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Mood effects on emotion recognition

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Abstract Mood affects memory and social judgments. However, findings are inconsistent with regard to how mood affects emotion recognition: For sad moods, general performance decrements in emotion recognition have been reported, as well as an emotion specific bias, such as better recognition of sad facial expressions compared to happy expressions (negative bias). Far less research has been conducted on the influence of happy moods on emotion recognition. We primed 93 participants with happy, sad, or neutral moods and had them perform an emotion recognition task. Results showed a negative bias for participants in sad moods and a positive bias for participants in happy moods. Sad and happy moods hampered the recognition of mood-incongruent expressions; the recognition of mood-congruent expressions was not affected by moods.

Keywords Mood · Emotion recognition · Positive and negative biases

Introduction

The present study focuses on how sad or happy moods influence the ability to recognize other people's emotions. So far, research on emotion recognition has mostly focused on depressed patients (whose symptoms, amongst others, include deficient positive and excessive negative affect, DSM-IV; APA 2000). The study of normal variation of mood on emotion recognition in healthy individuals is scarce.

Beck's cognitive theory of depression (Beck 1976) and other theories focusing on healthy individuals, such as mood-congruity theories (Bower 1981; Schwarz 1990) state that a person's mood exerts a congruity effect on memory and social judgments. Being in a negative mood or being depressive promotes recall of negative stimuli and makes an individual prone to judge others in a negative way (negative bias). Mood-congruity theories also predict that positive moods facilitate recall of positive stimuli and making positive judgments about others (positive bias). Applied to emotion recognition, these theories would predict that sad moods and depression lead to better emotion recognition of sad versus happy faces, whereas happy moods would promote better recognition of happy versus sad faces.

Because depression and mood theories postulate the same mood biases, one might assume that individuals in sad moods and depressed patients process emotionally toned stimuli in a comparable way. However, Asthana et al. (1998) argue that clinically depressed individuals might have additional cognitive impairments (e.g., problems with visuospatial tasks) that can affect emotion recognition. Depressed patients might show a generalized decrease in the ability to recognize all kind of emotions (positive and negative ones) instead of an emotion-specific, negative bias. Also, Rottenberg et al. (2005) posit that depressed patients show emotion context insensitivity (ECI)—a reduced response to all emotion cues, regardless of valence. Empirical studies including depressed populations revealed both emotion-specific negative biases (e.g., Gur et al. 1992; Hale 1998) and general decreased emotion recognition performance (e.g., Surguladze et al. 2004; Zuroff and Colussy 1986). Asthana et al. (1998) argue that

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the additional cognitive impairments of depressed patients are the reason for the inconsistent findings and that negative mood per se promotes a negative bias and not a general performance decrement. This suggests that healthy individuals in sad moods would show a negative bias and not an overall performance decrement.

There is indeed some evidence for mood-congruity effects in healthy participants. Bouhuys et al. (1995) primed healthy participants with happy or sad moods and exposed them to schematic facial expressions (line drawings). Participants in sad moods perceived more sadness and less happiness in the schematic faces compared to the happy participants. Niedenthal et al. (2000) primed participants with happy or sad moods and exposed them to happy and sad expressions that morphed into a neutral expression. Participants moved a sliding bar to morph the face frame by frame, and were asked to drag the bar to the frame at which they no longer perceived the initial emotional expression (sadness or happiness). Participants primed with happiness showed a hysteresis effect in that they chose the offset of the happy emotion at a later frame than for the sad emotional expression. The opposite pattern was found for participants primed with sadness. Although the Bouhuys et al. (1995) and Niedenthal et al. (2000) studies provide evidence for mood-specific biases, both studies focused on the degree to which a certain emotion is perceived in facial expressions and not on the accuracy of those assessments. Accuracy is the focus of the present study.

Contrary to what mood-congruity theory would predict, Chepenik et al. (2007) showed a general performance decrement in emotion recognition for healthy individuals in sad moods compared to a control group in a neutral mood. However, their results might be due to the stimuli set used, comprised of photographs of people displaying either a neutral expression, a positive emotion (happiness), or one of three negative emotions (sadness, anger, or fear). Thus, emotions were not only judged on valence, but also had to be classified into discrete emotion categories. This is different from studies in which mood-congruity effects emerged; in the latter, participants had to perform simple valence judgments. Note also that Chepenik et al. did not examine how *happy* mood affects emotion recognition accuracy.

The present study aims at understanding how healthy individuals' mood (happy, sad, or neutral) affects their ability to recognize happy and sad emotions. We predict a positive bias for participants in happy moods (better recognition of happy faces compared to sad faces) and a negative bias for participants in sad moods (better recognition of sad compared to happy faces). We further examine whether happy and sad moods boost or hinder the recognition of mood-congruent and mood-incongruent faces compared to neutral moods.

Method

Participants

Participants were 93 students, 51 women, 42 men (*M* age = 23 years). Participants had the possibility to win one of four iPod Shuffles.

