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Gender Differences for Speed and Accuracy in the Judgment of the Six Basic Emotions

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Abstract

It was predicted that female participants would judge pictures of emotional faces more quickly and accurately than males, and that responses for the female poser pictures would be quicker and more accurate than for male posers. Participants (24 male, 10 female) were shown photographs of posers expressing one of the six basic emotions and were asked to decide which emotion they saw; their speed and accuracy were recorded. Female participants were not significantly faster or more accurate than males, but the hypothesis for poser photographs was supported with $p < 0.05$ for accuracy and speed. This experiment did not reveal a gender difference in the judgment of emotions although further research should be conducted to explore differences in the judgment of poser expressions.

Gender Differences for Speed and Accuracy in the Judgment of the Six Basic Emotions

The stereotype that women are more emotional than men has been a widespread belief throughout Western culture. However, there has been research in the area of self-reported emotional experiences that suggests women across many cultures and countries experience emotions more intensely and for longer periods of time than their male counterparts (Fischer & Manstead, 2000). From this evidence one might propose that women may judge photographs of facial expressions of emotion more quickly and accurately than males. There appears to be an emerging body of literature that shows promising results with regard to the question of possible gender differences in the judgment of emotion.

In a relevant article concerning gender and emotion, Fischer and Manstead (2000) researched the involvement of culture in the expression of emotions for both sexes. These two authors acknowledge a well-known stereotypical belief among Western cultures that overall, women are the “emotional” sex while men are the “rational” sex. Fischer and Manstead mention several articles in which this stereotype of emotionality as a feminine characteristic and reason as a masculine one is featured as a part of our culture’s philosophy. In particular, these authors’ interest involved comparing cultures in terms of emotional expressiveness and gender, in which the gender roles determined by the culture may influence this expression of feelings. Fischer and Manstead observed that research of this kind on gender, emotion, and culture has a very short and recent history, so the results of their study should be perceived as preliminary and not conclusive evidence regarding this subject. To examine this topic in detail, information from the ISEAR database was used. Participants were asked several open-ended and close-ended

questions pertaining to their experiences with seven different emotions (joy, fear, sadness, anger, disgust, shame, and guilt). Feedback from the participants was analyzed with regard to intensity, duration, and clarity. Contrary to their first hypothesis stating that differences in emotional responses between the two sexes and across different cultures are mostly a result of differences in gender roles, Fischer and Manstead found that women in all thirty-seven countries examined in the study reported experiencing emotions more clearly, more intensely, and for a longer period of time than the men. Also, the authors found that men and women from more individualized cultures with less clearly defined gender roles (such as in the United States) reported experiencing more intense emotional reactions than their cultural counterparts which contradicted the authors' prediction that women in such individualized cultures would be less in-tune with their emotions and more able to control themselves in order to be "rational". This surprising evidence gives support to the hypothesis that the accuracy and speed of emotional expression recognition differs among the sexes. Although this article by Fischer and Manstead does not involve the judgment of facial expressions as Ekman's many experiments did, it is relevant to gender differences in emotion recognition.

Research that involves the actual judgment of emotions and gender differences, rather than just self-reports of emotion, has been contributed to by Merten (2005). With similarities to the hypotheses of Fischer and Manstead (2000), Merten's study centered on the gender effects and differences involved across cultures and countries when men and women were asked to identify several different emotional expressions. Merten mentions the study by Fischer and Manstead (2000), hypothesizing that the more frequent and intense expression of emotion by women across different cultures may translate into

greater recognition accuracy when compared with men of the same culture. It was proposed that the amount of gender difference found was dependent on two aspects of society; the importance placed on traditional masculine and feminine roles and also, the amount of gender equality in terms of the economy and politics of a country. Overall, the female participants demonstrated greater recognition accuracy than the men of the same country. Contrary to one of the hypotheses, there were no significant correlations between the gender differences and their emphasis on traditional masculine/feminine roles in the various countries represented by participants, although the extent to which women were equal to men in the economic and political arenas did correlate positively with the recognition accuracy of women overall. In concurrence with the results of Fischer and Manstead (2000), women from countries that give more equal status to both genders in the area of economics and politics had greater recognition accuracy than their male counterparts.

