Gender and Emotional Response: How does Gender Affect the Emotional Response to Facial Expressions when Non Verbal and Verbal Cues Mismatch?

Divya Suri

University of California, Berkeley

Research and Data Analysis in Psychology

Dr. Arman D. Catterson

GSI: Chanelle Gordon

Fall 2015

December, 2015

Introduction

You ask her "How are you?" and she, with puffy eyes, responds "I'm fine, I'm just tired", what would you most likely react to? Her puffy, red eyes or her words? The way we react to a situation can change depending on how we perceive the emotion being expressed by another individual and what cues we tend to pick up the most. Someone might choose to take her to the side and console her, clearly responding to her non-verbal cues. On the other hand, another person would rather continue with the conversation and accept her verbal cues.

Emotional and non-verbal cues can contain important information about the intentions and feelings of others. Non-verbal cues can range from body language to inflected speech but the focus of this research will be on facial expressions, particularly when facial expressions do not match the dialogues. Furthermore, the impact of gender on this process will be evaluated.

The phenomenon of using facial expressions to extrapolate key insights about individuals has been tested greatly over the years. In May of 2015, a study on social demographics was conducted to see whether a person's life span could be gauged simply by looking at a person face (Re, Tskhay, Tong, Wilson, Zhong and Rule, 2015). Participants viewed the 100 portraits from a 1923 university yearbook and were asked to estimate how long each person lived. The researchers additionally wanted to look at what parameters of judgment were more likely to be used by the participants to judge longevity. Using a structured equation model, they were able to conclude that estimates of longevity significantly predicted the stimulus' actual age of death. Underlying judgments that were utilized included predictions of health, attractiveness and wealth were underlying factors that influenced the participant's response. Perceived wealth had the strongest relationship with the estimations of the age.

Research has also focused on the influence of trait mindfulness when evaluating emotion (Quaglia, Goodman and Brown, 2015). It can enhance the quality of social behavior in most contexts by allowing the use of efficient top-down attention to and discrimination of facial expressions. Trait mindfulness allows for the timely and accurate discernment of facial expressions. Quaglia et al. tested this by attention-based event-related potentials (ERPs) and behavioral responses while participants completed a go/no-go emotional task involving happy, neutral and fearful facial expressions. It was determined that mindfulness predicted greater and faster emotional response.

The idea of emotional mismatch is highly applicable within eyewitness testimonies and identifying emotional deception. Emotional deception is a common behavior that, if unnoticed, can have major consequences. Brinke, MacDonald, Porter and O'Connor in 2012 investigated the nature of true and false remorse. How sincere an offender's depiction of their remorse can actually be an extremely important factor in their sentencing and parole hearings. They examined the facial, verbal and body language behaviors commonly associated with deception in videotaped accounts of true transgressions along with either genuine or fake remorse. They were able to conclude, after analysis over 300,000 frames, that a greater range of facial expressions is associated with falsified remorse. Furthermore, in falsified remorse, criminals were ore likely to follow a negative emotion with another emotion, as opposed to returning to a neutral one (Brinke et al. , 2012).

Only recently have gender difference been considered when examining the usage of facial expressions to denote emotion. Facial expressions of one's emotional can help convey the expressers' behavioral intentions. This primes the observers' approach towards them accordingly. Kim and Son in November of 2015 examined whether detecting behavioral intent through facial expressions would influence the perceivers' estimation of the distance between them and the expresser. Using 18 undergraduates, facial expressions were chosen on

the degree of threat and anger displayed by them. Results showed that facial expression did affect the distance estimation with the faces exhibiting threatening or safe expressions were deemed to be closer than those displaying neutral expressions. Furthermore, they found that females' judgment were more likely to be influenced by the facial expressions of the expresser (Kim and Son, 2015).

