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What Makes a Smile Sincere: Do We Express Emotions on One Side of Our Face Better than the Other[1]

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People have a variety of ways to express their emotions; in particular, their wide array of facial gestures can depict almost any mood. Somebody who is smiling sincerely presents a completely different picture than somebody who is smiling insincerely. This was established using a Likert scale assessment in experiment one where we looked at whether people are good at detecting if somebody is smiling sincerely or insincerely. The twenty pairs of faces were then used in experiment two by creating four composite faces for each individual: sincere right composite (right side of the face copied and flipped to create a mirror image of the other), sincere left composite, insincere right composite and insincere left composite. Again, subjects rated the sincerity of the smiles for these images. The goal was to determine if one side of the face was more responsible for expressing emotion (sincerity) than the other.

Introduction

It is a seemingly obvious trend in human behavior to gauge a reaction in another by looking at their facial expression. So much of communication is "non-verbal" that it holds true to the age old expression it's not what you say, it's how you say it. Research by Brand (2012) revealed that individuals have developed the ability to learn the signals being given off by a person's face in a relatively quick manner. Brand states this is apparent because of evolutionary factors as well as social ones; meaning that the greater the ability to accurately read emotions, the more assistance one can provide in social communication, reproduction and survival. Malcolm Gladwell refers to forming a quick first impression about a person as "thin-slicing," and states that we make rapid decisions about individuals and situations, often without conscious awareness that we are doing so, because very specific details can tell us a lot about that person or situation (Brand, 2012).

The right hemisphere of our brain is responsible for bringing a global, flexible, and open awareness to the world while the left hemisphere pays attention to more detail orientated things (McGilchrist, 2009). The right hemisphere is, on the one hand, intimately in touch with the body and its role in emotion and therefore with the "primitive," or "animal" areas of experience (McGilchrist, 2009).

It is clear that humans have developed the ability to determine quickly what the facial expressions of other humans are, but interest has been generated in whether or not this extends to animals. When most people meet a stranger face on, their gaze tends to shift to the left and people watch the right side of the unfamiliar face (Racca, Guo, Meints, & Mills, 2012). Research by Guo, Meints, Hall, Hall, and Mills (2009) indicates that the left-gaze bias extends beyond humans to include dogs as well. Their study indicated that when dogs were shown pictures of other dogs, gaze was distributed equally, however when shown human faces, dogs tended to gaze to the left (right side of the human face) first.

The term "facial asymmetry" is defined as the muscular involvement to one side of the face in relation to the other side (Borod, Haywood, & Koff, 1997). Their research has shown that the bottom two-thirds of the face reflects input from the contralateral (opposite) cerebral hemisphere. Hypotheses have been formulated that just as people have dominant hands (left or right), people might also have left side or right side dominant faces (Borod, et al., 1997). Their review of 49 separate studies yielded results that indicate the left side of a person's face is more involved than the right when expressing emotions, and presumably the right cerebral hemisphere has stronger connectivity to the left hemiface. If so, then it would suggest that people would prefer, or be

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more confident in their assessment of smile sincerity if a smiling face was derived from the left side compared with the right side.

The current study was conducted to elaborate on the research by Borod, et al. (1997) who found that humans express emotion better on the left side of their face as opposed to the right. It will address the issue of how composite faces are viewed in relation to right and left differences, and aim to find if there are clear differences in a person's ability to detect expression of emotions.

Method

Participants

A total of 218 participants (126 male and 92 female) volunteered as subjects. Two subjects' data were dropped due to missing responses. Subjects were taken from multiple lower and upper level psychology classes at Robert Morris University in Pennsylvania. Some participants received extra credit for their participation while others had no incentive; the decision was solely up to each professor whose class was used.

Design

The present study involved two experiments. The first was a simple two condition repeated measures design to establish that subjects could discriminate real from fake smiles. In experiment two, the design was a 2x2 design in which Smile-Type (real, fake) and Composite (left, right) were both manipulated within subjects. The three dependent variables involved ratings (using a seven point Likert scale) of smile sincerity, trustworthiness, and facial familiarity.

