SEX DIFFERENCES IN THE ENCODING AND DECODING OF NEGATIVE FACIAL EMOTIONS

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ABSTRACT: To study the effects of gender on ability to recognize facial expressions of emotion, two separate samples of male and female undergraduates (727 in Study 1, 399 in Study 2) judged 120 color photographs of people posing one of four negative emotions: anger, disgust, fear, and sadness. Overall, females exceeded males in their ability to recognize emotions whether expressed by males or by females. As an exception, males were superior to females in recognizing male anger. The findings are discussed in terms of social sex-roles.

Facial expressions are one of the more obvious and important guides to others' emotional states. While some programs of research have focused on the universality of both expression and its interpretation (see, e.g., Ekman & Friesen, 1975), other research (Hall, 1978; Kirouac & Dore, 1985; Stanners, Byrd, & Gabriel, 1985) documents the superior ability of women to identify facial emotions. In Hall's (1984) comprehensive review, for example, she notes that females exceed males at all ages in their recognition of emotions. Moreover, women are also better senders of emotion than men (Buck, Miller, & Caul, 1974; Buck, 1979; Hall, 1984; Kirouac & Dore, 1985).

Although some studies include subject gender and specific emotions in their design (e.g., Fugita, Harper, & Wiens, 1980; Riggio, Widaman, & Friedman, 1985), they have not directly examined gender differences in ability to transmit particular emotions nor do they report the pertinent comparisons. For example, Fugita, Harper, and Wiens (1980) elicited facial expressions of happy, sad, interest, and injury but present accuracy scores for males and females averaged across all four emotions. Riggio,

Widaman, and Friedman (1985) reported positive relationships between gender and factor scores for positive and negative emotions. While these results indicated females' superior sending ability, only aggregated data were presented for positive (happy and surprise) and negative (anger and disgust) conditions of emotion. No data were presented which related gender to the ability to encode each of the emotions. Further, it should be noted that two negative emotions (sadness and fear) did not load on their negative sending factor. Thus, the negative factor score which was used in relating gender to sending ability did not represent all four negative emotions used in the design.

Those studies which present findings comparing the ability of men and women to express various emotions disclose inconsistent results. Drag and Shaw (1967) reported that women exceeded men in their ability to enact happiness, love, fear, and anger. Although Thompson and Meltzer (1964) found significant correlations between sex and encoding happiness and disgust which favored males, they also noted that these were 2 of 4 significant correlations in a matrix of 60 and the results could easily be attributed to chance. In a factorial design which examined sex of expresser, race of expresser, sex of perceiver, and race of perceiver, Gitter, Black and Mostofsky (1972) reported that females exceeded males in expression accuracy, although this varied by emotion. For fear and anger, females were judged more accurately than males. However, an interaction between sex of expresser and race of perceiver for anger resulted in white males being more accurately perceived than white females while black females were more accurately perceived than black males. Males were judged more accurately than females for the emotions of disgust and sadness. It needs to be noted, however, that the presence of four-way interactions for anger, fear, disgust, and sadness make interpretations of lower order effects less meaningful.

Thus, the picture of the comparative ability of males and females to encode emotions is complicated by the specific emotion being expressed and by perceiver characteristics. Moreover, Buck (1979) presents evidence showing that men generally tend to internalize emotional responses and show little overt (facial) expression. Conversely, females overtly express affective responses and show less tendency to internalize. However, this does not hold over all emotions. Buck cites data that in aggressive situations, males are more likely than females to externalize a response while women are more likely to internalize the emotion. While the data cited by Buck are not derived from studies using posed expressions of anger, other studies (Fugita, Harper, & Wiens, 1980; Zuckerman, Hall, DeFrank, & Rosenthal, 1976) have reported a positive relationship between the

ability to pose expressions and spontaneous expressiveness. To paraphrase Hall (1984), a man who looks sad while watching a sad film will also be good at posing sadness. Extending this reasoning, we believe that women's superior ability to express or encode emotions (spontaneous or posed) would not hold for feelings (spontaneous or posed) of aggression or anger because, as Buck notes (1979), women generally tend to suppress feelings of anger. Furthermore, given men's tendency to externalize feelings of aggression or anger, they should excel over women in anger expression.

