Creating a Facial Expression Database and Exploring Posed and Genuine Differences

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Introduction

Recognizing the emotions of other people is an essential part of human interaction and communication. Whether it is a student trying to decipher the mood of a professor when asking for a paper extension or an employee trying to figure out if it is the right time to ask for a raise, we use facial expressions to navigate our social environment on a daily basis. As such, any scientific knowledge that could help further our understanding of this process could help individuals deficient in emotion identification, such as those with autism, as well as help us all better determine the emotions of others.

Several databases of facial expressions have been previously created to understand emotion recognition; however, the majority of databases utilized *actors* to *pose* expressions (e.g., Ekman & Friesen, 1976, POFA). Researchers have argued that posed expressions are more easily identifiable because they are dramatized, and this may be especially true for actors. Moreover, these researchers contend that these factors may contribute to high accuracy rates and that these results may lack ecological validity (e.g., Motely & Camden, 1988; Russell, 1994; Tcherkassof et al., 2007).

The purpose of the current research is (1) to create a database of valid facial expressions of both posed and genuine expressions across a variety of emotions from the same subjects for researchers to utilized in emotion recognition research and (2) to compare the identification accuracy of posed versus genuine expressions.

Hypotheses: We hypothesize that posed expressions will be dramatized, and therefore more accurately recognized compared to genuine expressions. In accordance with the findings of a meta-analysis by Elfenbein and Ambady (2002), we hypothesize that people will be most accurate at recognizing happy expressions and least accurate at recognizing fearful and disgusted expressions. Finally, we hypothesize that the intensity of the emotion expressed will be associated with the speed of response and the rate of identification accuracy.

Method

Stimulus Collection

Participants. One hundred and ninety-five participants (126 females) with a mean age of 19.19 (*SD* = 1.72) were videotaped as they watched videos to evoke and posed emotional expressions.

Materials and Procedure. Participants were placed into one of two groups: posed-genuine-survey or genuine-survey-posed. During the posed stage, participants were asked to think of a time that they experience a corresponding emotion (i.e. happy, sad, angry, confused, disgusted, fearful, surprised, or neutral) and then asked to adjust their facial expression to express that emotion. In order to generate natural expressions during the genuine stage, participants watched 12 clips from movies and TV shows. These video clips were selected to evoke emotion in participants. Lastly, participants indicated the emotion they felt during each clip and the intensity of that emotion.

Stimulus Validation

Participants. Two hundred and forty-eight (70% female) with a mean age of 19.50 (*SD* = 2.26) from varying ethnic backgrounds identified the expressions.

Materials and Procedure. After a pilot with 23 participants to narrow the expression to a more manageable size, the expressions of 47 subjects (55% female) met all criterion to continue to validation. A total of 401 (230 genuine; 171 posed) expressions were used in the final validation experiment. Facial expressions were randomly shown and responses were recorded using SuperLab 4.5. Participants were randomly assigned to either the posed (n = 119) or genuine (n = 129) conditions. In each condition, participants only viewed expression types according to their condition (e.g. participants in the genuine condition only viewed genuine expressions *not* posed). Participants viewed each expression and were asked to identify the emotion of the facial expression. In order to test the reliability of the emotional expressions, participants completed a second block identifying each emotion again. Finally, participants were asked to complete a short demographic survey using Survey Monkey (surveymonkey.com).

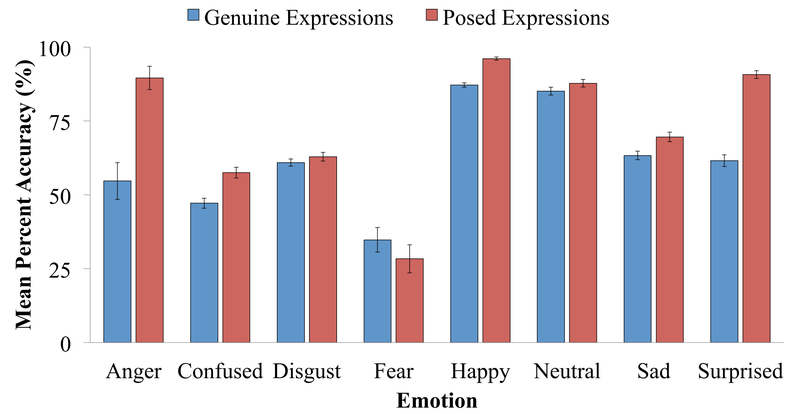

Figure 1. Mean percent accuracy for correctly identifying expressions across each emotion and expression type during the first block.