In an experiment noted as more complex than previous studies involving judgment of emotion, Ekman et al. (1987) recorded the judgments of participants from ten separate cultural backgrounds. In contrast to similar previous experiments in which the judgment of only a single emotion per poser was recorded by the participant, those in this study were asked to identify if multiple emotions were expressed in each picture as well as to judge the intensity of such emotions. Participants from all cultures exhibited much agreement as to the first and second most intense expressions but Ekman et al. (1987) admit that discrepancies between cultures were discovered when participants were asked to judge the absolute level of intensity for several emotions. The authors of this article thoroughly and specifically point out several flaws of previous studies that seemed

authors expressed concern that participants (who were all college students) may have learned from mass-media which would confound any study involving participants who have been exposed to other cultures before. Also, there was significant disagreement among the cultures as to the intensity of the judged emotional expressions, although it seems as if emotional intensity is an even more abstract and less relevant matter to researchers than just the judgment of a type or types of emotions expressed by a poser by itself. The authors of this experiment appeared to be successful in remedying criticism of previous studies; however, the confounding variable of exposure to multiple cultures previous to the experiment continues to be a concern among researchers interested in the universality of emotional expressions.

Another experiment conducted to determine possible gender differences in the judgment of emotion took an extra step to eliminate possible bias based on the facial structure of posers (Hess, Adams, & Kleck, 2004). In two separate studies, Hess and colleagues used uniform faces for each emotional expression and either placed a male or female haircut on the head to indicate gender. For Study 1, drawings of each emotion were used so that participants viewed the exact same face for each emotion with the exception of long or short hair. In study 2, actual photographs of posers were manipulated by the computer to appear completely androgynous, and then given either the male or female hairstyle as the only indicator of gender. The importance that was placed on creating posers with the exact same facial structure and features was due to the hypothesis that when people judge emotion, they are influenced by signs of dominance or affiliation depending on the facial structure. Dominance is connected with features such as thick eyebrows and square-shaped jaws which are most often seen in male faces.

Affiliation is connected with a rounder “baby” face that may indicate warmth or approachability, often seen in the facial structure of females. Hess and colleagues believed this dominant or affiliative facial structure would cause people to judge emotions as more negative expressions like anger, and more positive expressions like happiness, respectively. Hence, making male and female faces appear to have the same structure whether dominant or affiliative could eliminate this possible bias. Surprisingly, Hess and colleagues found that when the cue of facial features was removed, judgment of happy and angry expressions for men and women were actually reversed from what previous studies found; the smiling “male” faces were judged as happier than the smiling “female” faces although the only difference in the pictures was hair style. Also, the angry “female” faces were judged as angrier than the angry “male” faces when, again, the actual expressions were exactly the same. One explanation offered was that the expressions of happiness in men and anger in women are normally muffled by the facial structure of the male or female; however, when this structure was made androgynous, the cues of anger in women and happiness in men were revealed more clearly and participants made an unbiased judgment. This experiment design was an inventive way to reveal more about how males and females judge emotional expressions.

I propose that females will judge the six basic emotions (joy, fear, surprise, disgust, anger, and sadness) of posers more accurately and in less time than males overall. I also propose that both women and men will judge the emotions expressed by female posers more accurately and in less time than for male posers.

Method

Participants

Thirty-four participants (24 males and 10 females) from a Color Perception course and an Attention and Spatial Vision course at the Rochester Institute of Technology took part as volunteers for this study. The two classes mentioned above were visited by the experimenter who asked for volunteers; extra credit was offered as an incentive to participate. Because the purpose of the study was to examine differences between the two genders in their judgment, there was no “control” group and no one could be assigned to a gender group; out of all the participants, about one-third were female. The only major demographic characteristic important to this experiment was gender which was noted.

Apparatus and Materials

Participants viewed 36 black and white photographs (pictures of 18 men and 18 women, 3 pictures of each basic emotion for each gender) taken from Pictures of Facial Affect (Ekman & Friesen, 1976) in two identical consecutive blocks of trials on a Power Macintosh G3 with a Macintosh 8.6 operating system (see Figure 1 for sample picture). A 15 inch Apple display was used and participants viewed photographs 57cm from the monitor. The program used to display the pictures was Super Lab Pro 1.75 and to take user input, a Cedrus model RB-620 was used. Each of the six buttons was labeled with one emotion in the following order: happy, angry, sad, surprised, disgusted, and afraid. One photograph was presented on the screen at a time in a pre-determined order (Table 1) and was 256 x 384 pixels. Participants viewed each photo as long as necessary to make a decision, then pressed a key on the Cedrus corresponding to the emotion they picked.