Research pertaining to gender differences in judgment accuracy for negative facial expressions also presents contradictory results. For example, Rosenthal, Hall, DiMatteo, Rogers, and Archer (1979), using the Profile of Nonverbal Sensitivity (PONS), reported a significant three-way interaction among decoder sex, dominance, and positivity of cues. In decoding negative cues, females, overall, were better than males, but their advantage was weaker for negative dominant cues (i.e., jealous rage) than for negative submissive cues (i.e., asking forgiveness). Gitter, Black, and Mostofsky (1972) found no sex differences in males' and females' ability to decode various expressions. Haviland and Ingate (1980), however, reported some preliminary findings which suggest that males were perceptually vigilant for anger (negative dominant cues) while females were perceptually vigilant for expressions of distress (negative submissive cues). This specificity indicates that a comparison is needed between male and female ability on expression and judgment accuracy for negative emotions, i.e., anger, fear, sadness, and disgust. More specifically, would the hypothesized encoding superiority of anger by males also apply to decoding abilities?

The current study examines sex-differences in the ability to encode and decode facial expressions of negative emotions. Previous findings lead us to predict that females will exceed males overall in expression and recognition of negative emotions except that of anger. For anger, we predict that males will express and recognize it better than females.

Study 1

Method

Subjects. A total of 241 male and 483 female undergraduates from two colleges in the Northeast were recruited on an anonymous and voluntary basis. Three did not indicate their gender and were not used in this phase of the analysis. Their median age was 20 years. No data were collected on race, ethnicity, or religion.

Materials. Serving as encoders were 22 male and 45 female students, staff, and faculty at one of the colleges. They were recruited on a voluntary basis. Each was photographed posing the four negative emotions of Anger, Disgust, Fear, and Sadness which resulted in 268 photographs. The order of pose was randomized from encoder to encoder.

The 3.5 cm by 5.2 cm facial color photographs were sorted into four piles (one for each emotion). For each batch, 10 judges were recruited to sort the pictures into three categories. The first was for poses that expressed the emotion under consideration, the second for poses that did not express the emotion and the third for uncertain poses. From the 67 poses for each emotion, 30 photographs with the highest percent of appropriate assignments were selected. Consequently, for each emotion there were 30 faces all of different encoders.

The primary instrument had 120 facial color photographs which employed 39 different females and 15 different males. Some encoders appeared in more than one emotion. For Anger, 20 faces were female, 10 were male. For Disgust, 21 were female, nine were male. For Fear, 20 were female, 10 were male. Finally, for Sadness, 23 were female, seven were male. Approximately three-quarters of the encoders were white and the remainder included a sampling of black, Hispanic and oriental encoders. Although the actual ages of the encoders were not recorded, the majority of the faces (88) were judged by the experimenters to be in the 18–24 range with fewer (12) in the 25–40 year old range and the over 40 category (20).

For each emotion, the 30 stimuli were divided randomly into two subsets of 15 pictures. Four subsets, one from each emotion, were then combined and two accuracy scores were computed each based on the 60 picture subset. The Cronbach alpha was $r = .71$.

Procedure. Initially, the 30 faces for each emotion were scambled thoroughly. On an additional randomized basis, they were divided into two piles of 15 faces. Four 15-face piles, one from each emotion, were then combined into one pile of 60 faces. These were thoroughly scrambled and numbered from 1–60. We repeated this for the remaining 60 photos and these were numbered from 61–120. This insured that equal numbers of each emotion appeared on both halves.

The first page of the response form provided detailed instructions for answering. In essence, it indicated that subjects should look at each face in succession, and for each one, judge which of four emotions, Anger, Disgust, Fear, or Sadness, was being expressed. They responded by writing in a number corresponding to their choice on a 120 item answer sheet appearing on the next page.

After completion of the pictures, subjects answered a personal background questionnaire. They provided information on age, sex, college class, and college major. In addition, using nine-point rating scales, they indicated how much they enjoyed the task and how good they are at recognizing emotions.

