Stereotypes and Prejudice Affect the Recognition of Emotional Body Postures

Emotion, in press

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Abstract

Most research on emotion recognition focuses on facial expressions. However, people communicate emotional information through bodily cues as well. Prior research on facial expressions has demonstrated that emotion recognition is modulated by top-down processes. Here, we tested whether this top-down modulation generalizes to the recognition of emotions from body postures. We report three studies demonstrating that stereotypes and prejudice about men and women may affect how fast people classify various emotional body postures. Our results suggest that gender cues activate gender associations, which affect the recognition of emotions from body postures in a top-down fashion.

Keywords: body language, stereotypes, prejudice, associations, social categorization

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How do people recognize emotional expressions of others? On one hand, specific emotion cues, such as the contraction or relaxation of one or more facial muscles (Ekman, Friesen, & Tomkins, 1971), individual differences in eye size of the expresser (Marsh, Adams Jr., & Kleck, 2005; Sacco & Hugenberg, 2009), and the position of the brow ridge (Becker, Kenrick, Neuberg, Blackwell, & Smith, 2007), affect how fast or accurate an emotion is recognized. On the other hand, information about the social category, such as gender cues, may activate associative knowledge about the perceived person, such as stereotypes and prejudice. An increasing number of studies have demonstrated that perceivers' associations with the social category of the expresser affect emotion recognition in a top-down fashion (e.g., Bijlstra, Holland, Dotsch, Hugenberg, & Wigboldus, 2014; Hugenberg 2005; Kang & Chasteen, 2009; Lipp, Craig, & Dat, 2015; Smith, LaFrance, & Dovidio, 2015). Accordingly, emotion recognition is best described as a process that is influenced by a mix of bottom-up and top-down influences (Freeman & Ambady, 2011).

Fast and correct recognition of emotional expressions is critical to infer emotional states and behavioral intentions of others. Although prior studies (e.g., Ekman, 1993; Jack, 2013) have provided much insight into the nature of emotion recognition processes, they almost exclusively employed facial stimuli. However, facial expressions are not the only way in which people communicate emotional information. Recently, researchers have turned their attention to the perception of emotions from body postures (e.g., Aviezer et al., 2008; Dael, Mortillaro, & Scherer, 2012; De Gelder, 2006; Johnson, McKay, & Pollick, 2011). Overall, there is evidence that body postures provide important information for emotion recognition (Martinez, Falvello, Aviezer, & Todorov, 2016; Van den Stock, Righart, & De Gelder, 2007). Some research suggests that the recognition of emotion on the basis of bodily postures may often be as accurate as on the basis of facial expressions (De Gelder, 2009). In fact, recent studies have found that under some conditions the valence of emotional displays is better identified by bodily than facial cues (Aviezer, Trope, & Todorov, 2012). In sum, these studies provide clear evidence that humans are able to extract emotional expressions from specific configurations of bodily postures.

Although bottom-up processes, such as those described above (e.g., Becker et al., 2007; Van den Stock et al., 2007), have been studied in some depth for emotion recognition from both bodies and faces, top-down influences on emotion recognition from body postures have remained largely unstudied, despite having received attention recently within the domain of faces (below we will describe two exceptions: i.e. Kret & De Gelder, 2010 and Kret, Roelofs, Stekelenburg, & De Gelder, 2013, Study 3). To strengthen the claim that top-down associations influence emotion perception, the scientific field would benefit from a systematic investigation of other communication modalities than faces as well. Here we test whether the putative role of stereotypes and prejudice in recognizing facial emotion expressions extends to emotional body postures. The current studies, therefore, are aimed at showing the robustness of this theoretical principle by providing novel evidence that top-down associations affect the recognition of emotional body postures.

Top-down processes affect recognition of facial expressions

Prior research has demonstrated that social category cues influence emotion recognition in a top-down fashion (e.g., Bijlstra, Holland, & Wigboldus, 2010; Hugenberg & Bodenhausen, 2003; Hutchings & Haddock, 2008). By qualifying a variable as having a top-down influence, we mean to say that the variable affects emotion recognition on the basis of increased accessibility of existing associations. Instead of affecting emotion recognition directly, such as for example lowered eyebrows affecting the recognition of anger or raising your arms in the air as a sign of (extreme) happiness, top-down processes may affect emotion recognition via a more indirect, associative process. The social category, e.g., gender, of the expresser is one such variable with a top-down influence on emotion recognition. Gender cues, like having long hair (Macrae & Martin, 2007), may activate the social category of women and corresponding associative knowledge. Typically, within social psychological literature, social category related associations are described as stereotypes or prejudice (e.g., Amodio & Devine, 2006; Wittenbrink, Judd, & Park, 2001a, 2001b). *Stereotypes* are seen as “qualities perceived to be associated with particular groups or categories of people” (Schneider, 2004, p.25), whereas *prejudice* refers to general affective evaluations of social categories (e.g., Dovidio, Kawakami, Johnson, Johnson, & Howard, 1997; Fazio, Jackson, Dunton, &Williams, 1995). These associations may facilitate the recognition of certain emotions and not others. For example, the gender stereotype ‘men are angry’ may facilitate the emotion recognition of anger on men. Moreover, the positive category evaluation of women in comparison to men (i.e. prejudice) may bias a perceiver to recognize positive emotions faster on women than on men.

Bijlstra and colleagues (2010) provided evidence that gender cues affect the recognition of emotional faces in a top-down fashion. Participants completed an emotion classification task in which men and women (Study 2) displayed facial emotional expressions. Participants who were asked to classify the negative expressions anger and sadness, showed a stereotype-congruency effect. That is, in line with common gender stereotypes (e.g., Plant, Hyde, Keltner, & Devine, 2000), anger was more quickly classified than sadness on male faces, whereas sadness was more quickly classified than anger on female faces.

Interestingly, prior social categorization research demonstrated that the task context may affect whether people activate stereotype or evaluative associations (Wittenbrink at al., 2001a, 2001b). Consistent with this idea, Bijlstra and colleagues (2010) not only demonstrated distinctive effects on emotion recognition of stereotype associations (i.e., associations between social categories and specific emotions), but also of prejudice (i.e., associations between social categories and valence). Specifically, participants were asked to distinguish between either two negative expressions (anger *and* sadness), or between a positive (happiness) and a negative expression (either anger *or* sadness). In a comparative context that contained only negative facial expressions, the stereotype-congruency effect described above was observed. However, when a positive expression was pitted against a negative expression, participants more quickly classified a positive than a negative facial expression on female faces. For male faces this positive emotion advantage was not observed. The latter findings are consistent with previous studies showing that women are evaluated relatively more positive than men (Eagly & Mladinic, 1989; Eagly, Mladinic, & Otto, 1991). Importantly, the difference in classifying positive and negative expressions between female and male faces was independent of the specific negative emotion (anger or sadness) that was pitted against the positive one (see also Hugenberg & Sczesny, 2006).

In sum, these and other studies (e.g., Hugenberg, 2005; Hutchings & Haddock, 2008; Otten & Banaji, 2012) provided evidence that social category cues affect the recognition of facial emotional expressions in a top-down manner. When the task context emphasizes valence differences, using an emotion classification task that includes both a positive and a negative expression, prejudice may guide emotion recognition (e.g., Hugenberg, 2005). When the task context does not involve valence differences because two negative emotions are pitted against each other, stereotypes may guide emotion recognition (Bijlstra et al., 2010).