Impairments in emotional recognition from facial recognition have been found to be linked to psychopathic traits. This is particularly seen with the idea that these individuals are less likely to pay attention to the eyes of emotional faces. Gillespie, Rotshtein, Wells, Beech and Mitchell, 2015 investigated the relationship of primary and secondary psychopathic traits with attention to the eyes among adult male non-offenders while they completed an emotion recognition task. They measured the number of fixations and found that primary psychopathic traits were associated with less fixations depending on the intensity of the expression they viewed along with the gender of the expresser. They found that increased fixation was associated with increased accuracy in recognizing anger and fearful expressions.

Having both verbal and non-verbal cues in communication contributes to human multimodal communication (Roter, Frankel, Hall and Sluyter, 2015). This serves the purposes of social influence and information transfer. While verbal cues are better for the transfer of conceptual information, non-verbal cues have a greater affective and social influence.

The relationship between emotion mismatch and gender responses has not been deeply understood as most previous studies focus on personality traits, as opposed to gender differences.. The present aims to study how gender would affect the degree of response to a stimulus of mismatched emotions where verbal cues portrayed do not match the non-verbal cues illustrated from the context of university students that takes into account their current location. The null hypothesis formulated for this research is that there would be no difference

in which cues the genders act upon. The alternative hypothesis is that women are more likely than men to respond to non-verbal cues as opposed to verbal cues.

Methods

Participants: The participants were mainly comprised of undergraduate students with the exception of 1 participant who was not and thus, their responses were not included in the analysis. The undergraduates were mainly in the United States to ensure that culture did not play a confounding role. They were recruited through social media, in the form of Facebook messages, posting on Facebook groups and emailing. A total of 65 took the survey with 48 being female and 17 being male (1 non-University student excluded from count).

Procedures: Participants responded to a survey, powered by Qualtrics, which approximately took 3 to 5 minutes. It consisted of a mixture of multiple-choice and text entry questions. Participants were first asked to state what gender they identified with, and if they were in University. If answered 'Yes' to the previous question, they were further asked to write which university they were in. Stimulus material was then presented in the form of a gif and accompanying text. The gif showed an individual displaying an emotion and the accompanying text described what they were saying to another individual. Stimulus material was deliberately chosen to describe a situation where facial expressions did not match the accompanying text. Additionally, to ensure that context was not a confounding variable, all participants were told to imagine that the individual in the gif was a friend of theirs.
There were six mismatched emotion states that were displayed: excitement/nervousness, regret/content, sadness/happiness, annoyance/seriousness, surprise/agreeableness and confusion/understanding. To standardize the responses, the participants were allowed to choose between three prescribed choices or 'Other' which allowed them to write their own response. The prescribed choice varied in the degree to which the respond to verbal or non-

verbal cues. The responses were then dummy-coded to correspond to a number on a scale of 1 to 3.

Measures: The gifs showed six mismatched emotions that were further categorized into "High Mismatch" and "Low Mismatch". "High Mismatch" represented the mismatches that were complete opposites emotions. This consisted of sadness/happiness, excitement/nervousness and confusion/understanding. "Low Mismatch" consisted of mismatches that were often harder to decipher by the non-verbal cues. This included annoyance/seriousness, regret/content and surprise/agreeableness.

Degree of Response was measured, as mentioned, using a scale. There were three choices that participants could choose from. One, for example "Move on and continue with the conversation" to the Annoyance/Seriousness stimulus, was dummy coded to 1. This response shows a low degree of response to the non-verbal as, in this case, the participant does not address the annoyance of the person in the gif. Another, for example "Ask him how he is feeling" to the Regret/Content stimulus, was coded to 2. While not entirely addressing his regret seen through his eyes in the gif, it moves away from his verbal cue that he feels great. Finally, the last option is coded to 3 and this is a clear addressing of the non-verbal cue to the point that the participant would take clear action on it. For example, this would be the option of "Take her to the side and console her" for the Sadness/Happiness stimulus where the individual in the gif says that she is just tired but clearly has tear-filled eyes.