Results

Design and Analyses. Mixed ANOVAs were employed utilizing one between and two within subject variables. The first repeated measure,

Stimulus Emotion, had four conditions: Anger, Disgust, Fear, and Sadness. The second, with two levels, was Encoder Sex. The only between subjects variable was Subject Sex. Unweighted means analyses were performed to deal with the unequal and disproportionate frequencies among the 16 cells produced by the factorial combination of the above three variables.

Scoring. Although each of the four emotions depicted had 30 stimuli, the proportion of male to female faces varied (see *Materials* above). To adjust for this disproportionality and the greater number of female faces for all conditions, the basic datum for analysis from each subject was the percent correct for each of the eight Encoder Sex by Stimulus Emotion circumstances.

Accuracy. Female subjects were significantly more accurate ($M = 76.6\%$ correct) than male subjects ($M = 73.4\%$), $F(1,722) = 31.75$, $p < .001$, in their ability to identify facial emotional expressions. Second, expressions of females, overall, were more accurately identified ($M = 76.8\%$) than males ($M = 73.2\%$), $F(1,722) = 143.13$, $p < .001$. In general, Fear was the most easily recognized emotion ($M = 83.3\%$), Anger was the most difficult one ($M = 63.8\%$), with the accuracy of Sadness ($M = 80.6\%$) and Disgust ($M = 72.3\%$) falling in between the two extremes, $F(3,2166) = 440.19$, $p < .001$.

Although the gender main effects were obtained as predicted, the complexity of these relationships may be seen by the significant Emotion by Subject Sex interaction, $F(3,2166) = 7.7$, $p < .001$. However, it is the three-way interaction for Emotion by Subject Sex by Encoder Sex, $F(3,2166) = 12.6$, $p < .001$, that is most revealing. Table 1 shows female decoders either tended to or significantly outperformed male subjects for Disgust, Fear, and Sadness, whether the stimulus person was male or female. For Anger, females were significantly more accurate than males when judging female encoders. However, for Angry male encoders, males were superior to females. The strength of this reversal can be underscored by viewing the data from another angle. Male subjects were significantly more accurate in identifying female encoders than male encoders for Disgust (6.4% difference), Fear (3.4% difference) and Sadness (11.6% difference). For Anger, males were more accurate in identifying male poses than female poses (10.1% difference). This is no minor reversal. Thus, the prediction that males would exceed females in the expression of anger was supported while the prediction concerning males superior ability to recognize anger was supported only for male encoders.

TABLE 1

Mean Accuracy Scores in Study 1

Emotion	Subject Sex	Encoder Sex		t
		Male	Female	
Anger	Male	68.9	58.8	10.31***
	Female	65.4	62.0	4.91***
	t	2.24*	2.05*	
Disgust	Male	67.3	73.7	6.53***
	Female	70.2	78.1	8.53***
	t	1.86	2.82**	
Fear	Male	79.8	83.2	3.43***
	Female	82.8	87.5	7.08***
	t	1.92	2.76**	
Sadness	Male	72.1	83.7	11.84***
	Female	79.4	87.1	11.13***
	t	4.68***	2.18*	

$*p < .05,$ $**p < .01,$ $***p < .001$

Study 2

Method

Subjects. The second sample consisted of 162 males and 237 females recruited from the same colleges as those in the first sample. Materials, procedure, scoring and analyses remained the same.

Results

Accuracy. As in Study 1, females were significantly more accurate ($M = 76.0\%$) than males ($M = 74.2\%$), $F(1,397) = 5.6$, $p < .05$, in identifying expressions of emotion. Consistent with the results of the first study, expressions of females were identified ($M = 77.1\%$) more accurately than those of males ($M = 73.0\%$), $F(1,397) = 122.0$, $p < .001$. The accuracy in recognizing emotions was similar across the samples (Table 2). Fear was again most readily recognized ($M = 84.0\%$), and Anger the most difficult

TABLE 2

Mean Accuracy Scores in Study 2

| Emotion | Subject Sex | Encoder Sex | | t |
		Male	Female	
Anger	Male	70.3	61.7	7.12***
	Female	66.9	62.4	4.51***
	t	1.64	<1	
Disgust	Male	65.7	73.6	6.54***
	Female	67.8	77.6	9.82***
	t	1.01	1.93	
Fear	Male	80.4	85.0	3.81***
	Female	84.2	86.6	2.40*
	t	1.83	<1	
Sadness	Male	73.2	83.8	8.36***
	Female	75.8	86.6	10.82***
	t	1.25	1.35	

*$p < .05$, $p < .01$,   ***$p < .001$

to recognize ($M = 65.3\%$). Sadness ($M = 79.8\%$) and Disgust ($M = 71.1\%$) again fell in between, $F(3,1191) = 204.4$, $p < .001$.