Once a button was pressed, the computer presented the next photo. After the first block was finished, a blank screen appeared and participants were allowed to rest if needed before continuing. Participants were not told that the two blocks of pictures were the same. The correctness of each decision and the total time it took each participant to judge each photo was recorded in Microsoft Excel spreadsheets.

Procedure

This study used a 2 x 2 factorial design; the first factor was the gender of the participant and the second factor was the gender of the poser. Everyone was tested individually. Upon arrival to the lab, participants were handed two identical informed consent forms and the experimenter read from a script and asked the participant to read and sign one of the consent forms if they agreed to participate in the experiment. The participant was then asked to sit at the computer and become familiar with the response box for approximately ten seconds. Then participant was left alone at the computer to complete the experiment while the experimenter monitored their progress and debriefed. When the experiment concluded the participant was thanked.

Results

All of the accuracy and speed data were analyzed with two-sample independent t-tests. The means and standard deviations reported for speed judgments were calculated after the removal of outliers; 250ms was the lower cutoff used and $Q3 + 1.5 \times IQR$ was used for the upper cutoff. Refer to Table 2 for the means and standard deviations for the speed and accuracy of participants. Hypothesis 1 stated that female participants would judge photos more accurately than males; the data showed that on average, females did make fewer errors than males, so the first hypothesis was supported. A Welch Two

Sample t-test was conducted to determine if the means were significantly different. The alpha level used for all t-tests was 0.05. For the means of female and male participant errors, $t = -1.3$ with 19.2 degrees of freedom; the p -value > 0.05 . Although the means supported hypothesis 1, the t-test proved the values were not significantly different. Hypothesis 2 stated that female participants would judge photos more quickly than males; however, the means revealed that males made their decisions more quickly than females. Although these data contradict the original hypothesis, a t-test was conducted to see if the means were significantly different; $t = 1.6$ with 16.1 degrees of freedom and the p -value > 0.05 . Neither of the hypotheses regarding gender differences in participants for speed and accuracy was supported with a significant difference in means.

Refer to Table 3 for the means and standard deviations for the speed and accuracy for judgment of male and female posers. Hypothesis 3 stated that participants would judge female poser photographs more accurately than male poser photographs, and the means supported this. For the t-test, $t = 2.3$ with 64.9 degrees of freedom and the p -value < 0.05 . The t-test showed that the difference in means was significant, giving support to Hypothesis 3. Hypothesis 4 predicted that participants would judge female poser photographs more quickly than male poser photographs, which was supported by the means. For the t-test, $t = -5.3$ with 2202.3 degrees of freedom and the p -value < 0.05 ; there is a significant difference between the means. Both of the hypotheses regarding speed and accuracy differences in the judgment of male and female posers were supported.

Discussion

Two of the four hypotheses for this experiment were supported by significant differences in speed and accuracy. No significant difference was found within speed and accuracy data between male and female participants. However, in terms of the gender of posers in the photographs, female posers were judged both more accurately and more quickly than were male posers. These results suggest that although men and women find it easier to decide emotion on a woman's face than on a man's, both genders seem equally capable of judging emotions on faces in general.

Contrary to the findings of Merten (2005), the female participants in this study had no significant advantage in the judgment of emotion than the males did, although the study by Merten suggested that female participants from countries where females are considered more economically and politically equal to men demonstrated greater recognition accuracy than their male counterparts. In the study by Merten, the United States was considered one of these countries, but in all the countries tested, women demonstrated overall greater recognition accuracy than men of the same country. Only the gender of participants was noted in this study because it was the only relevant demographic to test the hypotheses, although it may have been pertinent to ask the participants if they had grown up in the United States or another country if this factor was to be considered in this study as it was in Merten's.

