Gender-related differences in the production and perception of emotion
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Published in:
Proceedings of the international conference on spoken language processing (Interspeech 2008)

Publication date:
2008

Link to publication in Tilburg University Research Portal

Citation for published version (APA):
Gender-related differences in emotion

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Abstract
This article discusses a study into gender-related differences in emotion. The results show that women have better emotional skills in judging emotions in others than men. There is an ongoing debate regarding the extent to which such differences are due to sociocultural, cognitive or biological factors. The study used a mood induction procedure to investigate how various moods could affect one's choice of emotions. The results indicate that women are more accurate in estimating whether a recorded speaker was in a negative or positive condition.

Index Terms: emotion, gender, facial expression, production, perception

1. Introduction
There is a whole body of research which suggests that men differ from women in the way they deal with emotions. There is an ongoing debate regarding the extent to which sociocultural, cognitive or biological factors contribute to these differences. The study aims to combine different perspectives on gender differences in emotion. It makes use of a specific mood induction paradigm that has been shown to be very effective in spontaneously eliciting positive and negative emotions in speakers, i.e., the film mood induction procedure. To this end, the current study starts with a production study that tests to what extent women and men differ in the way they experience negative and positive emotions. Video clips collected through the production study are then used in a perception study, in which they are shown to independent observers, whose task it was to judge whether the recorded speakers were in a negative or positive condition. Overall, judges were very accurate in estimating whether a displayed speaker was positive or negative. Moreover, there were again gender differences in that female speakers were more expressive than male speakers, and female observers were more accurate in their judgments than male observers.

2. Production experiment
2.1. Goal
The current experiment aims to induce either a negative or a positive mood in female and male participants through the use of a film mood induction procedure. The goal is to find out whether there is any evidence that the two genders differ in the extent to which they experience a positive or a negative feeling.

2.2. Method
2.2.1. Procedure
The actual experimental procedure consisted of a number of steps, and was conducted on an individual basis. Participants were first informed by written instruction about the fact that they were going to participate in an experiment whose aim it is to investigate how various moods could affect their choice behaviour when confronted with certain dilemmas. They were told that they would see a 7-minute fragment of a movie to get them in a certain mood. After the instruction phase, the partic-
Participants first had to respond to 3 different dilemmas, such as the following one:

"You had intended to go out for working out, but as soon as you leave your house, it starts raining. What will you do?"

A You get on your bike, and you go ahead anyway
B You decide to wait for 15 minutes, and if the weather hasn't changed after that, you cancel."

In the next stage, participants had to watch the movie fragments. In the positive mood condition, participants viewed the first 7 minutes, excluding the begin tune, of episode 5.14 of Friends (The one where everyone finds out). Participants in the negative mood condition watched a 7-minute fragment (the "liquidation of the ghetto. March 1943"-scene of Schindler's list, corresponding to scene 13/14 of Disc 1 of the commercial dvd). After having watched either of these two film clips, participants were asked to complete a short written questionnaire, based on a larger questionnaire adapted from Krahmer and van Dorst (2004). The questionnaire consisted of 6 bipolar 7-point scales (Dutch), the items of which can be translated into English as follows: happy/sad, pleasant/unpleasant, satisfied/unsatisfied, content/discontent, cheerful/sullen, and high spirits/low-spirited. For 4 scales, "1" corresponded to a very positive mood and "7" to a very negative one, whereas for the other 2 scales, the extremes of the scales had opposite interpretations; the variable interpretation of the extremes of the scale was introduced to keep the participants alert. Finally, the participants were interviewed about the film-fragment they had just seen, after which they were given 3 other dilemmas similar to the ones given before the movie. The whole procedure took about 30 minutes per participant. Note that participants were filmed by a visible camera while they were watching the movie fragments, during the interview session and when responding to the dilemmas given before and after the movie fragment. Figure 1 gives some representative stills of male and female speakers in positive and negative mood conditions. The stills come from the first part of the production experiment, where the participants were watching a happy or sad movie.

2.2.2. Participants
33 participants (17 female, 16 male), all students from the Arts faculty at Tilburg University, between the age of 18 and 30, took part in the experiment on a voluntary basis: 17 of them (8 male, 9 female) were randomly assigned to the positive mood condition, 16 (8 male, 8 female) to the negative mood condition. All of them signed a written consent form in which they agree that the video recordings of their reactions during the movie fragments, the interview and the session in which they responded to the dilemmas could be analysed for academic purposes and shown to third parties. After the experiment, all participants received a candy bar to thank them for their participation.

