A BEHAVIORAL STUDY OF FACE SYMMETRY AND TRUSTWORTHINESS

by

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A Thesis
Submitted to the
Graduate Faculty
of
George Mason University
in Partial Fulfillment of
The Requirements for the Degree
of
Master of Arts
Psychology

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Date: _____ Fall Semester 2019
George Mason University
Fairfax, VA

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Bachelor of Arts
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ABSTRACT

A BEHAVIORAL STUDY OF FACE SYMMETRY AND TRUSTWORTHINESS

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First impressions can play an important role in how we judge and interact with other people. Humans often rely on rapid judgments of personality traits and qualities, such as trustworthiness, based on physical features such as someone's face. Similarly, perceptions of the attractiveness are often made quickly and based on facial features. A common contributor to ratings of trustworthiness and attractiveness is facial symmetry: we tend to find faces that are more symmetrical to be both attractive and trustworthy. There is also evidence of differences between males and females in the use of cues such as symmetry in judgments of faces. This thesis aimed to describe the interactions between face symmetry and the perception of trustworthiness and attractiveness, as well as possible contributions of sex differences in the use of these cues. In this study I created a task to determine the contribution of symmetry to judgments of trustworthiness and attractiveness. The study utilized an online experiment environment, Millisecond. The experiment assessed trustworthiness and attractiveness among faces in a judgment task.

Due to technical difficulties we could not collect data from the trustworthiness ratings. However, I did find evidence for differences in the reliance on face symmetry for judgments of attractiveness between males and females. This behavioral research contributes to our understanding of human perception and could potentially be applied to jury selection, among other uses.

INTRODUCTION

What do facial judgments tell us?

We live in a world where we are perpetually being judged or are judging others. How we make a snap judgment on one's face forecasts many other critical decisions we make about that individual. For example, the influence of one's first impression could be the deciding factor between which politician is voted into office, whether a person is found guilty or not guilty in a trial solely based on facial appearance, the trustworthiness of an attorney, or the selection of being hired for a job (Todorov, 2017). Additionally, in the brief moment we are exposed to an unfamiliar face, these inferences aid our predictions of one's trait characteristics (trustworthiness and dominance), social class, and potential social network (Todorov, Said, Engell, & Oosterhof, 2008). First impressions can be a pivotal lasting impression that form the infrastructure in which relationships and friendships are constructed (Jones, Moore, Stanaland, & Wyatt, 1998).

Emotion Overgeneralization Hypothesis

According to the emotion overgeneralization hypothesis, people assume personality traits from the resemblance of their morphological features to their emotional expression (Zebrowitz, 2004). In one previous study, neutral faces were perceived to be higher in dominance in comparison to their counterparts and were viewed as happy and

more trustworthy than those resembling a negative demeanor (Neth and Martinez 2009). Alternatively, they were perceived to obtain traits such as disgust, fear, anger, and threat as a result of our overgeneralization emotion recognition system (Said, Sebe, & Todorov, 2009). Additionally, personality traits are also inferred from these emotional displays. For example, if someone appears to be expressing happiness, they are often perceived to have positive social traits whereas someone who appears angry is often perceived to be socially dominant (Hess, Adams, & Kleck, 2005). The emotion overgeneralization hypothesis also applies to judgments of trustworthiness in individuals based on their appearance. In the following experiment faces will be solely limited to a neutral facial expression.

Representational dynamics of facial judgments and trustworthiness

In a behavioral and cognitive study performed by Freeman, Stolier, Ingbretsen, and Hehman (2014), it was found that neural activity in the sub-cortical region of the amygdala, decided in approximately 33 milliseconds, quicker than the blink of an eye, reflected the trustworthiness of an individual face. These results suggest that the trustworthiness of a face might be registered even before perception of the face reaches conscious awareness. In that study, regions of the amygdala tracked not only how untrustworthy a face appeared but also the overall signal of the strength of the face's untrustworthiness in both "original" and "augmented" faces that were modified to how trustworthy they appeared. Therefore, the amygdala's processing of high-level social cues (stereotypes, attitudes, goals) and facial information is far greater than anticipated in the

absence of awareness (Freeman & Johnson, 2016). Furthermore, the amygdala's response to untrustworthy individuals is greater than one's own conscious individual judgments (Engell, Haxby, & Todorov, 2007). This means that the automatic categorization of perceived signaling of trustworthy and untrustworthiness is processed very early in the processing stream. Thus, if an individual is perceived as being trustworthy it could be inferred that they would also be evaluated positively as being attractive (Todorov, Baaron, & Oosterhof, 2008).