Although evidence for top-down modulation of emotion recognition abounds in the face perception literature, as yet, such top-down modulation has not been reported for the recognition of emotional body postures. In daily life, however, faces are not always clearly visible and observers may infer behavioral intentions of others on body postures and not on facial expressions. To our knowledge, only a few relevant studies have been conducted in this research domain. Johnson and colleagues (2011), for example, provided evidence that participants applied gender stereotypes of emotion to infer gender classification. Point light displays of the body postures of anger were more likely to be classified male than female, whereas point light displays of the body postures of sadness were more likely to be classified female than male. Although their study is related to the present research, it is qualitatively different in that we investigate emotion classification, whereas Johnson and colleagues focused on gender classification. Interestingly, Kret and De Gelder (2010; see also Kret et al, 2013) investigated the recognition of emotional body postures as a function of social context. The social scenes in which emotional body postures were placed affected the accuracy of emotion classification, such that consistent body-scene combinations (e.g., happy body postures at a party or angry postures at a strike) were classified more accurately than inconsistent posture-scene combinations (e.g., happy postures at a strike or angry postures at a party). Thus, expectancies activated by the social scenes had a top-down influence on the ease with which emotions were inferred from bodies.

The Present Research

We focus on modulation of emotional body postures recognition by information inferred from cues that are inseparable from the expresser of the emotion, namely gender cues. Because gender cues are almost always present in bodies, they may affect emotion recognition across a wide variety of social scenes in which an emotion is displayed. In three studies we investigated whether gender cues affect the speed with which pictures of emotional body postures are classified. Based on social categorization literature (e.g., Allport, 1954; Devine, 1989; Macrae & Bodenhausen, 2000) we assumed that merely perceiving members of different social categories (men and women) temporarily activates stereotypes and prejudice about the respective categories. The activated knowledge may influence the accessibility of specific emotional states (e.g., the association that men are more likely to appear angry than women). As a consequence, emotional body postures congruent with the activated associations (e.g., angry male bodies) should be more quickly classified than incongruent emotional body postures (sad male bodies).

STUDY 1

In Study 1 we aimed to provide initial evidence for top-down, stereotype-congruency effects in recognizing emotional body postures of men and women. To this end, participants completed a speeded classification task in which angry and sad postures were displayed by male and female bodies (with the faces masked away, see Figure 1). Participants were asked to classify the displayed posture as quickly as possible without making mistakes. We employed sadness and anger because prior research (e.g., Plant et al., 2000) demonstrated that sadness is more strongly associated with women than men, whereas anger is more strongly associated with men than women. Furthermore, both expressions are negative in valence such that the comparative context did not emphasize an evaluative component. We therefore, predicted that stereotype-congruent expressions (i.e., angry postures on male bodies and sad postures on female bodies) are more quickly classified than stereotype-incongruent expressions (i.e., angry postures on female bodies and sad postures on male bodies).

Method

Participants

Thirty-Nine Radboud University students (30 female, 7 male, 2 unknown, *Median* $_{age}$ = 22, range 18 - 40) completed a sad versus angry speeded classification task. The sample size used in this study was comparable to a previous study that employed similar emotion and category variables (Bijlstra et al., 2010; Study 2)[1]. Based on the effect-size of Bijlstra and colleagues and assuming a .75 within-subjects correlation across measures, we had greater than 99% power with our chosen sample size to detect the predicted interaction at an alpha level of .05 (GLIMMPSE; http://http://glimmpse.samplesizeshop.org/#/).

Materials & Procedure

Twelve models, six men and six women, were selected from the Bochum Emotional Stimulus Set (BESST), on the basis of classification data from a validation study (Thoma, Bauser, & Suchan, 2013; see Appendix 1 for an overview of the stimuli that were selected in Study 1, including validation data from Thoma and colleagues). The selection criterion used in this study was that both angry and sad postures of each model were accurately classified by at least 89% of participants. For these 12 models, we selected the pictures that depicted anger and sadness, resulting in a total of 24 pictures: 2 body postures x 2 target gender x 6 targets per gender group.

Participants were seated in individual cubicles and instructed that their task was to classify two emotional expressions as quickly and accurately as possible. The procedure was adapted from Bijlstra and colleagues (2010; see also Hugenberg, 2005) and consisted in total of two experimental blocks of trials. Before each of two experimental blocks, we added an eighttrial practice block to familiarize participants with the emotion classification task. Each trial consisted of a fixation cross presented for 300 milliseconds followed by a picture of an emotional body posture for 200 milliseconds. Participants were asked to classify pictures of emotional body postures as angry or sad, by pressing one of two buttons ('A' or 'L'). Response mappings switched between experimental blocks, whereas starting order of response mapping was counterbalanced between participants. Within each experimental block participants were presented with 48 trials, with each picture being presented twice. To achieve this, within each experimental block the 24 pictures were presented in random order without replacement and this procedure was repeated.

Results

The primary dependent variable in the present study was the average response time needed to classify the emotional body postures. In line with Bijlstra et al. (2010), we excluded incorrect trials (12%) and response latencies below 300 milliseconds or above 3000 milliseconds (<1%) from analysis. All response latencies were log-transformed in order to correct for the skewed distribution of responses. However, in order to facilitate interpretation we report untransformed latencies in our text and figures.

We subjected the mean log-transformed response latencies to a 2 (Gender: male versus female) X 2 (Body posture: angry versus sad) repeated measures ANOVA. This analysis revealed the predicted two-way interaction between Gender and Body posture, $F(1, 38) = 51.73$, $p < .001$, $\eta_p^2 = .58$, see Figure 2.

Participants more quickly classified anger ($M = 677$, $SD = 112$) than sadness ($M = 706$, $SD = 123$) on male bodies, $F(1, 38) = 7.59$, $p = .009$, $\eta_p^2 = .17$. For female bodies the opposite was true, participants classified sadness ($M = 648$, $SD = 98$) more quickly than anger ($M = 713$, *SD* = 127), $F(1, 38) = 27.72$, $p < .001$, $\eta_p^2 = .42$. Additionally, classification of both body postures differed significantly across genders. Angry male bodies were classified more quickly than angry female bodies, $F(1, 38) = 12.81$, $p = .001$, $\eta_p^2 = .25$, whereas sad female bodies were classified more quickly than sad male bodies, $F(1, 38) = 37.16$, $p < .001$, $\eta_p^2 = .49$. No main effects of Gender ($F = 2.70$, $p = .108$) or Body posture ($F = 2.87$, $p = .098$) were found.

We also explored the proportion of errors in classifying the body postures. To test whether errors were in line with the stereotype effect found in participants' response latencies, we subjected the proportion correctly classified body postures to a 2 (Gender: male versus female) X 2 (Body posture: angry versus sad) repeated measures ANOVA. This analysis revealed a significant 2-way interaction in line with our stereotype effect, $F(1, 38) = 4.631$, $p = .038$, $\eta_p^2 = 109$. More mistakes were made for angry than sad females, $F(1, 38) = 5.669$, $p = .022$, $\eta_p^2 = 109$, whereas for males the reverse non-significant pattern was found ($p = .375$). Furthermore, more mistakes were made for sad male than sad female bodies, $F(1, 38) = 6.363$, $p = .016$ $\eta_p^2 = 143$, whereas for anger the reverse non-significant pattern was found ($p = .254$), see Table 1. No other effects were found.

STUDY 2

Study 1 provides first evidence for the idea that stereotype effects in emotion recognition on faces generalize to the recognition of emotional body postures when the task context does not involve valence differences. Participants more quickly classified angry male bodies than sad male bodies, whereas sad female bodies were classified more quickly than angry female bodies. Furthermore, this pattern of results was reflected also to some extent in the proportion of emotion classification errors. The goal of follow-up Study 2 was twofold, namely we aimed to (1) replicate the stereotype effect observed in Study 1 and (2) extend these findings by additionally investigating whether gender cues affect the classification of emotional body postures via heightened accessibility of evaluative associations (prejudice). That is, Study 2 was designed to dissociate cognitive (stereotype) from evaluative (prejudice) associations in perceiving emotional body postures. Analogous to Bijlstra and colleagues (2010) we reasoned that in a comparative context where valence of the emotional expressions is made salient, evaluative associations about the relevant categories (men and women) should facilitate the classification of evaluative-congruent body postures such that a positive body posture is classified more quickly than a negative one when expressed by a woman. For male targets this positivity effect was expected to be attenuated.