Results

After dummy coding the responses, they were further analyzed in R. The responses were grouped under the variable "general mismatch" to include the means of all the responses for each participant. The degree of responses for all the participants ranged from 1.33 to 3 (mean = 2.30, median = 2.33, SD = 0.38) with a slight negative skew (skew = -0.39)

and approximately a normal distribution, showing that, in general, there was a higher likelihood to respond to non verbal cues amongst the participants. After the data was subset by gender, it was found that the degree of responses for the female participants ranged f rom 1.50 to 3 (mean = 2.40, median = 2.50, SD = -0.68) with a slight negative, but higher than the general population's, skew (skew = -0.68) and an approximate normal distribution. On the other hand, the degree of responses for men ranged from 1.33 to 2.67 showing a much narrower range of responses (mean = 2.01, median = 2.00, SD = 0.35). The data from the male participants was also approximately normally distributed with a slight positive skew (skew = 0.38) showing a higher likelihood of responding to verbal cues.

There were 65 participants who were University students while 1 was not and therefore their responses were omitted. 48 participants identified as female while 17 identified as male. Effect of gender on the responses to all the mismatched emotions was first analyzed using the power analysis of a t-test. The t-test was a two-sample t-test conducted on samples with unequal variance. The responses from the two groups, female and male, were found to be significant (t = 4.0046, df = 27.261, p-value = 0.0004312) therefore; the null hypothesis could be rejected.

Secondly, the effect was analyzed by constructing a bivariate linear model. The linear model measured the effect that gender had on the response given to the general mismatched emotions. The coefficient of the intercept in this model was the average degree of response given to all the mismatch emotions if the participant was female. The bivariate regressions returned significant results for the predicted values for male and female. A significant positive effect for being female and having a higher degree of response to the mismatched emotions, particularly towards the non-verbal cues (predicted value = 2.4028, p-value = 0.0001306, t = 48.737, r^2 = 0.2087) was extrapolated from the model. A significant effect for being male and having a lower degree of response to the mismatched emotions, leaning more

towards the verbal cues was also seen (estimated effect on predicted value = -0.3930, p-value = 0.0001306, t = -4.076, r^2 = 0.2087).

A confound variable that was further tested was the extent of mismatch within the mismatched emotions depicted and how this could have affected the responses by the genders. This led to the creation of two variables "low mismatch" and "high mismatch". "Low mismatch" encompassed the mismatches: Surprise/Agreeableness, Annoyance/Seriousness and Regret/Content. "High mismatch" consisted of "Excitement/Nervousness", "Sadness/Happiness" and "Confusion/Understanding". The means for the responses to each of these were combined and stratified based on gender. Female data for "Low Mismatch" ranged from 1.67 to 3 with an approximate normal distribution and a slight negative skew (skew = -0.42). Conversely, with "High mismatch", the range of responses was from 1.33 to 3 with a slight positive skew (skew = 0.1). With the data for males, for "Low mismatch", the range was 1.67 to 3 with a slight positive skew (skew = 0.22). Finally, for "high mismatch", the range was 1 to 2.67 with a slight positive skew (skew = 0.33).

Two bivariate models were constructed to test the effect that gender had on responses to "Low Mismatch" stimulus and "High Mismatch" stimulus separately. With similar coefficients as the previous bivariate model, it was seen that there was a significant positive effect on being female and displaying a high degree of response to the "Low Mismatch" stimulus (predicted score = 2.61111, t = 41.731, p-value = 0.001957, r^2 = 0.1422). Additionally, there was a significant effect on being male and displaying a low degree of response to the stimulus (estimated effect on predicted value = -0.39542, t = -3.232). Bivariate regression helped extrapolate the predicted response of each gender for "High Mismatch" stimuli. There was a significant positive effect on being female and displaying a high degree of response to this type of stimulus (predicted score = 2.19444, t = 34.871, p-

value = 0.002329, r^2 = 0.1378). On the other hand, there was a less significant effect on the likelihood of the male in displaying a high degree of response (estimated effect on predicted value = -0.39052, t = -3.174). T-tests on both these types of data for each gender showed significance.