What makes a face attractive?

Kościński (2007) studied facial preferences (size, shape, averageness, etc.) cross-culturally, as well as facial symmetry, and concluded that female preferences included prominent lips, small lower face, good complexion, youthfulness, symmetry, light hair, and light skin. Additionally, other positive correlations include large eyes and significant space between eyes, small nose and chin, higher eyebrows, and high cheekbones (Cunningham et al., 1995). Male preferences included moderate levels of masculinity (eye-mouth-eye angle and face size), skin condition, and, importantly, symmetry (Danel & Pawlowski, 2007). Cunningham et al. (1995) also noted other statistically significant measures that portray dominance and attraction of males that include wider cheekbones, chin, and jaw. These data indicate that symmetry might be one of a number of contributing factors to perceptions of facial attractiveness. However, it does appear to be an important factor that might reflect things such as the genetic fitness of a potential mate.

Evolution of Symmetry and Its Relationship with Attractiveness

Not only are the human species concerned with the attractiveness of their potential partner, in fact, this has shown to hold true among other species within the animal kingdom, as well. Non-human species tend to rely more so on physical traits like size, shape, exterior elements (feathers, fur, color, etc.) to attract a partner (Andersson, 1994). Symmetry in animals reflects overall quality of development (Wade, 2010). Through extensive animal research, symmetry is one of the individual traits that has been found to be highly attractive across humans and animal species (Moller & Thornhill, 1998). For example, peacock females are attracted to males with a higher degree of train or tail symmetry and detail (Petrie & Halliday, 1994). In another example, E. Westwoodii male butterflies with more symmetrical claspers and antennae have been shown to obtain an advantage for more successful mating (Koshio, Muraji, Tatsuta, & Kudo, 2007).

In a study regarding face symmetry and the perception of beauty by humans, the experiment drew positive correlations between symmetry and attractiveness. In experiment one, attractiveness increased when symmetry increased, and when symmetry was decreased so was the level of perceived attractiveness. The morphed faces used in their study, which was a statistical measure used across the sample of faces that was averaged, was preferred over the "original" faces for the population they sampled (Rhodes, Proffitt, Grady, & Sumich, 1998). Grammer and Thornill (1994) found evidence that symmetry plays a major role in facial attractiveness. In their experiment, they asked men and women to rate to rate the opposite sex on attractiveness. Faces were morphed to

be more symmetrical by averaging composite photos (4 faces, 8 faces, and 16 faces). Their results concluded that males rate female faces as more attractive when they were more composite photos which increased the symmetry of the faces. Interestingly, females rated men as less attractive the more symmetrical they appeared in comparison to the individual authentic male faces presented in the task. “Synthetic” faces are mathematical averages of faces in a sample population, the technique used to average their facial symmetry was assigning numerical values, averaging the result, and developing a new face; these results supplemented a general definition of facial attraction from an evolutionary and cognitive-model point of view (Langlois, Roggman, & Musselman, 1998). In another study, comparatively, facial asymmetry was an indicator for low resistance to disease, and being susceptible to parasites, both being undesirable genetically transmitted traits (Cronin, 1992; Hamilton, Axelrod, & Tanese, 1990).

To further justify the link between symmetry and attractiveness, Langlois, Roggman, and Musselman (1998), performed a study on facial attractiveness in relation to facial proportions detected through the functional magnetic resonance imaging technique (fMRI) on humans. Results were found to be quite similar (Shen et al, 2016). Facial attractiveness was found to be affected by induced facial proportions which induce positive neural responses in reward regions such as the caudate nucleus, amygdala, and orbitofrontal cortex (OFC). Averaged or “synthetic” faces were found to be more attractive which was attributed to facial ratios and face shape of a person. These findings suggest neurophysiologic evidence to hypothesize that human faces, not including the

influence of hair, skin tone, or facial expression, with the variable proportions, have a biased attraction.

Trustworthiness and Attractiveness

Growing up, we are often given advice from our parents and other social and educational leaders not to judge a book by its cover and in a study designed by professors Eckel and Wilson (2004), they tested just that. They created an experiment online across several states to ensure the subjects did not know one another and from the study were able to conclude that people are in fact willing to trust complete stranger through the online task. In a later study, Eckel and Wilson (2006) tested whether attractiveness is used as a means to discriminate their trust toward a stranger. Their findings strongly supported that we shy away from our parents' advice and concluded that attractiveness appears to be a major component in trust and evaluation. Subjects not only trusted strangers blindly but also trusted them solely on their level of physical attractiveness.