In order to dissociate top-down effects of stereotypes and prejudice in emotion recognition, we designed three between-subjects versions of the speeded classification task of Study 1, each reflecting one of three conditions: a stereotype context condition and two evaluative context conditions. The stereotype context condition was identical to the task used in Study 1 and consisted of male and female models displaying anger and sadness. We expected to replicate the findings of Study 1, namely that stereotype-congruent expressions are more quickly classified than stereotype-incongruent expressions.

In the two evaluative context conditions participants were asked to classify as quickly as possible a body postures as positive (happiness) or negative (anger in one condition and sadness in the other condition). We predicted, in line with Hugenberg and Sczesny (2006), that in both evaluative context conditions the positive body posture would be classified faster than the negative body posture. Consistent with studies showing that women are evaluated more positively than men (Eagly & Mladinic, 1989), we expected this main effect to be qualified by an interaction between gender and valence of the body posture, such that the difference between classification of positive and negative postures is larger for female bodies than for male bodies. Furthermore, the two evaluative context conditions were designed to dissociate the influence of stereotypes and prejudice in an experimental context that made valence salient. That is, when evaluations affect emotion recognition, both negative postures should be classified more quickly from male than female bodies. When stereotypes affect emotion recognition, which we did not expect, especially anger postures (compared to sadness postures) should be classified more quickly from male than female bodies resulting in a three-way interaction between gender, expression valence, and comparative context.

Method

Participants & Design

Sixty-One Radboud University students (46 women, $Median_{\text{age}} = 22$, range 18 - 36) either completed a stereotype (sad versus angry) or evaluative (happy versus sad *or* happy versus angry) speeded emotion classification task. Using the same assumptions as in Study 1 we had a power of greater than 80% to detect the predicted interaction effects in both the stereotype and evaluative context condition. Participants within the *evaluative context* conditions were asked to classify either anger and happiness or sadness and happiness postures displayed by male and female bodies. The *stereotype context* condition was identical to Study 1. Participants were randomly assigned to one of these three between-subject conditions.

Materials and Procedure

Twelve models, six men and six women, were selected from the Bochum Emotional Stimulus Set (BESST; Thoma et al., 2013). The emotional body postures in this stimulus set are not standardized, i.e. no specific instructions were provided to models on how to display each emotion, and thus these vary highly between models. In Study 2 we tried to minimize differences in the way each body posture was displayed and selected models that approximately used similar configurations to express each specific emotion (see Figure 3 for example stimuli and Appendix 1 for an overview of models that were selected). We selected pictures from these models on which anger, sadness or happiness was displayed. In total this resulted in set of 36 pictures: 3 body postures x 2 target gender x 6 targets per gender group. Per between-subject condition, participants were asked to classify as quickly as possible one out of two emotional body postures. The experimental procedure used in Study 2 was otherwise identical to the procedure used in Study 1.

Results

As in Study 1, the primary dependent variable in this study was the average response time needed to classify emotional body postures. In line with Study 1, we excluded incorrect trials (13%) and response latencies below 300 milliseconds or above 3000 milliseconds (1%) from analysis. Latencies are reported in milliseconds, whereas analyses were done on log-transformed mean response latencies. Results are presented for each comparative context separately. First the results for the stereotype context condition (that is similar to Study 1) are presented. Subsequently, results for the two evaluative context conditions are presented.

Stereotype context. Replicating Study 1, we predicted a Gender X Body posture interaction in our anger versus sadness context condition. Mean log-transformed latencies were subjected to a 2 (Gender: male versus female) X 2 (Body posture: angry versus sad) repeated measures ANOVA. First, a main effect of Body posture was found, $F(1, 19) = 4.88$, $p = .040$, $\eta_p^2 = .20$. Sad body postures ($M = 627$, $SD = 114$) were more quickly classified than angry body postures ($M = 647$, $SD = 93$). Second, no main effect of Gender was found, $F(1, 19) = 4.14$, $p =$

.056. Third, and in line with Study 1, this analysis revealed the predicted two-way interaction between Gender and Body posture, $F(1, 19) = 19.36$, $p < .001$, $\eta_p^2 = .51$ (Figure 4). Participants more quickly classified sadness than anger postures on female bodies (Table 2), $F(1, 19) = 22.35$, $p < .001$, $\eta_p^2 = .54$. No difference was found for male bodies ($F < 1$, ns). Additionally, sad postures by females were classified more quickly than sad postures by males $F(1, 19) = 17.07$, $p = .002$, $\eta_p^2 = .47$. For anger, we found no significant differences in classification speed across target genders ($F = 2.57$, $p = .126$).

Evaluative context. To test for an evaluative effect in emotion recognition, we analyzed both between-subject evaluative context conditions together (see also Hugenberg & Sczesny, 2006). The mean log-transformed response latencies were subjected to a 2 (Gender: male versus female) x 2 (Valence: positive vs. negative) x 2 (Context: 'happy versus angry' vs. 'happy versus sad') mixed design with repeated measures on the first two variables and comparative context as between participants variable.

This analysis yielded a main effect of Valence, $F(1, 39) = 41.02$, $p < .001$, $\eta_p^2 = .51$. In line with literature showing that positive expressions are classified faster than negative expressions (e.g., Hugenberg & Sczesny, 2006), we found that positive body postures ($M = 514$, $SD = 99$) were classified faster than negative body postures ($M = 545$, $SD = 106$). Furthermore, a main effect of Gender was observed, $F(1, 39) = 10.40$, $p = .003$, $\eta_p^2 = .21$. Expressions were more quickly classified on female ($M = 522$, $SD = 105$) than male ($M = 537$, $SD = 110$) bodies. Overall, a main effect of Context was observed such that participants were faster in classifying emotional body postures in the sad versus happy than angry versus happy context condition, $F(1, 39) = 18.787$, $p < .001$, $\eta_p^2 = .33$.

More importantly, we observed the predicted two-way interaction between Gender and Valence, $F(1, 39) = 16.90$, $p < .001$, $\eta_p^2 = .30$ (Figure 5). Positive emotional expressions were classified more quickly than negative emotional expressions for female bodies (Table 2), $F(1, 39) = 57.32$, $p < .001$, $\eta_p^2 = .60$, but not for male bodies, $F(1, 39) = 2.54$, $p = .119$. Also, for the response latencies towards the positive body postures, a difference for target gender was found, $F(1, 39) = 22.06$, $p < .001$, $\eta_p^2 = .36$, with faster responses for female than for male bodies. For the negative body postures no such difference was found, $F(1, 39) = 1.43$, $p = .238$. Importantly, this two-way interaction was not qualified by the three-way interaction with Context as between participants variable (F<1, ns) which indicates that, in line with earlier findings by Hugenberg and Sczesny (2006), we found no evidence that the response patterns in both evaluative context conditions differed significantly from each other.

Accuracy. Similar to Study 1, we explored whether the number of errors was in line with the observed response latency effects. In order to do so we analyzed the proportion correctly classified expressions. First, we subjected the proportions of the stereotype context to a 2 (Gender: male versus female) X 2 (Body posture: angry versus sad) repeated measures ANOVA. This analysis resulted in a significant 2-way interaction in line with our stereotype effect, $F(1, 19) = 54.424$, $p < .001$, $\eta_p^2 = .741$, such that the proportion correct answers was lower for angry than sad female bodies, $F(1, 19) = 9.226$, $p = .007$, $\eta_p^2 = .327$, and for sad than angry male bodies (Table 3), $F(1, 19) = 8.842$, $p = .008$, $\eta_p^2 = .318$. Moreover, a main effect of Gender was found, $F(1, 19) = 4.976$, $p = .038$, $\eta_p^2 = .208$. Participants more accurately classified postures on female bodies ($M = .87$, $SD = .09$) than on male bodies ($M = .83$, $SD = .11$).