Key Results (Indicating that the null hypothesis can be rejected)

Model	Results
mod3 <- lm(generalmismatch ~ Gender, data = college.data)	p-value: 0.0001306
mod2 <- lm(highmismatch ~ Gender, data = college.data)	p-value: 0.002329
mod <- lm(lowmismatch ~ Gender, data = college.data)	p-value: 0.001957

Figures

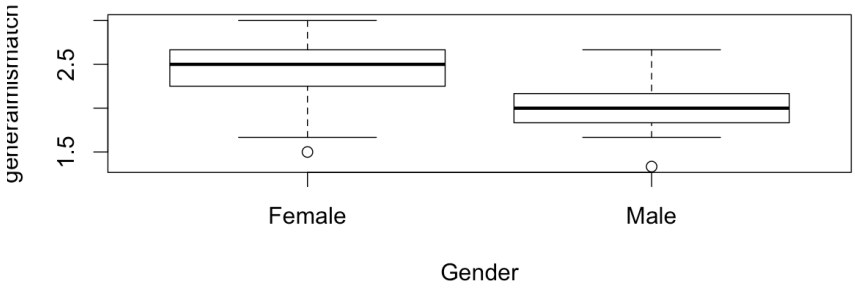

Figure 1 Effect of General Mismatch on Gender Responses

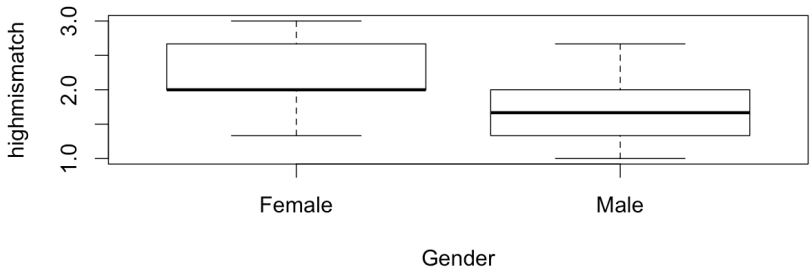

Figure 2 Effect of Gender on Responses to High Mismatch

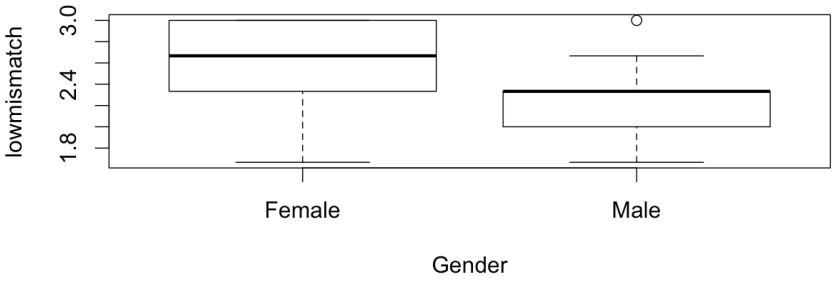

Figure 3 Effect of Gender on Responses to Low Mismatch

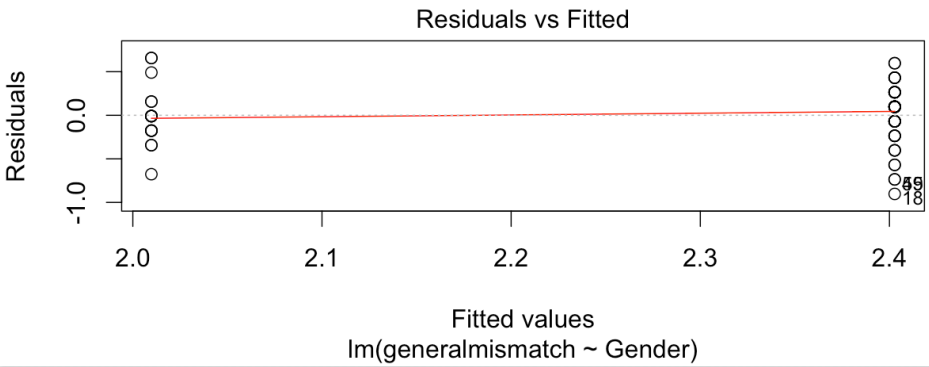

Figure 4 Residual vs Fitted Plot for Effect of Gender on Response to General Mismatch