Materials

There were 23 individuals who volunteered the use of their faces for these experiments. To reduce the risk of participants recognizing any of the stimulus faces, photographs were taken from upperclassmen (juniors and seniors) volunteers. Three faces were used only for practice while the remaining 20 face volunteers provided a sincere as well as an insincere smile for use in the data collection stage of the experiments resulting in 40 unique photographs. Face volunteers were students throughout the university. They were told to pose for two different images (real and fake smile) and were also made aware that their images would be manipulated. No freshmen or sophomores were used, and there was an approximately equal representation of males (11) and females (9) was maintained. They were asked to pose in front of a blank wall and had two pictures taken. It should be noted that the batch of usable stimuli came from people who had good facial symmetry and avoided tilting of the head in any way. A head tilt caused one composite picture to seem overly wide and top heavy while the other composite picture seemed unnaturally skinny.

All photographs were taken with a digital camera and then transferred to a PC for image manipulation or storage. Microsoft Office PowerPoint was used to generate the slides that were presented to classes during both experiments. Although all 20 (plus three practice) face volunteers were seen by all participants, only one version of each image was ever seen by any research volunteer (conditions were counterbalanced across classes). For example, set one contained stimulus-face 1's real smile derived from the composite of his or her left side; set two included stimulus-face 1's real smile derived from the composite of his or her right side; set three used a fake smile composite made from the left side; and set four presented the same person's right side composite image based on their fake smile.

Experiment one established that the subjects were able to determine smile sincerity. For experiment two, the 40 images were manipulated in PowerPoint to create mirror composites. Each real and fake smile image was divided in half and each half was mirrored to create a composite face: Real, left-composite; Real, right-composite; Fake, left-composite; and Fake, right-composite. The resulting 80 images were distributed into stimuli files that counterbalanced faces so that no participant ever saw a stimulus face more than one time.

The survey contained 72 questions. The first three were filler questions that determined sex, a self-report of how much each subject's mood was affected by others, as well as a self-report of how good they believed they could detect lying. The experimental questions were repeated in sets of three for each of the 23 images (3 practice, followed by 20 experimental) to be viewed. (1)

How sincere/real does this person's smile seem to you? (2) *How trustworthy does this person seem to be?* (3) and, *How familiar does this person seem to be?* Questions were answered on a Likert scale from 1 to 7 with 1 representing fake or not-at-all (respectively) and 7 representing real or very (respectively).

Procedure

The researcher was allowed time in multiple classes to collect data. Once all students were present, the surveys were distributed and the researcher explained the task. No mention was made about composite faces, and no participant appeared to notice that some of the stimuli faces were derived from mirrored half-faces. Before beginning the slideshow, the research asked for questions of clarification. When everyone appeared ready, the slideshow was started and ran for about 15 seconds per slide (23 slides).

Once the slideshow was completed, the researcher collected the surveys, thanked everyone for their time, and departed. All data were collected anonymously from students in classroom sized groups and the time needed to collect data from each class never exceeded ten minutes.

Results

For experiment 1, an analysis of variance (ANOVA) was conducted on each of the three measures (Sincerity, Trustworthiness, Familiarity). For Sincerity, a significant effect of Smile-Type was also found, $F(1,216) = 146.77$, $p < .01$, in which real smiles were rated as more sincere (mean = 4.69, SD = 0.93) than fake smiles (mean = 3.73, SD = 0.91). For Trustworthiness, a significant main effect of Smile-Type was found, $F(1,215) = 60.56$, $p < .01$, in which real smiles were rated as more sincere (mean = 4.23, SD = 0.93) than fake smiles (mean = 3.66, SD = 0.91). For Familiarity, no effect of Smile-Type was found ($p > 0.35$).

The evidence from experiment 1, that subjects could discern real from fake smiles for the current stimuli, allowed us to proceed with experiment 2. In this study, a 2 x 2 within subjects ANOVA was conducted on mean ratings of Sincerity, Trustworthiness, and Familiarity. See Table 1 for a summary of means for all conditions of Experiment 2.