Next, we subjected the proportion correctly classified expressions of the evaluative context to a 2 (Gender: male versus female) x 2 (Valence: positive vs. negative) x 2 (Context:

'happy versus angry' vs. 'happy versus sad') mixed design with repeated measures on the first two variables and comparative context as between participants variable. First, a main effect for Gender was found, $F(1, 39) = 8.019$, $p = .007$, $\eta_p^2 = .171$. Again, participants more accurately classified postures on female bodies (*M* = .90, *SD* = .08) than on male bodies (*M* = .86, *SD* = .12). Furthermore, a main effect was found for Context, $F(1, 39) = 5.946$, $p = .019$, $\eta_p^2 = .13$, such that participants were more accurate in a sad-happy context (*M* = .91, *SD* = .08) than in an angry-happy context (*M* = .84, *SD* = .10).

In contrast to the response latency findings, we found a significant 3-way interaction between Gender, Valence, and Context, $F(1, 39) = 12{,}802$, $p < .001$, $\eta_p^2 = .25$. A significant 2-way interaction was found within the angry-happy context condition, $F(1, 39) = 22.774$, $p < .001$, $\eta_p^2 = .369$. Happiness was classified more accurately than anger on female bodies, $F(1, 39) = 6.778$, $p = .013$, $\eta_p^2 = .148$, whereas for male bodies anger postures were more accurately classified than happiness postures, $F(1, 39) = 11.824$, $p = .001$, $\eta_p^2 = .23$. Furthermore, more mistakes were made for happy postures on male than female bodies, $F(1, 39) = 22.155$, $p < .001$, $\eta_p^2 = .362$, whereas for anger the reverse non-significant pattern was found ($p = .143$), see Table 3. No 2-way interaction was found within the sad-happy context condition ($F < 1$, *p* ns).

STUDY 3

The results of Study 2 largely replicate the stereotype findings of Study 1 and provide first evidence for the idea that evaluative associations may also affect emotion recognition of emotional body postures within a task that made valence differences salient. Although the data did not provide evidence for a full crossover pattern as was found in Study 1, we did replicate the two-way interaction within our angry-sad comparative context conditions. Furthermore, the observed effects of evaluative context extend prior findings from studies focusing on recognition of facial expressions (e.g., Hugenberg & Sczesny, 2006) to emotional body postures. Specifically, a happy body advantage was observed for female, but not for male bodies.

The goal of Study 3 was to solidify our findings through replication using a standardized set of stimuli. Since the emotional body postures in the BESST database (Thoma et al., 2013) are not standardized or tightly controlled, physical differences across context conditions could also have affected participants' classification speed. That is, specific configurations of male and female bodies may potentially overlap with specific emotional expressions in this specific set of stimuli. For example, one may speculate that the level of bodily masculinity is related to the expression of anger. Another possibility is that the emotional body postures used may have been slightly different between gender conditions, e.g., sadness was expressed by women slightly different or 'more natural' than it was expressed by males. Consequently, such stimulus differences could present a potential confound, explaining the differences in classification speed on the basis of bottom-up instead of top-down factors. For Study 3, we developed perfectly controlled computer-generated emotional body postures, which we used to replicate Study 2.

Method

Our sample size, hypotheses, and statistical analyses were preregistered at the Open Science Framework (OSF): https://osf.io/m5s63/.

Participants & Design

Sixty-Two Radboud University students either completed a stereotype (sad versus angry) or evaluative (happy versus sad *or* happy versus angry) speeded emotion classification task. Following our preregistered protocol, we excluded the last 2 students that we tested beyond our preregistered sample size, which led to a final sample of 60 students (46 female, $Median_{age} = 22$, range 17 - 48). Participants were randomly assigned to one of three between-subject conditions.

Materials and Procedure

For this study, we developed computer-generated emotional body postures. First, an avatar was created with a workflow using Morph Characters System (Morph3D), Unity 5.6, Autodesk Motionbuilder 2017, Autodesk 3ds Max 2017, and Adobe Photoshop CS6. Second, for each emotional body posture we selected two versions from the BESST database, on the basis of classification data from a validation study as reported by Thoma and colleagues (2013). The selection criterion used in this study was that each emotional body posture was accurately classified by at least 95% of participants. Third, based on these images we developed 6 computer-generated emotional body postures: 2 angry, 2 happy, and 2 sad postures. Finally, we created 4 male and 4 female models from the original avatar to make the final stimulus set (see Figure 6 for example stimuli). Clothing of models was matched on colors between gender conditions. Following this procedure, we ended up with emotional body postures that were identical between models.

In total this resulted in a set of 48 pictures: 6 emotional body postures x 2 target gender x 4 targets per gender group. Similar to Studies 1 and 2, participants were asked to select as quickly as possible one out of two emotional body postures based on the context condition they were assigned to. As our stimulus set was larger in Study 3 than in the previous studies, the experimental task of the current study contained more trials. Each experimental block consisted of 32 pictures, which were presented in random order without replacement. As in Studies 1 and 2, this procedure was repeated, resulting in a total of 64 trials per experimental block with each picture being presented twice. The experimental procedure used in Study 3 was otherwise identical to the procedure used in Study 2.

Results

As in the previous studies, the primary dependent variable was the average response time needed to classify emotional body postures. Again, we excluded incorrect trials (10%) and response latencies below 300 milliseconds or above 3000 milliseconds (4%) from analysis. Analyses were identical to Studies 1 and 2. As in Study 2, we present the results for each comparative context separately, starting with the stereotype context condition.

Stereotype context. Replicating Studies 1 and 2, we predicted a Gender X Body posture interaction in our anger versus sadness context condition. Mean log-transformed latencies were subjected to a 2 (Gender: male versus female) X 2 (Body posture: angry versus sad) repeated measures ANOVA. This analysis revealed the predicted two-way interaction between Gender and Body posture, $F(1, 29) = 5.96$, $p = .021$, $\eta_p^2 = .17$ (Figure 7). Participants more quickly classified sadness than anger postures on female bodies (Table 4), $F(1, 29) = 22.35$, $p < .047$, $\eta_p^2 = .130$. No difference was found for male bodies ($F = 2.32$, $p = .139$). In contrast to Study 2, we did not find evidence that sad postures by females were classified more quickly than sad postures by males, $F(1, 29) = 3.02$, $p = .093$, $\eta_p^2 = .09$. Also, for anger, we found no significant differences in classification speed across target genders ($F = 2.39$, $p = .133$). No main effects of Gender or Body Posture were found ($F<1$, ns.).

Evaluative context. As in Study 2, we predicted a Gender X Valence interaction in the absence of a three-way interaction with Context. The mean log-transformed response latencies were subjected to a 2 (Gender: male versus female) x 2 (Valence: positive vs. negative) x 2 (Context: ‘happy versus angry’ vs. ‘happy versus sad’) mixed design with repeated measures on the first two variables and comparative context as between participants variable.

Consistent with Study 2 and existing happy face advantage literature, this analysis yielded a main effect of Valence, $F(1, 28) = 9.95$, $p = .004$, $\eta_p^2 = .26$. Positive body postures (*M*

= 486, *SD* = 132) were classified faster than negative body postures (*M* = 504, *SD* = 134). Furthermore, a main effect of Gender was observed, $F(1, 28) = 5.69$, $p = .024$, $\eta_p^2 = .17$. In contrast with Study 2, expressions were more quickly classified on male (*M* = 488, *SD* = 131) than female (*M* = 503, *SD* = 137) bodies. No main effect of Context was observed ($F = 1.73$, $p = .20$).