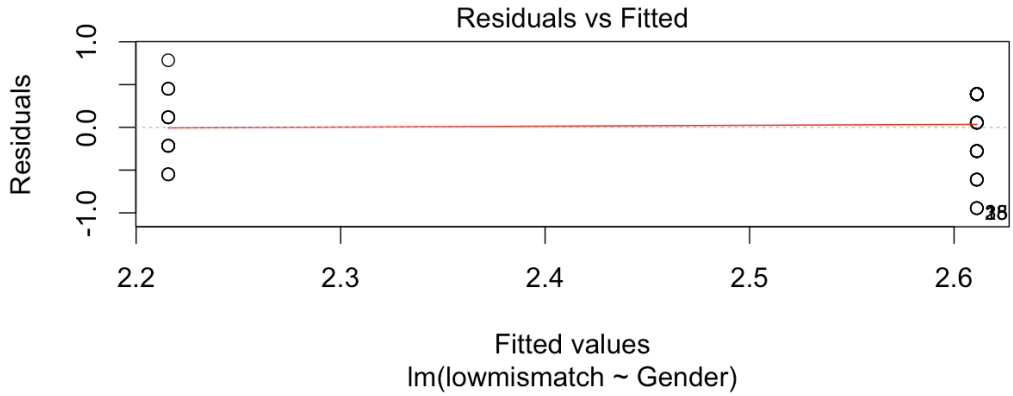

Figure 5 Residuals vs Fitted Plot for Low Mismatch stimulus on Gender responses

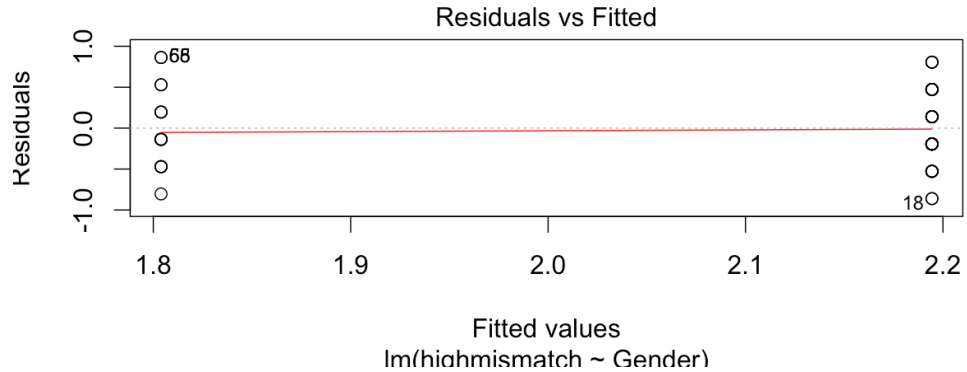

Figure 6 Residuals vs Fitted Plot for Effect of High Mismatch stimulus on Gender responses

Discussion

The present study found that gender has a significant effect on the degree to which a person responds to non-verbal cues when verbal and non-verbal cues do not match. Women are more likely to react to non-verbal cues, especially when the level of mismatch in the emotions displayed is low. Men are more likely to respond to verbal cues, more so when the level of mismatch in emotions is high.

The conclusions of the study follow the insights generated from previous research about women being more mindful and aware of non-verbal cues. As opposed to previous research, it was found that men do significantly respond to non-verbal cues when the level of mismatch in emotions is low. While similar to the results found for women in the study, it points at a possible confound that might have arisen due to the small sample size of men (n = 17) compared to the women in the study (n = 48). In the future, recruitment methods should

be focused on finding an equal number of each gender as participants. Other limitations lie in the strong confirmation bias that might have occurred with participants being recruited through social media. Furthermore, this was an extremely informal way of conducting the study and results might be different if participants were called in and physically viewed a stimulus.

One future research direction in re-conducting the study with more reliable results is to use a proper experiment with stooges. The stooges can act out the mismatched emotions and participants can physically respond to them. Another direction could be looking at age and how that might affect emotional response. By having a variety of age groups, one can see how aspects, like mindfulness, evolve over time.

References

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