Only considering gender and no other demographic may have been one limitation of this study. Several problems arise when an experimenter must have a limited sample of participants for a study such as this one. For example, having a more equal (male and

female) and a greater number of participants might have revealed more relevant differences in terms of gender. Also, all participants appeared to be between the ages of 18 and 25, which is a limited sample when considering that experience may impact the ability to judge emotion. Along with limitations of the sample of participants, there are also considerable disadvantages that come with the use of the photographs in this study. These photographs were chosen because they have been used successfully in studies for over 30 years. The difference in the time from when they were taken and when they are used many years later may present a problem, however, because in reality, participants will never have to judge emotions of someone from anytime other than the present. Also, there is also a significant age difference between the male and female posers; the females appear to be mostly in their 20s while the males appear to be in their 40's. Participants in this study may have been able to judge emotions of posers in their own age group more quickly and accurately which would confound the results for the data regarding posers. Two other limitations involved with using these photographs are that they are black and white, and the emotions are posed and not natural; both of these conditions are not encountered in real life and may have negatively influences the results. One final problem with the experiment is that after the participants were tested, it was discovered that a picture had been switched by mistake; instead of seeing 3 sad females and 3 happy females, participants saw 2 sad females and 4 happy females. Since joy was the only positive emotion being tested and was easily recognizable, all participants judged the picture that was switched correctly which may have influenced the data. For future experiments examining these hypotheses, these limitations should be considered when designing a study.

Contrary to the findings of Merten (2005), female participants in this study were not significantly more accurate or faster at identifying emotions than the male posers were. More research should be conducted to explore the nature of this subject; several limitations may have influenced this study enough to produce these contrasting results. Interestingly, the gender of the poser being judged seems to play a significant role in recognition speed and accuracy, although not much research has been done on this matter in the past. This finding makes sense based on the findings of Fischer and Manstead (2000), in which women reported feeling more clear and intense emotions, and therefore might express the emotions more intensely resulting in easier recognition of female emotional faces than male ones. For future studies, experimenters might try using a modern set of photographs and a larger sample of participants to have more confidence in the results of the study.

Aside from research evidence, females were expected to judge emotions in this study more quickly and accurately because from an evolutionary sense, women have benefited from social support during and after pregnancy, and also, women must be able to interpret their infant's needs through emotional cues. This is not to say men never care for their infants, but women tend to be primarily responsible for the wellbeing of infants. From this theory one might assume females would be better able to judge emotions in general but for this study, this was not the case. As for why participants were quicker and more accurate for female posers rather than male posers when there was no significant difference in the judgment of female versus male participants, the age of the poser may have had a strong effect. It is possible that participants may have been better able to interpret the emotions expressed by their own age group rather than of people twice their

age; in the case of this study, almost all of the females were younger looking than the males. The results of this study may suggest that although men and women are equally capable of identifying emotion, women express emotions more intensely and are therefore easier to recognize. Although it is disappointing to find no significant gender difference between the judgment of emotion for this study, it is clear that more research must be done with consideration of the limitations of this study. In contrast, it is encouraging to find a significant difference between the judgment of emotion in male and female posers, and further study is required to either confirm or refute this finding.

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Table 1

Order of Photographs from Pictures of Facial Affect as Presented to Participants

Number	Photo Name	Number	Photo Name	Number	Photo Name
1	C1-23	12	EM-4-17	25	GS-2-01
2	EM-4-24	13	C2-18	26	JM-1-04
3	EM-2-11	14	MF-1-27	27	GS-1-16
4	A1-06	15	C1-10	28	JM-5-03
5	EM-5-21	16	GS-2-08	29	JJ-5-05
6	A1-14	17	C1-04	30	JB-1-16
7	A1-25	18	GS-1-08	31	MO-1-23
8	EM-5-14	19	GS-2-25	32	JB-1-09
9	A1-24	20	C1-18	33	JM-1-16
10	EM-4-07	21	GS-1-25	34	JM-3-11
11	EM-5-24	22	C2-12	35	JB-1-23
12	A2-06	23	JM-2-08	36	JB-1-12

Table 3

Speed and Accuracy Data for Posers

		Male	Female
Speed (ms)	Mean	2511.3	2239.5
	Standard Deviation	1262.7	1158.7
Number Correct	Mean	13.3	14.2
	Standard Deviation	1.8	1.5

Table 2

Speed and Accuracy Data for Participants

		Male	Female
Speed (ms)	Mean	75922.7	82885.7
	Standard Deviation	11391.9	11994.2
Number of Errors	Mean	8.9	7.6
	Standard Deviation	3.0	2.7

Figure Caption

Figure 1. An example picture showing an afraid female from the set of photographs shown to participants.