Procedure

Participants were randomly assigned to one of three mood priming conditions: happy, sad, or neutral. Mood priming was performed by short film scenes. Participants indicated right after having watched the movie scenes how they felt using a 7-point Likert scale (1 = extremely sad, 7 = extremely happy, 4 = neutral). Participants then performed an emotion recognition task while listening to (induced) mood-congruent music.

Material

Mood priming

We used a 2 min 46 s film scene from "When Harry Met Sally" to prime happiness, a 2 min 46 s scene from "The Champ" for sadness, and a 3 min 26 s screen-saver animation to prime a neutral mood (Rottenberg et al. 2007). During the emotion recognition task, emotionally toned music (of the same valence as in the film priming) was audible for participants via headset. Based on previous research (Gerrards-Hesse et al. 1994) we chose "Mazurka", "Divertimento in D Major #136" and "Eine kleine Nachtmusik" for the positive mood condition, "Adagio in G Minor" "Adagio for Strings" and "Preludes" (Opus 28#6) for the negative mood condition, and "Common Tones in Simple Time", "Neptune—The Mystic" and "Aerial Boundaries" for the neutral mood condition.

Emotion recognition task

We used 60 different stimuli from the Facial Expressions of Emotion: Stimuli and Tests (FEEST: Young et al. 2002). Stimuli contained 30 happy and 30 sad facial expressions of different intensities. The intensity of the emotions was manipulated by morphing the sad and happy expressions into a neutral expression. The morphed faces expressed 25, 50, or 75% of happiness resp. sadness (Fig. 1). Stimuli were presented for 2,000 ms (according to Surguladze et al. 2004). Participants could answer as soon as the stimuli disappeared with no fixed time frame for the answers.

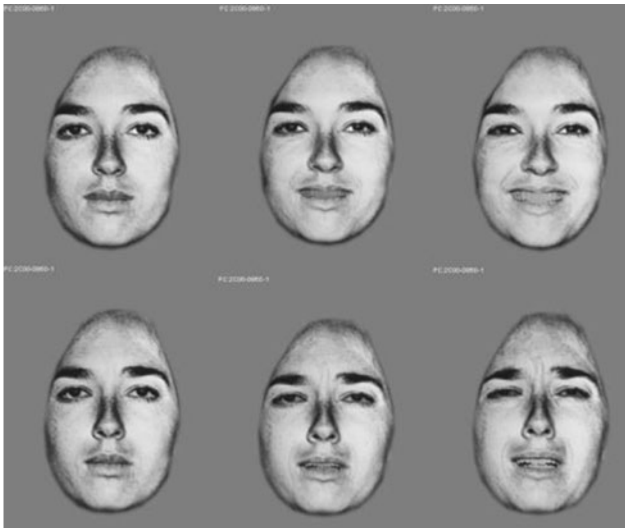

Fig. 1 Happy (*upper line*) and sad (*lower line*) emotional expressions of 25, 50, or 75% intensity

We included stimuli of different intensities so the task would not be too easy, as participants only had to distinguish between happy and sad emotions. Other studies showed that effects only emerged when using emotional expressions with reduced intensity (e.g., Kohler et al. 2003; Surguladze et al. 2004).

Manipulation check

An ANOVA with mood priming as the independent variable and participants' reported mood as the dependent variable was conducted to check if mood priming worked. The mood priming main effect was significant, $F(2, 90) = 10.53$, $p < .001$. Contrast analyses showed that participants felt significantly happier after happy mood priming ($M = 5.44$) than after neutral mood priming ($M = 4.90$), F contrast $= 4.88$, $p = .029$, and participants felt significantly less happy after sad mood priming ($M = 4.34$) than after neutral mood priming, F contrast $= 5.24$, $p = .026$.

Results

A mixed model ANOVA was calculated to examine mood effects on emotion recognition. The within-subjects factors were the facial expressions (happy vs. sad) and the intensity of the facial expressions (25, 50, or 75%). The between-subjects factors were mood priming (happy, sad, or neutral), and gender. It is well-documented that women outperform men in emotion recognition (McClure 2000, for a meta-analysis) so we included gender as a factor to control for potential gender effects in our main results.

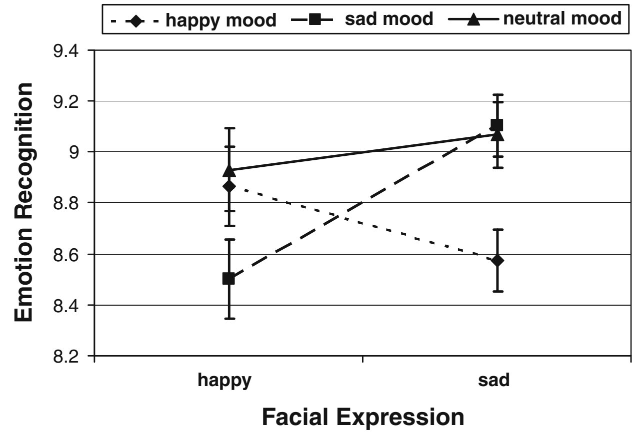

Fig. 2 Number of correctly recognized happy and sad facial expression in happy, neutral, and sad mood

Results showed a significant gender main effect (women outperformed men, $F(1, 87) = 10.93$, $p = .001$), and a main effect of intensity, such that high intensity facial emotions were easier to correctly assess than low intensity facial emotions, $F(2, 174) = 244.18$, $p < .001$ (Huynh–Feldt epsilon = .82). Neither the facial emotion expression nor the mood priming main effects were significant (all F's < 2.57, all p's $> .082$).