2.2.3. Design
The experiment had a between-subjects design with 2 main factors, i.e., mood (positive, negative) and gender (female, male). The choice to have a between- rather than a within-subject design is that it would seem very difficult to have participants switch between two extreme moods in the same experiment.

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2.3. Results
Before testing the effect of the positive and negative conditions on the experienced moods, the internal consistency between the scores of our 6 scales was tested by means of Cronbach’s α. To this end, the scores for 2 out of the 6 scales were reversed to make sure the extremes would have similar interpretations (positive or negative) with 1 being “very positive” and 7 being “very negative”. Cronbach’s α turned out to be very high (0.93) which points out that the internal consistency between the different scales was very good. In the remaining analyses, the scores for the different scales were first pooled, in that we got one average score per participant.

We performed an analysis of variance with mood (negative, positive) and gender (female, male) as independent factors, and the average score per participant as dependent variable. This analysis revealed a significant main effect of mood ($F_{(1,29)} = 58.845, p < .001, \eta^2_p = .662$), whereas the main effect of gender turned out not to be significant. The mood effect was such that the positive condition led to a significantly more positive score of 2.259 (std. error = .182) than the negative score of 4.177 (std. error = .177). In addition to the main effects, there was a significant 2-way interaction between mood and gender ($F_{(1,29)} = 6.527, p < .05, \eta^2_p = .184$). Even though split analyses revealed that the difference between positive and negative scores was significant for both the male ($t = -2.682, df = 14, p < .05$) and the female participants ($t = -11.977, df = 15, p < .001$), it is clear from Table 1 that the difference between the positive and the negative mood conditions is bigger for female (2.567) than for male participants (1.268).

2.4. Discussion
The production experiment discussed above thus revealed that the film mood induction procedure is extremely effective to turn participants in either a positive or negative mood by means of film clips. Interestingly, the method also brought to light gender differences in that female participants appeared to produce more extreme scores on the valency scales than the male participants, meaning that the former experienced the different moods
Table 1: Average self-ratings, standard deviations and difference scores from male and female participants in positive and negative mood conditions (1=very positive to 7=very negative)

<table>
<thead>
<tr>
<th>Gender</th>
<th>Mood condition</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Positive (1)</td>
<td>2.625 (.258)</td>
<td>1.893 (.258)</td>
</tr>
<tr>
<td></td>
<td>Negative (2)</td>
<td>3.893 (.258)</td>
<td>4.460 (.243)</td>
</tr>
<tr>
<td></td>
<td>Diff (2-1)</td>
<td>1.268</td>
<td>2.567</td>
</tr>
</tbody>
</table>

Table 2: Average scores (1=very positive to 5=very negative) for different instances of mood, fragment, gender speaker and gender observer

<table>
<thead>
<tr>
<th>Factor</th>
<th>Level</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mood</td>
<td>Positive</td>
<td>2.623</td>
</tr>
<tr>
<td></td>
<td>Negative</td>
<td>3.715</td>
</tr>
<tr>
<td>Fragment</td>
<td>Movie</td>
<td>3.468</td>
</tr>
<tr>
<td></td>
<td>Interview</td>
<td>2.870</td>
</tr>
<tr>
<td>Gender speaker</td>
<td>Male</td>
<td>3.302</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>3.036</td>
</tr>
<tr>
<td>Gender observer</td>
<td>Male</td>
<td>3.159</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>3.178</td>
</tr>
</tbody>
</table>

Table 3: Observed mood scores, standard deviations and difference scores for male and female speakers in positive and negative mood conditions (1=very positive to 5=very negative)

<table>
<thead>
<tr>
<th>Mood condition</th>
<th>Speaker</th>
<th>Positive (1)</th>
<th>Negative (2)</th>
<th>Diff. (2-1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>2.941 (.081)</td>
<td>3.662 (.086)</td>
<td>.721</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>2.304 (.090)</td>
<td>3.768 (.101)</td>
<td>1.464</td>
</tr>
</tbody>
</table>

3. Perception experiment

3.1. Goal

Given the results of the previous experiment about gender differences in the way positive or negative moods are experienced, the current experiment aims to test whether the different experiences are reflected in gender differences in the expression and perception of different moods.