The predicted two-way interaction between Gender and Valence was not significant[2], $F(1, 28) = 3.64$, $p = .067$, $\eta_p^2 = .12$ (Figure 8). However, positive emotional expressions were classified more quickly than negative emotional expressions for female bodies (Table 4), $F(1, 28) = 12.95$, $p < .001$, $\eta_p^2 = .60$, but not for male bodies ($F<1$, ns). For the response latencies towards the positive body postures, no difference for target gender was found ($F<1$, ns), whereas for the negative body postures a difference for target gender was found, $F(1, 28) = 10.69$, $p = .003$, $\eta_p^2 = .60$. Importantly, no three-way interaction with Context as between participants variable ($F = 1.64$, $p = .21$) was found.

Accuracy. Similar to Studies 1 and 2, we explored whether the number of errors was in line with the observed response latency effects. First, we subjected the error proportions of the stereotype context to a 2 (Gender: male versus female) X 2 (Body posture: angry versus sad) repeated measures ANOVA. We observed a significant 2-way interaction in line with the stereotype effect, $F(1, 29) = 23.01$, $p < .001$, $\eta_p^2 = .44$. The proportion correct answers was lower for angry than sad female bodies (Table 5), $F(1, 29) = 24.47$, $p < .001$, $\eta_p^2 = .46$. The difference between the proportion correctly classified sad and angry male bodies did not differ, $F(1, 29) = 4.03$, $p = .054$, $\eta_p^2 = .122$. Moreover, angry postures were more often classified correctly on male than female bodies, $F(1, 29) = 23.58$, $p < .001$, $\eta_p^2 = .45$, whereas sad postures were more often classified correctly on female than male bodies, $F(1, 29) = 6.92$, $p = .014$, $\eta_p^2 = .19$. Finally, no main effects of Gender, $F(1, 29) = 3.21$, $p = .083$, $\eta_p^2 = .10$, and Body posture, $F(1, 29) = 3.38$, $p = .076$, $\eta_p^2 = .10$, were found.

Next, we subjected the proportion correctly classified expressions of the evaluative context to a 2 (Gender: male versus female) x 2 (Valence: positive vs. negative) x 2 (Context: ‘happy versus angry’ vs. ‘happy versus sad’) mixed design with repeated measures on the first two variables and comparative context as between participants variable. In contrast to Study 2, we found no 3-way interaction between Gender, Valence, and Context, $F(1, 28) = 3.44$, $p = .074$, $\eta_p^2 = .11$. No main or 2-way interactions were found ($F < 1.49$, ns).

In sum, the observed effects of Study 3 were smaller in magnitude than those of Studies 1 and/or 2. Within a purely negative, angry-sad classification task, we again found evidence for a stereotype emotion recognition effect for both response latencies and accuracy. However, contrary to predictions, we found no interaction effect between Gender and Valence when the classification task did emphasize valence differences. Nevertheless, the observed data pattern was in line with Study 2. Potentially, the sample size calculation of Study 3, which was based on previous studies that employed stimuli of ‘actual’ bodies, was not accurate for a classification task that employs these computer-generated stimuli. Other, theoretical, explanations for the non-significant finding are discussed below.

General Discussion

The goal of the current research was to examine whether the recognition of emotional body postures is modulated by top-down knowledge about the expresser’s category. Across three studies, we observed that stereotypes about men and women affected the speed (and accuracy) with which participants recognized angry and sad body postures. In line with common gender stereotypes (e.g., Plant, et al., 2000), we observed the hypothesized interaction between gender and body postures in Studies 1-3. Moreover, in Study 2, and to a large extent in Study 3, we demonstrated that participants' evaluative-knowledge of men and women affected their recognition of positive and negative body postures under conditions where valence was made salient. In line with Hugenberg & Sczesny (2006) we observed an interaction between target gender and valence of body postures. As predicted this effect was independent of the specific negative emotion that was used in comparison with happiness. Therefore, we think that these latter results can be better explained with evaluative- than stereotype-knowledge. The observed valence-effect in Study 2 and pattern of results in Study 3 are in line with prior research, which showed that although both gender categories are evaluated positively, females are evaluated relatively more positive than men (Eagly & Mladinic, 1989).

Based on Study 3, we can conclude that indeed top-down associations affect the recognition of emotional body postures. As we employed computer-generated stimuli in our final study, we were able to keep expresser's emotional body postures constant while manipulating their gender. This way we eliminated the possibility that our findings were driven by bottom-up factors, such as gender differences in displaying emotional body postures. However, the observed effects are smaller in magnitude and did not reach conventional levels of significance within the evaluative context condition. This suggests that (a) bottom-up features, at least to some extent, may have influenced our findings in Studies 1 and 2 and/or (b) the computer-generated stimuli may activate gender categorization to a lesser extent than the non-computer-generated stimuli (e.g. due to the fact that some female models do not have long hair which has been shown a critical feature in gender categorization; see Macrae & Martin, 2007).

Stereotypes seem to affect the recognition of emotional body postures in all three studies. Although in Studies 2 and 3 we did find the predicted stereotype effect, we did not replicate the full crossover interaction pattern found for Study 1. At first sight, this seems surprising because previous research demonstrated the strong link between men and anger (e.g., Becker et al., 2007; Plant et al., 2000). There are at least two explanations for the observed difference in results. First, recently Bijlstra and colleagues (2014) have shown that the strength of participants' stereotype associations between specific emotional expressions and social categories underlie stereotypic emotion recognition. Possibly, the male-anger association for our participants in Studies 2 and 3 was weaker than these same associations of participants in Study 1. Future research could test whether participants' stereotype associations can predict the magnitude of the effects presented here. Second, prior research has shown that bottom-up features that are more typical for male than female faces, such as lowered eyebrows, also affect the classification speed of anger (Becker et al., 2007). Whether such bottom-up feature overlap present for angry male body postures is unclear, and therefore a smaller effect may be predicted. This may be an interesting avenue for future studies. Most importantly, the predicted interaction between gender and emotional body posture, demonstrating that responses to emotions differed as a function of target gender in a stereotype-congruent way, did reveal a significant effect. Thereby, we demonstrated additional evidence for a stereotype effect in emotion recognition, and provided novel evidence that this effect can be generalized from facial to bodily emotion recognition.

Furthermore, the emotion recognition data of our evaluative context conditions (Studies 2 and 3) converge with prior emotion recognition studies, which demonstrated that positive facial expressions are faster and more accurately recognized as positive than negative facial expressions as negative (e.g., Leppänen & Hietanen, 2004). In particular, earlier studies demonstrated that happy facial expressions were recognized as such more quickly than, for example, angry (Leppänen & Hietanen, 2003), sad (e.g., Crews & Harrison, 1994; Kirita &

Endo, 1995), and disgusted (Leppänen & Hietanen, 2003) facial expressions. This effect has been labeled the happy face advantage. Regardless of the exact underlying mechanism of this effect (i.e. low-level feature differences between positive and negative expressions or a general positivity offset) the results of the present research show that besides happy facial expressions people also tend to recognize happy body postures more quickly as such than their negative counterparts. This suggests that the effect is more accurately labeled as happy *expression* advantage than a happy *face* advantage because the effect seems not restricted to facial expressions. Future research may systematically examine whether such an effect is present independent of the communication channel selected.

In Study 2, we observed a main effect of comparative context, which showed that participants needed more time to categorize angry versus happy than sad versus happy body postures. Although we did not predict this main effect, on a speculative note this could be explained by the fact that discrete emotions elicit specific behavioral tendencies (e.g., Cottrell & Neuberg, 2005). That is, both anger and happiness are approach oriented, whereas the expression of sadness is avoidance oriented (Adams Jr. & Kleck, 2003). This similarity in behavioral tendency for one of these conditions may have made it more difficult for participants to differentiate between the two bodily emotional expressions. The accuracy with which emotional body postures were recognized in Study 2 was in line with this suggestion. Participants in the sad-happy context condition made fewer errors than participants in the angry-happy context condition. Although the analyses on the proportion of errors were explorative in nature, and we had no a-priori predictions for this dependent variable, this finding is consistent with the observed main effect in recognition speed. Furthermore, we did not observe those effects in Study 3.