More interestingly, the significant three-way interaction for Emotion X Subject Sex X Encoder Sex found in the first sample was replicated in the second one, $F(3,1191) = 3.0$, $p < .05$. Female subjects tended to outperform males in recognizing Disgust, Fear, and Sadness for both male and female stimuli (Table 2). This did not hold for Anger. Though significance was not attained, males again tended to outperform females in recognizing male anger (Table 2). In addition, both males and females significantly found anger more discernable from male than female encoders. The emotion of anger continues to stand in contradistinction to the other emotions of disgust, fear, and sadness which are all more perceivable when expressed by females than by males. The F ratios for Study 2 are somewhat reduced compared with those of Study 1 and the t tests for sex of subject comparisons were not significant in Study 2. Nevertheless, the means for the two samples are remarkably alike.

Discussion

Once more, support has been found for women's superior ability to recognize facial expressions of emotion. Moreover, women's expressions were more accurately judged than those of men. Accuracy scores also depended on the emotion being expressed. That is, anger was the most difficult emotion to recognize. The low anger accuracy paralleled the accuracy scores of Thompson and Meltzer (1964). Fear was the easiest emotion to identify. Sadness ranked second in terms of ease and disgust ranked third.

The fact that our subjects were least accurate in identifying anger is open to alternative explanations. Most simply, our photographs of angry expressions could be the least expressive of the set. Perhaps we are better trained to conceal anger than to reveal it. Moreover, anger, in contrast to disgust, fear, and sadness, is an emotion which implies confrontation. Perhaps, one way we deal with such a threat is to deny its expression. If we fail to notice anger, it does not harm us.

The main effect for subject sex was qualified by its interaction with the emotion being expressed. That is, women exceeded men in recognizing the negative expressions of disgust, fear, and sadness in both male and female encoders. A different pattern was shown for anger. Not only was anger generally more difficult to recognize, it was the one expression in which there was no overall difference in accuracy between male and female subjects.

A three-way interaction was found among emotion displayed, subject sex, and encoder sex. Males were superior to females in identifying male anger. Female subjects were better in recognizing anger in males than in females. At the same time, males were poorer than females in identifying female anger. In fact, the worst performing circumstance among all cell conditions occurred in the ability of male subjects to recognize female anger.

Our finding that male anger is better identified than female anger certainly bolsters Buck's observation (1979) that males are more likely to externalize responses in aggressive situations while females tend to internalize. While socialization of aggressiveness might involve our learning to control and inhibit angry behavior, pressures for this would be stronger on females than on males (Eron & Huesmann, 1984).

If we assume a power or status differential between men and women, then anger as a threat can elicit different responses depending on the status or power of the angry person. Anger expressed by males demands more attention in general and particularly from other males because it is an overt

threat to their own sense of power. Obviously, these speculations merit closer study in additional research.

In these two studies, both men and women were more accurate in identifying the other emotions expressed by females than when expressed by males. This result is consistent with previous research that women are better senders of emotion (Buck, Miller, & Caul, 1974; Hall, 1979). The explanation is apparently rooted in socialization which encourages females to be more expressive than males (Riggio, Widaman, & Friedman, 1985).

While a reliable encoder sex main effect was obtained, the encoder sex by type of emotion interaction revealed the effect was limited to disgust, sadness, and fear. It seems likely that females are superior to males in portraying these emotions, but it is also possible that we attend more to women's expressions of these feelings. Anger was more readily recognized when expressed by males than by females. Again, either males are better senders of anger or, possibly, men and women are more attentive to men's expressions of anger. The stability of these findings is underscored not only by the reliability of significance over two samples but also by the fact that 30 different persons posing anger were utilized.

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