3.2. Method

3.2.1. Stimulus materials

The stimulus materials were selected from the video recordings of the participants of the earlier production study. Using the Adobe Premiere software, we cut 10-second fragments from exactly the middle of the recording of participants watching the 7-minute movie scenes. In addition, we took 10 seconds from the middle of the interview session conducted after the movie session and the completion of the questionnaire. The audio-channel of both kinds of fragments were removed from the clips, so that observers had to base their judgments on the visual information only.

3.2.2. Procedure

All the fragments (from movie and interview segments) were presented in random order to observers (individually performed experiment), who were asked to judge the emotional content of the presented clip on a 5-point scale (with 1 meaning “very positive” and 5 meaning “very negative”). To compensate for possible learning effects, half of the participants received the clips in one order, whereas the other half received them in the opposite order. The participants saw a clip after which they had 3 seconds to express their judgment on the scale (paper-and-pencil task). To make subjects acquainted with the experimental procedure and the kinds of stimuli, the experiment was preceded by a short practice session where they had to judge 2 clips. After the practice session, there was no further interaction with the experimentors. The whole experiment (including practice session and instructions) lasted about 15 minutes.

3.2.3. Participants

24 participants, equally balanced across gender and presentation order, all students from the Arts faculty at Tilburg University between the ages of 18 and 30, took part in the perception study on a voluntary basis. None of them had participated as

more extremely than the latter. Given these production results, it remains to be seen whether the differences are also perceived as such by independent observers, and if so, whether the gender of observers matters there as well.

3.3. Results

The data were analysed with a $2 \times 2 \times 2 \times 2$ repeated measures anova with gender of observer (male, female) as a between-subjects factor, with gender of speaker (male female), mood (positive, negative) and fragment (movie, interview) as within-subject factors, and the perceived mood (on a scale from 1 to 5) as dependent variable. The analysis revealed main effects of gender of speaker ($F_{(1,22)} = 10.985, p < .01, \eta^2_p = .333$), mood ($F_{(1,22)} = 271.256, p < .001, \eta^2_p = .925$), and fragment ($F_{(1,22)} = 70.564, p < .001, \eta^2_p = .762$), whereas gender of observer turned out not to be significant. From table 2, it can be seen that the significant results can be interpreted as follows: fragments from a negative condition are indeed perceived as being more negative than the positive ones.

In addition, it appears that fragments from the movie sequence are perceived on average as being more negative than the interview fragments. And finally, male speakers are on average perceived as being slightly more negative than the female speakers. In addition there turned out to be significant 2-way interactions between between mood and gender of speaker ($F_{(1,22)} = 5$).
The current paper has reported about a study of gender-related differences in emotion, which used a combination of a film mood induction procedure which turned out to be extremely effective, and a perception study in which two kinds of clips were presented to independent observers. Our first general finding is that the research reported above indeed provides support for the claim that women are more emotional than men. Interestingly, this gender difference is reflected in the fact that women experience, express and perceive emotions in others more extremely than men.

In addition, it is also interesting to observe that the perception results for the movie fragments are different from the interview fragments in that the latter on average appear to be more positive than the former (even though within both sets observers are able to make a correct distinction between positive and negative mood conditions). The more positive appearance of the interview fragments could be due to the fact that they reflect some correlates of the social emotions that speakers display in interactions with a conversation partner. In that respect, it is interesting to observe that most of our participants, irrespective of whether they were in the positive or negative condition, smiled after the interviewer’s first question, even when they had explicitly stated that they felt quite negative after having seen the movie. This smile does not necessarily display a happy feeling, but seems to be produced to reflect some social bonding with the interviewer.

5. Acknowledgments

This research was conducted in the context of the FOAP project, which is funded by the Netherlands Organisation of Scientific Research (NWO) (see http://foap.uvt.nl). We thank Nadja van Bodegom, Manon de Caluwé, Stefanie Fassaert, Marthy Herckenrath, Eva van de Sande, Annelot Smulders and Sara Theunisse for help with the data collection and the perceptual evaluations, and Lennard van de Laar for technical assistance.

6. References