The results of our studies aim to contribute to the field of social categorization and emotion research. Although a large body of research has demonstrated the link between emotional expression recognition and social categories (e.g., Fischer, Eagly, & Oosterwijk, 2013; Hess, Adams Jr., Grammer, & Kleck, 2009; Hugenberg, 2005), as yet, only a limit number of studies investigated whether this effect generalizes to other ways of communicating emotional information than via facial expressions only. With the present studies, we provide first evidence that this generalization is indeed possible. More generally, the current results show that top-down knowledge about the expresser of an emotion affects the speed with which emotional body postures were classified. Thereby, we demonstrate yet another way in which stereotypes and prejudice influence our perception of what others feel and intent to do, in a confirming way. Recognition of emotional expressions is important in daily life because it provides observers with information about someone's behavioral intentions, which serves as input for how to behave appropriately. When these perceptions are biased by top-down processes, our social category associations may be self-perpetuating by influencing perception and behavior in a stereotype or prejudice confirming way.

The current research offers important insights for emotion research. Although some early studies on emotion perception did stress the importance of 'whole-body' perception (e.g., Ekman, 1965), as yet, the emotion perception literature has largely been dominated by studies employing (isolated) facial expressions. The present results apply to recognition of isolated emotional bodily stimuli. We believe that our studies, together with the findings outlined in the introduction of this paper, provide input for future investigations that could lead to a broader picture of emotion communication in daily life. That is, future research may focus on top-down processes in 'whole-body' perception including body postures and facial expressions. Recently, some studies investigated expression recognition based on a combination of facial expressions and body postures (e.g., Aviezer et al., 2008; Kret et al., 2013). Hassin, Aviezer, and Bentin (2013), for example, argued that bodily expressions may be used by perceivers as contextual information in perceiving facial expressions. Aviezer and colleagues (2008) demonstrated the *confusability effect*, showing that the more similar facial expressions are (such as with disgust and anger), the stronger the influence of bodily context. Their studies provide clear evidence that body posture affect the perception of facial expression, especially when bottom-up facial features between expressions overlap. However, as yet, no research investigated top-down effects in perceiving emotional consistent and inconsistent face-body composites. For example, could top-down knowledge about the expresser of an emotion affect recognition of (in)consistent face-body composites? Future studies may focus on this.

In sum, although there is quite some evidence for top-down effects in recognizing facial expressions, we provide novel evidence that participants' stereotypes and prejudice about men and women also affect the recognition speed of emotional body postures. Biased perception of body postures may therefore be yet another way in which stereotypes and prejudice are confirmed in daily life.

References

Adams Jr, R. B., & Kleck, R. E. (2003). Perceived gaze direction and the processing of facial displays of emotion. *Psychological Science*, *14*(6), 644-647.

Allport, G. (1954). *The nature of prejudice.* Reading, MA: Addison-Wesley.

Amodio, D. M., & Devine, P. G. (2006). Stereotyping and evaluation in implicit race bias: Evidence for independent constructs and unique effects on behavior. *Journal of Personality and Social Psychology, 91*, 652-661.

Aviezer, H., Hassin, R. R., Ryan, J., Grady, C., Susskind, J. M., Anderson, A., Moscovitch, M., & Bentin, S. (2008). Angry, disgusted, or afraid? Studies on the malleability of emotion perception. *Psychological Science,* 19, 724–732.

Aviezer, H., Trope, Y., & Todorov, A. (2012). Body cues, not facial expressions, discriminate between intense positive and negative emotions. *Science,* 338, 1225–1229.

Becker, D. V., Kenrick, D. T., Neuberg, S. L., Blackwell, K. C., & Smith, D. M. (2007). The confounded nature of angry men and happy women. *Journal of Personality and Social Psychology, 92*, 179-190.

Bijlstra, G., Holland, R.W., & Wigboldus, D. H. J. (2010). The social face of emotion recognition: Evaluations versus stereotypes. *Journal of Experimental Social Psychology*, *46*, 657-663.

Bijlstra, G., Holland, R.W., Dotsch, R., Hugenberg, K., & Wigboldus, D. H. J. (2014). Stereotype associations and emotion recognition. *Personality and Social Psychology Bulletin, 40*, 567-577.

Cottrell, C. A., & Neuberg, S. L. (2005). Different emotional reactions to different groups: a sociofunctional threat-based approach to "prejudice". *Journal of Personality and Social Psychology*, *88*(5), 770-789.

Crews Jr., W. D., & Harrison, D. W. (1994). Cerebral asymmetry in facial affect perception by women: Neuropsychological effects of depressed mood. *Perceptual and Motor Skills*, *79*, 1667-1679.

Dael, N., Mortillaro, M., & Scherer, K. R. (2012). Emotion expression in body action and posture. *Emotion, 12*, 1085–1101.

De Gelder, B. (2006). Towards the neurobiology of emotional body language. *Nature Reviews Neuroscience*, *7*, 242-249.

De Gelder, B. (2009). Why bodies? Twelve reasons for including bodily expressions in affective neuroscience. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *364*, 3475-3484.

Devine, P. G. (1989). Stereotypes and prejudice: Their automatic and controlled components. *Journal of Personality and Social Psychology, 56,* 5-18.

Dovidio, J. F., Kawakami, K., Johnson, C., Johnson, B., & Howard, A. (1997). On the nature of prejudice: Automatic and controlled processes. *Journal of Experimental Social Psychology*, *33*, 510-540.

Eagly, A. H., & Mladinic, A. (1989). Gender stereotypes and attitudes toward women and men. *Personality and Social Psychology Bulletin, 15*, 543-558.

Eagly, A. H., Mladinic, A., & Otto, S. (1991). Are women evaluated more favorably than men?: An analysis of attitudes, beliefs, and emotions. *Psychology of Women Quarterly, 15*, 203-216.

Ekman, P. (1965). Differential communication of affect by head and body cues. *Journal of Personality and Social Psychology,* 2, 726-735.

Ekman, P. (1993). Facial expressions and emotion. *American Psychologist, 48*, 376-379.

Ekman, P., Friesen, W. V., & Tomkins, S. S. (1971). Facial Affect Scoring Technique: A First Validity Study. *Semiotica, 3*, 37-58.

Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G*Power 3: a flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, *39*(2), 175–91.

Fazio, R. H., Jackson, J. R., Dunton, B. C., & Williams, C. J. (1995). Variability in automatic activation as an unobtrusive measure of racial attitudes: A bona fide pipeline? *Journal of Personality and Social Psychology*, *69*(6), 1013-1027.

Fischer, A. H., Eagly, A. H., & Oosterwijk, S. (2013). The meaning of tears: Which sex seems emotional depends on the social context. *European Journal of Social Psychology*, *43*, 505-515.

Freeman, J. B., & Ambady, N. (2011). A dynamic interactive theory of person construal. *Psychological Review*, *118*, 247-279.

Hassin, R. R., Aviezer, H., & Bentin, S. (2013). Inherently ambiguous: Facial expressions of emotions, in context. *Emotion Review*, *5*, 60-65.

Hess, U., Blairy, S., & Kleck, R. E. (1997). The intensity of emotional facial expressions and decoding accuracy. *Journal of Nonverbal Behavior, 21*, 241-257.

Hess, U., Adams, R. B., Jr., Grammer, K., & Kleck, R. E. (2009). Face gender and emotional expressions: Are angry women more like men? *Journal of Vision, 9*, 1-8.

Hugenberg, K. (2005). Social Categorization and the perception of facial threat: Target race moderates the response latency advantage for happy faces. *Emotion, 5*, 267-276.

Hugenberg, K., & Bodenhausen, G. V. (2003). Facing prejudice: Implicit prejudice and the perception of facial threat. *Psychological Science, 14*, 640-643.