For Sincerity, a main effect of Smile-Type was found, $F(1,216) = 142.62$, $p < .01$. Real smiles were rated as more sincere (mean = 4.18, SD = 1.11) than fake smiles (mean = 3.51, SD = 0.99). Also, a main effect of Composite was found, $F(1, 216) = 30.31$, $p < .01$. Right composite faces were rated as significantly less sincere (mean = 3.70, SD = 1.08) than left composite faces (mean = 4.00, SD = 1.11). The interaction of Smile-Type and Composite was not significant ($p = .15$).

For Trustworthiness, a main effect of Smile-Type was found, $F(1,215) = 54.45$, $p < .01$. Real smiles were rated as more sincere (mean = 3.90, SD = 1.01) than fake smiles (mean = 3.54, SD = 0.97). Also, a main effect of Composite was found, $F(1,215) = 15.27$, $p < .01$. Right composite faces were rated as less sincere (mean = 3.63, SD = 0.98) than left composite faces (mean = 3.81, SD = 1.03). The interaction of Smile-Type and Composite was not significant ($p = .89$).

Table 1. Experiment 2 means (standard deviations) for all conditions and dependent variables.

Dependent Variable	Real		Fake	
	Right	Left	Right	Left
Sincere	**4.07 (1.92)**	**4.29 (1.11)**	**3.32 (0.93)**	**3.70 (1.01)**
Trustworthy	**3.82 (1.01)**	**4.00 (1.01)**	**3.48 (0.91)**	**3.64 (1.01)**
Familiar	**2.44 (1.23)**	**2.50 (1.30)**	**2.20 (1.10)**	**2.44 (1.24)**

For Familiarity, a main effect of Smile-Type was found, $F(1,215) = 6.81$, $p < .05$. Real smiles were rated as less familiar (mean = 2.47, SD = 1.26) than fake smiles (mean = 2.32, SD = 1.18). Also, a main effect of Composite was found, $F(1,215) = 8.07$, $p < .01$. Right composite faces were rated as less familiar (mean = 2.32, SD = 1.17) than left composite faces (mean = 2.47, SD = 1.27). The interaction of Smile-Type and Composite was not significant ($p > .05$). Although these outcomes were statistically significant, the effect sizes are small. Also, it is notable that this measure produced the lowest values (all scores were less than 3).

Discussion

The findings of Experiment 1 indicated that people have the ability to detect if a person is expressing a real (sincere) or fake (insincere) smile. Since other factors come into play, such as the top versus bottom half of the face having different effects, this should be studied further examined. Research in this area has indicated that when subjects viewed facial expression only from the lower part of the face, they accurately identified the emotion. However, when looking at only the top part of the face, there were differences with right composites and left composites indicating the upper part of the face expresses emotion in a more subjective way (Prodan, Orbelo, Test, & Ross, 2001).

The findings for Experiment 2 indicated that people viewed left composite faces as more sincere than right composites, meaning people tend to express an emotion of sincerity better with the left side of their face than with the right. The more a face appears to be both average and symmetrical, the more attractive it appears (Jones, DeBruine, & Little, 2007). It also suggests that composite faces (those manipulated by computers) tend to be viewed as more attractive than natural appearing ones (Jones, et al.). In combination with the left gaze bias theory that emotion is better expressed from the left side of the face due to a stronger right hemispherical involvement (Borod, et al., 1997), this supports why the left composite faces were viewed slightly more sincere than the right composite faces (for both real and fake smiles).

Although this study examined the facial expressions of college students (juniors and seniors), it would be beneficial to target a wider age-range of facial images. Due to facial changes with age, it may be that being able to discriminate sincerity might also change. Change in ability to detect sincerity might also be true as a function of age of participant. Examining age related changes would be interesting and beneficial toward filling the gap of what role facial symmetries play in the perception of sincerity.

It would also be interesting to expand on the research of McGilchirst (2009) which suggested that a fundamental basis of neuropsychology in relation to hemispheric differences is to distinguish between processes. Since there is cross over between the hemispheres of the brain (assuming the corpus callosum is intact), it seems that they share one central processing center. However, it is also the case that because each cerebral hemisphere deals with an extensive amount of functioning independently, further research is needed to pinpoint how much of that difference is expressed in facial emotions.

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