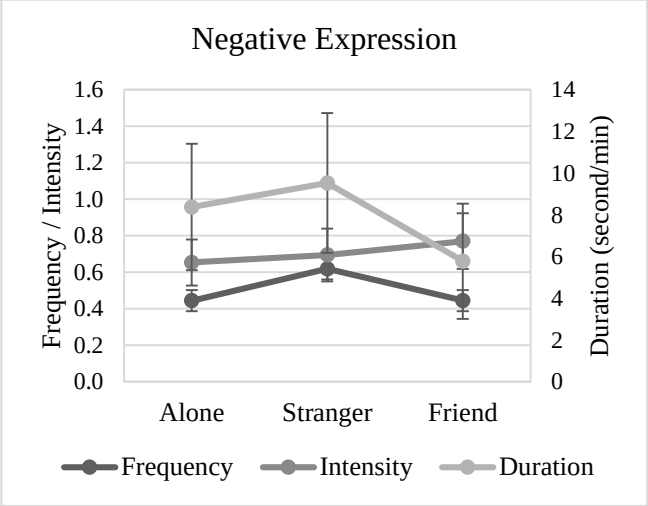

Figure 2. Mean frequency, duration and intensity of negative expression as a function of social context. Error bars represent standard error of the mean (SE).

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