Hugenberg, K., & Sczesny, S. (2006). On wonderful women and seeing smiles: Social categorization moderates the happy face response latency advantage. *Social Cognition, 24*, 516-539.

Hutchings, P. B., & Haddock, G. (2008). Look Black in anger: The role of implicit prejudice in the categorization and perceived emotional intensity of racially ambiguous faces. *Journal of Experimental Social Psychology, 44*, 1418-1420.

Jack, R. E. (2013). Culture and facial expressions of emotion. *Visual Cognition, 21*, 1248-1286.

Johnson, K. L., McKay, L. S., & Pollick, F. E. (2011). He throws like a girl (but only when he's sad): Emotion affects sex-decoding of biological motion displays. *Cognition*, *119*, 265-280.

Kang, S. K., & Chasteen, A. L. (2009). Beyond the double jeopardy hypothesis: Assessing emotion on the faces of multiple-categorizable targets of prejudice. *Journal of Experimental Social Psychology*, *45*, 1281-1285.

Kirita, T., & Endo, M. (1995). Happy face advantage in recognizing facial expressions. *Acta Psychologica*, *89*, 149-163.

Kret, M. E., & de Gelder, B. (2010). Social context influences recognition of bodily expressions. *Experimental Brain Research*, *203*, 169-180.

Kret, M. E., Stekelenburg, J. J., Roelofs, K., & de Gelder, B. (2013). Perception of face and body expressions using electromyography, pupillometry and gaze Measures. *Frontiers in Psychology*, *4*, 28.

Leppänen, J. M., Tenhunen, M., & Hietanen, J. K. (2003). Faster choice-reaction times to positive than to negative facial expressions: The role of cognitive and motor processes. *Journal of Psychophysiology*, *17*, 113-123.

Lipp, O. V., Craig, B. M., & Dat, M. C. (2015). A happy face advantage with male caucasian faces it depends on the company you keep. *Social Psychological and Personality Science*, *6*, 109-115.

Macrae, C. N., Bodenhausen, G. V. (2000). Social cognition: Thinking categorically about others. *Annual Review of Psychology*, *51*(1), 93-120.

Macrae, C. N., & Martin, D. (2007). A boy primed Sue: feature-based processing and person construal. *European Journal of Social Psychology*, *37*(5), 793-805.

Marsh, A. A., Adams Jr, R. B., & Kleck, R. E. (2005). Why do fear and anger look the way they do? Form and social function in facial expressions. *Personality and Social Psychology Bulletin*, *31*(1), 73-86.

Martinez, L., Falvello, V. B., Aviezer, H., & Todorov, A. (2016). Contributions of facial expressions and body language to the rapid perception of dynamic emotions. *Cognition and Emotion*, *30*(5), 939-952.

Otten, M., & Banaji, M. R. (2012). Social categories shape the neural representation of emotion: evidence from a visual face adaptation task. *Frontiers in Integrative Neuroscience*, *6*, 9.

Plant, E. A., Hyde, J. S., Keltner, D., & Devine, P. G. (2000). The gender stereotyping of emotions. *Psychology of Women Quarterly, 24*, 81–92.

Sacco, D. F., & Hugenberg, K. (2009). The look of fear and anger: Facial maturity modulates recognition of fearful and angry expressions. *Emotion*, *9*, 39-49.

Thoma, P., Brauser D.S., & Suchan, B. (2013). BESST (Bochum Emotional Stimulus Set) – A pilot validation study of a stimulus set containing emotional bodies and faces from frontal and averted views. *Psychiatry Research, 209* (1), 98-109.

Van den Stock, J., Righart, R., & de Gelder, B. (2007). Body expressions influence recognition of emotions in the face and voice. *Emotion, 7*(3), 487–494.

Wittenbrink, B., Judd, C. M., & Park, B. (2001a). Spontaneous prejudice in context: Variability in automatically activated attitudes. *Journal of Personality Social Psychology, 81*(5), 815-827.

Wittenbrink, B., Judd, C. M., & Park, B. (2001b). Evaluative versus conceptual judgments in automatic stereotyping and prejudice. *Journal of Experimental Social Psychology*, *37*(3), 244-252.

Footnotes

1. The data of the current research was collected in 2013, which was before the authors of this manuscript started to pre-register their research questions, hypotheses, and analyses.
2. Data collection for this study took place in a chunk of two unrelated studies and participants always started with the current experiment. When including the additional two students, which were run to complete the participant sample for the second study of the chunk, the expected interaction between Gender and Valence was significant, $F(1, 30) = 4.21$, $p = .049$, $\eta_p^2 = .12$. Moreover, when subjecting the mean log-transformed response latencies of the Studies 2 and 3 evaluative context conditions together to a 2 (Gender: male versus female) X 2 (Valence: positive versus negative) x 2 (Negative expression: angry versus sad) x 2 (Study: Study 2 versus Study 3) repeated measures ANOVA, the expected interaction between Gender and Valence was found, $F(1, 67) = 17.12$, $p < .001$, $\eta_p^2 = .20$. This interaction effect was not qualified by the Study variable. Across the two studies, positive emotional expressions were classified more quickly than negative emotional expressions for female bodies, but not for male bodies.

Table 1. Proportion and standard deviation of correct responses as a function of Gender and Expression (Study 1).

	Angry	**Sad**
Female	.86 (.12)	.90 (.09)
Male	.88 (.08)	.86 (.13)

Table 2. Mean response latencies and standard deviation in milliseconds per comparative context condition (Study 2).

	Stereotype context (N=20)		**Evaluative context (N=20)**		**Evaluative context (N=21)**	
	Angry	**Sad**	**Angry**	**Happy**	**Sad**	**Happy**
Female	654 (100)	603 (114)	609 (120)	546 (102)	491 (54)	446 (51)
Male	641 (92)	652 (121)	604 (115)	590 (124)	480 (58)	482 (67)

Table 3. Proportion and standard deviation of correct responses as a function of Gender, Expression, and Context (Study 2).

	Stereotype context (N=20)		**Evaluative context (N=20)**		**Evaluative context (N=21)**	
	Angry	**Sad**	**Angry**	**Happy**	**Sad**	**Happy**
Female	.84 (.10)	.90 (.08)	.85 (.08)	.91 (.08)	.91 (.08)	.92 (.06)
Male	.86 (.11)	.79 (.10)	.88 (.10)	.78 (.15)	.89 (.11)	.91 (.08)

Table 4. Mean response latencies and standard deviation in milliseconds per comparative context condition (Study 3).

	Stereotype context (N=30)		Evaluative context (N=13)		Evaluative context (N=17)	
	Angry	**Sad**	**Angry**	**Happy**	**Sad**	**Happy**
Female	527 (109)	520 (99)	555 (174)	520 (168)	492 (104)	461 (100)
Male	521 (117)	537 (127)	510 (129)	527 (167)	474 (131)	455 (91)

Table 5. Proportion and standard deviation of correct responses as a function of Gender, Expression, and Context (Study 3).

	Stereotype context (N=30)		Evaluative context (N=13)		Evaluative context (N=17)	
	Angry	**Sad**	**Angry**	**Happy**	**Sad**	**Happy**
Female	.84 (.11)	.91 (.09)	.88 (.09)	.92 (.08)	.92 (.06)	.91 (.08)
Male	.91 (.11)	.88 (.09)	.91 (.10)	.89 (.08)	.93 (.06)	.94 (.05)

Figure 1. Example stimuli of Study 1, representing a female and male model displaying sadness and anger.