Results showed the predicted mood-congruity effect represented by the interaction of facial expression by mood priming, $F(2, 87) = 4.41$, $p = .015$ (Fig. 2). The facial expressions by intensity interaction was also significant, $F(2, 174) = 20.80$, $p < .001$ (Huynh–Feldt epsilon = .63). Because the focus of the present paper was the mood-congruity effect, we do not discuss this finding in more detail. There were no other significant interaction effects (all Fs < 1.63, all p's $> .179$).

To test for positive and negative biases, we conducted planned contrasts on the aforementioned facial expressions by mood priming interaction effect (see Table 1 for means and standard deviations). People primed with sad moods recognized sad faces better than they recognized happy faces, F contrast $= 9.03$, $p = .005$, confirming the expected negative bias for sad moods. However, we did not find this effect for happy moods: participants primed with happy moods did not recognize happy faces better than sad

Table 1 Means and SDs (in parenthesis) for the recognition accuracy of happy and sad faces of participants in happy, sad, and neutral mood

Facial expression	Mood priming		
	Happy	Sad	Neutral
Happy	8.86 (0.15)	8.50 (0.15)	8.93 (0.16)
Sad	8.57 (0.12)	9.10 (0.12)	9.07 (0.13)

faces, F contrast = 2.28, p = .159. Participants primed with neutral moods showed no significant difference in recognizing happy compared to sad faces, F contrast = 0.48, p = .491.

To test whether the negative bias was due to sad moods increasing recognition of mood-congruent sad faces, or to sad moods decreasing recognition of mood-incongruent, happy faces, we assessed whether participants in neutral moods differed from participants in sad moods in the recognition of sad and happy faces. When judging sad faces, there was no difference in emotion recognition between the sad and neutral groups, F contrast = 0.03, p = .863. However, when judging happy faces, sad primed individuals were significantly less accurate in emotion recognition than were neutral participants, F contrast = 4.58, p = .040. Therefore, negative bias in sad moods must have occurred due to an impaired recognition of mood-incongruent happy faces.

Although we did not find evidence for a positive bias, we compared the happy participants' emotion recognition performance with those of neutral participants. Happy faces were recognized equally well in the happy mood condition as they were recognized in the neutral mood condition, F contrast = 0.11, p = .742. However, happy participants recognized mood-incongruent sad faces significantly less well than neutral participants, F contrast = 6.12, p = .019. Analogous to sad moods, happy moods did not facilitate the recognition of mood-congruent facial expressions, but hindered the recognition of mood-incongruent facial expressions.

Discussion

The goal of this study was to investigate how different mood states (happy, sad, and neutral) affect the ability to correctly recognize other people's emotions. We hypothesized and found mood-congruity effects. For participants in sad moods, a negative bias emerged—sad participants recognized sad facial expressions better than happy ones. Participants in happy moods did not recognize happy facial expressions better than sad ones, although means were in this direction. Nevertheless, we demonstrated that a primed happy mood as compared to a neutral mood was responsible for a decrease in recognition of sad facial expressions, indicating that happy moods hamper the recognition of mood-incongruent, sad emotions. Analogously, sad moods had a detrimental effect on the recognition of mood-incongruent, happy emotions: the recognition of happy facial expressions was reduced in sad moods compared to neutral moods. No evidence for a general performance decrement in sad moods emerged.

In sum, we showed that the mood-congruity effects documented in the literature (a) hold true for emotion recognition and not just for memory tasks, and (b) the effect not only occurs in sad but also happy moods. Moreover, we showed that it was incongruity that drove the effect. People are not particularly adept at emotion recognition just because their feelings align with a stimulus. Rather, when the emotion of another person is not in line with how one feels, people have difficulty recognizing the emotions of the other person. Whether this is due to paying less attention to the mood-incongruent stimuli, or impairment in interpreting the other person's emotional state remains an open question.

Note that our results contradict Chepenik et al. (2007) who found general performance decrements for participants in sad moods but no negative bias. Participants in our study only had to make a valence judgment (positive vs. negative), whereas participants in the Chepenik et al. study had to further differentiate among multiple negative facial expressions, which might explain why they failed to find a negative bias for sad participants. Perhaps the mood-congruity effect for emotion recognition is one that only manifests on the general valence dimension and not for specific emotions.

One limitation of the present study is that although primed sad participants reported feeling less happy than happy participants did, they still reported feeling slightly happy. Importantly, however, primed sad participants showed the predicted negative bias, indicating that the priming procedure successfully activated sadness-related concepts.

Our study is the first to examine how positive, negative, and neutral moods influence emotion recognition in terms of mood-congruity effects, and whether these moods reduce or boost overall emotion recognition accuracy.

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