In a different study, Sofer and colleagues (2015) examined the relationship between facial trustworthiness and attractiveness. They tried to disentangle the link between these two variables by examining how face typicality contributed to each. They used morphed faces that varied along a continuum between typical and attractive. They found that ratings of the trustworthiness of faces seemed to be linked to how typical the faces were, whereas ratings of attractiveness increased even as the face became less typical and more attractive. Typical faces were created by averaging many faces together. The authors argued that these data indicate that more typical faces are perceived as more

trustworthy. However, it is possible that this typicality effect on trustworthiness might be a consequence of typical faces being more symmetrical. Assuming that the exact nature of facial asymmetry is randomly distributed, averaging many asymmetrical faces together should create a more symmetrical face.

Trustworthiness and Symmetry

Attractiveness appears to be a by-product of higher face symmetry, amongst other characteristics. Numerous experimenters and researchers have reported that symmetry is also a critical factor in judgments of attractiveness in real faces (Jones et al., 2004; Little, Burt, Penton-Voak, and Perett, 2001; Rhodes, Proffitt, Grady, and Sumich, 1998; Rhodes et al., 2001). A significant advancement to this claim was found by researchers when they determined that although there are some sex difference found in humans, increasing symmetry of face shapes also increased ratings of attractiveness for both sexes and this in return had a positive impact on humans mating selection (Perett et al, 1999). Additionally, in a previous study performed by Zaidel, Bava, and Reis (2003), their results concluded that trustworthiness was directly associated with attractiveness than to a positive or negative facial expression expressed (neutral, happy, sad). It appeared to have created a "halo effect" which is when an impression influences one's opinion of another field.

Willis and Todorov (2006) over five experiments, tested to see if increased exposure to a face would alter how an unseen face is perceived. After increasing the exposure time from 100 to 500 milliseconds, it could be confidentially established that

increased exposure time did not increase the correlation across judgments (attractiveness, likeability, trustworthiness, competence, and aggressiveness). In fact, as exposure time increased, the participant's negative judgments increased. After increasing the time allotment from 500 to 1,000 judgments did not significantly change; however, the participant's confidence did increase in their perceived judgment toward the faces shown.

Untrustworthy Faces

Rule, Slepian, and Ambady (2012) explored single brief perceptions of unseen faces over three studies. In the first, participants encoded all of the faces provided as trustworthy or untrustworthy. The second, compared memory for faces rated high and low on numerous traits to include dominance, face maturity, likeability, and trustworthiness. They found from the second study that unlikable and untrustworthy faces were remembered unquestionably more so than the other traits. The final study compared information regarding facial appearance and trustworthiness. From this, Rule, Slepian, and Ambady deduced that untrustworthy individuals were remembered more so than trustworthy ones for behavior and faces. Trustworthy cues and facial appearance may lead the general population to who is remembered and forgotten in a single first impression which is consistent with ecological theories of perception. In Figure 1, it can be seen that in an expreiment performed by Freeman, Stolier, Ingbretsen, and Hehman

(2014), the right side of the amygdala had a higher response to untrustworthy faces than to trustworthy faces.

Figure 1: Results from a preliminary study examining the amygdala activation toward low-trustworthy faces performed by Freeman, Stolier, Ingbretsen, and Hehman (2014). Figure 1 shows a stronger bilateral amygdala activation to low-trustworthy faces. Depicted is a stronger response to low-trustworthy targets versus average- or high-trustworthy targets from a random-effects analysis targeting the bilateral amygdala ($p<0.05$, corrected) in the coronal slice ($y=-5$). Bar plots depict the mean Beta values for the 3-block type and error bars indicate SEM.

Symmetry vs Asymmetry

With the advanced technology measures in computer graphics, it has been researched and demonstrated that increasing facial symmetry, is sufficient to increasing attractiveness (Rhodes, Proffitt, Grady, & Sumich, 1998; Perrett et al., 1999). These preferences and exposure to symmetrical manipulated faces and asymmetrical faces have not only been limited to human studies. Other primates, most closely aligned to the Homo Sapiens species, monkeys, also share the same preference. Waitt and Little (2006) studied Macaca Mulatta (monkeys) and found that they had significant preferences toward the symmetrical faces by observing visual cues and behavior assessments. Evolutionary history facial symmetry preferences may be much further established than we previously speculated.

Is symmetry really the greatest predictor of attractiveness?