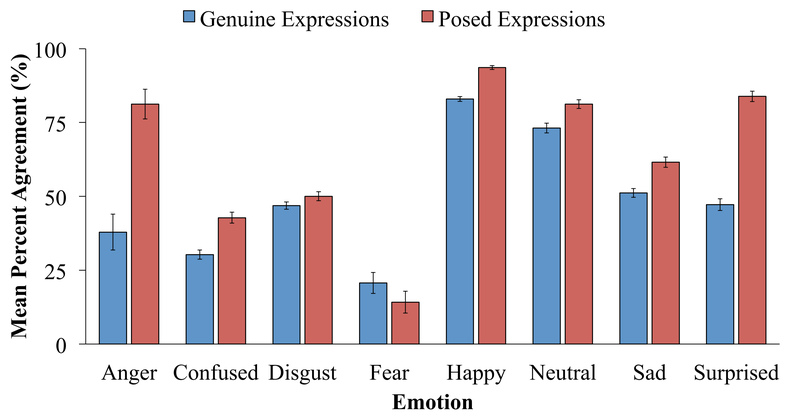

Figure 2. Mean percent agreement for correctly identifying expressions during both blocks across each emotion and expression type.

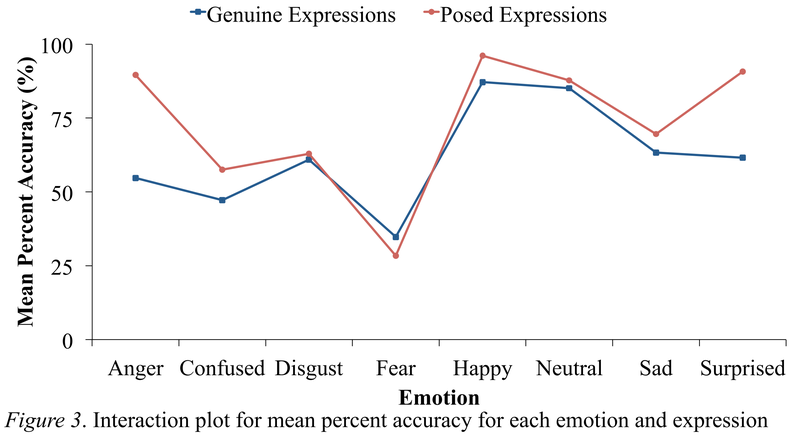

Figure 3. Interaction plot for mean percent accuracy for each emotion and expression type.

Results

A series of binomial tests were conducted to assess the validity of each expression. Only block one data was used in assessing the validity because it was participants' first impression of each stimulus. Because there were eight choices for each emotion, a .125 (1/8) criterion was used. Data revealed that all except for three genuine expressions (one disgust and two happy) were found to be accurately identified above chance. Figure 1 shows the average percent accuracy by emotion and expression type. No relationship was found between emotion intensity and mean percent accuracy, $r(206) = .01$, $p > .05$, or speed of response, $r(206) = .00$, $p > .05$.

In order to test the reliability of each expression, binomial tests were conducted to analyze the percent of participants that correctly identified the emotion during both viewings (see Figure 2 for averages across emotion and expression type). The probability of correctly identifying the emotion on both the first (1/8 or .125) and on the second (1/8 or .125) block by chance was .0156 (1/64). Every expression that was identified as valid from block one data was also identified as reliable.

A mixed factor ANOVA was used to compare the accuracy levels of posed versus genuine expressions (between variable) across the eight different emotional categories (within variable). The repeated measure variable did not meet the assumption of sphericity and the Greenhouse-Geisser correction was used. There was a significant main effect for emotion, $F(3.89, 956.63) = 286.37$, $p < .001$, $\eta^2 = .50$. Posed expressions were identified significantly more accurate compared to genuine expressions, $F(1, 1722) = 166.48$, p , $\eta^2 = .09$. Additionally, there was a significant interaction effect, $F(3.89, 956.63) = 38.19$, $p < .001$, $\eta^2 = .12$. Simple effects analyses revealed that posed expressions were accurately recognized significantly more often then genuine expressions for all emotions except fear where the reverse was true, all p's < .05.

Discussion

The final database consisted of 398 valid and reliable expressions (227 genuine; 171 posed) across eight emotions (angry, confused, disgusted, fear, happy, neutral, sad, and surprised) and two expression types (posed and genuine) derived from 47 subjects of varying ethnic backgrounds. Overall, data provided partial support for our hypotheses. Posed expressions were more accurately identified compared to genuine expressions with the exception of fear. Presumably, posed expressions were more accurately recognized because they were dramatized compared to genuine expressions. One explanation for higher accuracy rates for the genuine fearful expressions may be because their were so few fearful expressions and/or often times fear was confused for surprised. Interestingly, there was no relationship between a subject's perceptions of the intensity of the emotion and the accuracy or the speed of response by participants.

To the authors' knowledge, this is the first facial expression database that has both posed and genuine expressions of the same subjects. This database will be made free online for other researchers to utilize in emotion recognition experiments and interventions. These expressions were evoked in typical people and may be more ecologically valid compared to expressions from actors who are trained to be expressive. However, the database is not without its limitations. Unfortunately, some emotions such as fear and angry had fewer than 10 expressions. In the future, more expressions may be collected to provide more subjects with every emotion type.

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