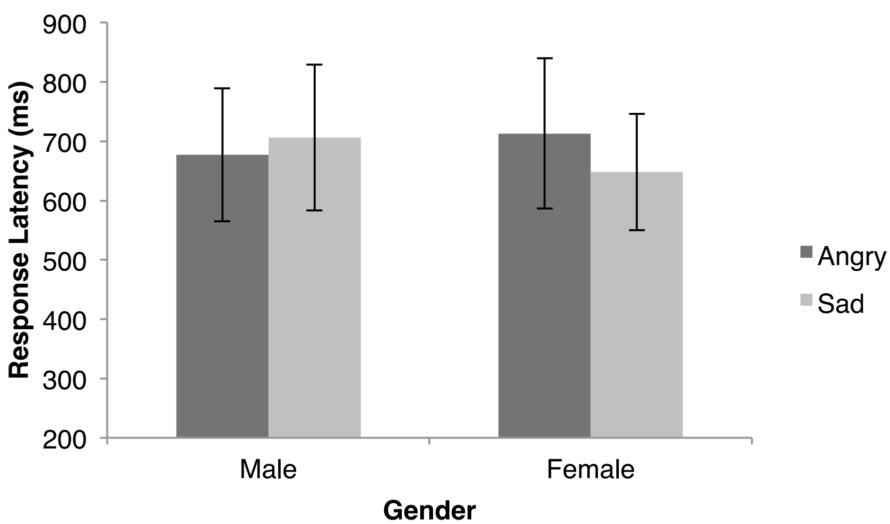

Figure 2. Mean response latencies and standard deviations in milliseconds as a function of Gender and Expression (Study 1).

Figure 3. Example stimuli of Study 2, representing female and male models displaying happiness, sadness, and anger.

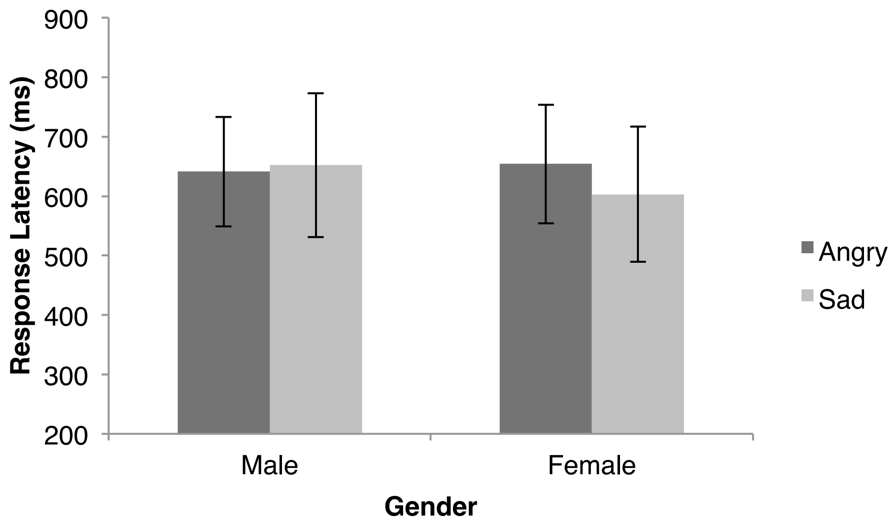

Figure 4. Mean response latencies and standard deviations in milliseconds as a function of Gender and Expression (Study 2).

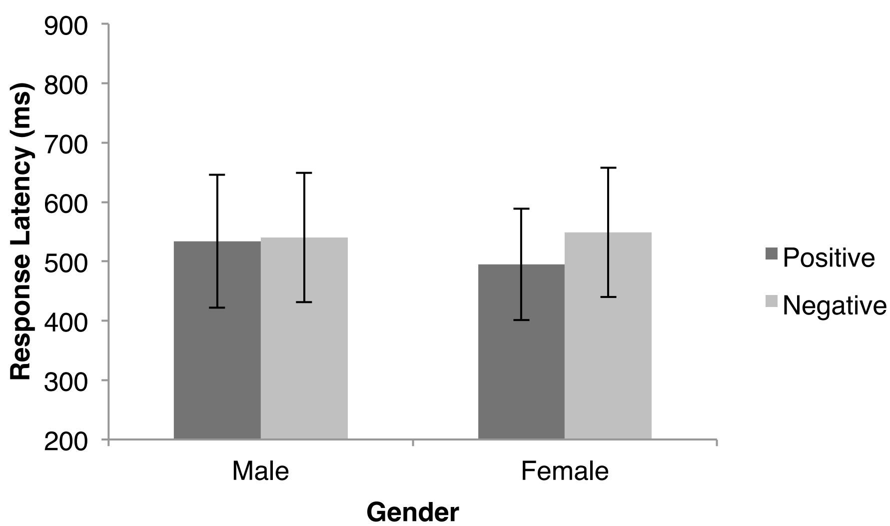

Figure 5. Mean response latencies and standard deviations in milliseconds as a function of Gender and Expression valence (Study 2).

Figure 6. Example stimuli of Study 3, representing all included models and emotional body postures; Anger (4 body postures on the left), happiness (models wearing a red shirt), and sadness (models wearing a blue shirt); upper row represents female models.

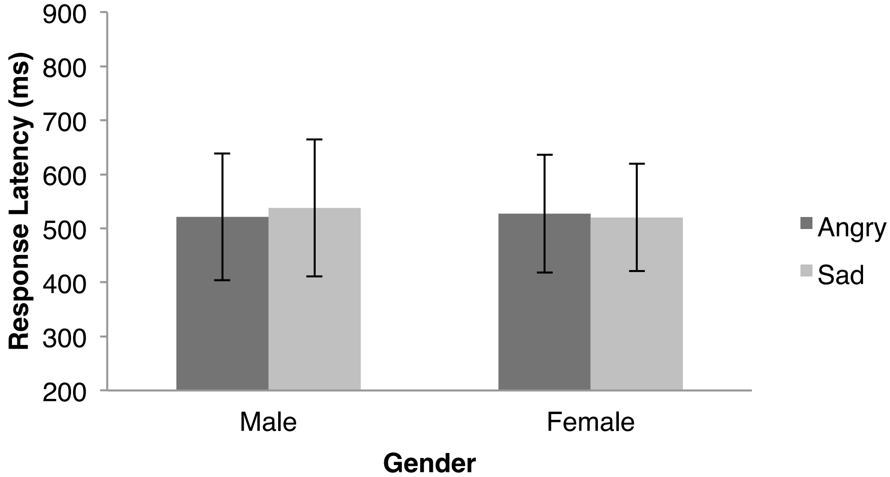

Figure 7. Mean response latencies and standard deviations in milliseconds as a function of Gender and Expression (Study 3).

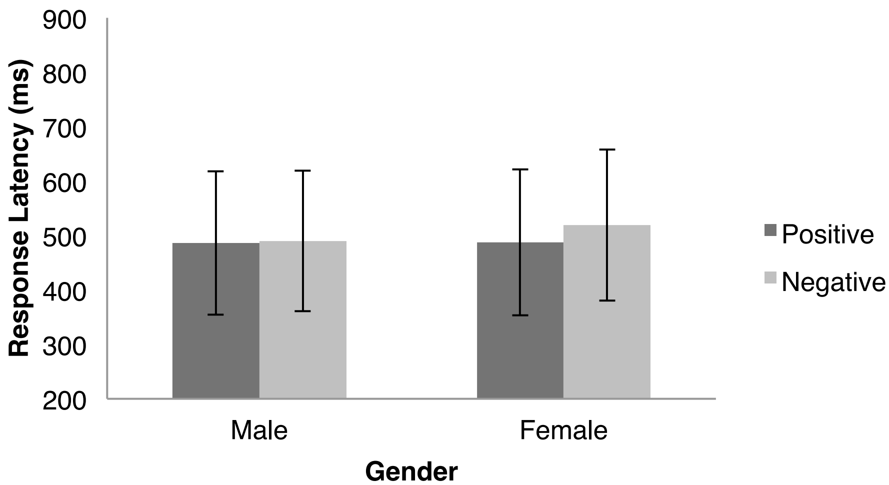

Figure 8. Mean response latencies and standard deviations in milliseconds as a function of Gender and Expression valence (Study 3).

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