Many studies question whether symmetry is the determining factor in the perception of attraction. Hume and Montgomerie (2001) successfully demonstrated that socio-economic status may be the greatest predictor for male facial attractiveness, over symmetry by women. Alternatively, Jones et al. (2001) interpreted the results from his study as good health potentially the driving cause in attractiveness ratings.

Scheib, Gangestad, and Thornhill (1999) performed an experiment to see if cues of phenotypic condition were among those used by females when choosing a mate. One of those conditions was symmetrical body and facial features. They removed symmetry cues to subjects by only displaying the left or right half of a face. Their findings suggested that supplementary features can be used to assess phenotypic condition, over the symmetrical feature. In a similar study, Zaidel and Marjan (2010) tested half faces versus full faces to test whether attractiveness could be concluded only from the presence of half faces. Their results concluded that there was not any statistically significant differences in attractiveness ratings thus consistent with the viewpoint that symmetry does not establish the fundamental factor in beauty assessment. It is unclear if this conclusion could be validated in that the half of the face shown may have had the necessary symmetrical metrics and thus did not support the theory.

Some animals share the pattern that symmetry is not the greatest factor in attraction such as with the eastern fence lizard, *Sceloporus Undulatus*, whom exhibit a

preference for local mates rather than the factor of symmetry (Hardwick, Robertson, Rosenblum, 2013). Like the eastern fence lizard, the livebearer fish, *Jenynsia*, have a preference to asymmetry, specifically in genitalia. The direction of genital asymmetry was found positively correlates with mating preferences in a series of experiments performed by Torres-Dowdall, Rometsch, Aguilera, Goyenola, and Meyer (2019).

Study Rationale

As described above, there is a relationship between face symmetry and attractiveness. Evidence also suggests that attractive faces are judged as more trustworthy. Face typicality might also contribute to trustworthiness ratings, although it is not clear if this is directly a result of the face typicality, or if it reflects the possibility that typical faces are more symmetrical. To disentangle these ideas, in this study, we wished to examine more directly the relationship between facial asymmetry and trustworthiness, while trying to control for the attractiveness of the face. To do this, we chose faces that were rated as less attractive and others that were rated as more attractive. We then made the unattractive faces more symmetrical than the attractive faces, and then morphed the faces along a continuum from unattractive/symmetrical to attractive/asymmetrical. We hypothesized that if symmetry directly contributes to ratings of trustworthiness, trustworthiness ratings should decrease as the faces become more asymmetrical, even as ratings of attractiveness increase.

METHOD

Participants

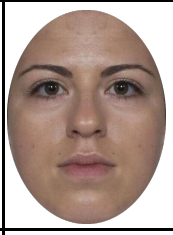
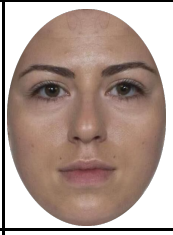
188 participants, with a mean age of 20.36 and a standard deviation of 3.39, that obtain normal or corrected-to-normal 20/20 vision via self-report were recruited to participate from George Mason University. This vision restriction is mandatory for the visual stimuli that will be presented in this behavioral study. The recruitment process was conducted through the use of the University's SONA system and email outreach. Gender, ethnicity, and socioeconomic status were dependent on the recruited participants. Before the study was conducted, informed consent was to be collected.

Materials

Materials for this study include an introductory script, consent form, demographic survey, face trustworthy or attractiveness judgment task, and a debrief script. The introductory script gave participants an overview of the study being performed. The demographic survey, though not required to complete, asks participants for their race, gender, and age.

Stimuli

The technique in the paper by Sofer, Dotsch, Wigboldus, and Todorov (2014) was be adapted to create facial transformations. 6 neutral female faces were accessed from Version III: The Face Research Lab London Set database (DeBruine & Jones, 2017). The "original" stimuli are the original faces provided from the database whereas the "synthetic" stimuli are derived from facial averages created on the PsychoMorph online software. "Original" faces selected were rated as unattractive (asymmetric) and 5 were selected. A singular "original" face selected was attractive to the naked eye. Nine symmetry transformations per one face were performed (from 0% to 100% in increments of 10%) to have a total of 50 faces, which can be seen in Figure 2. For the 5 "original" unattractive faces, we progressively morphed them closer to our selected attractive and asymmetrical face. By doing so, symmetry is being decreased and attractiveness is being increased. All of the faces were marked with 180 corresponding points to average the shape and facial features resulting in the synthetic faces appearing more realistic.

Typical face DFT = 0%	DFT = 10%	DFT = 20%	DFT = 30%	DFT = 40%
				
DFT = 50%	DFT = 60%	DFT = 70%	DFT = 80%	DFT = 90%

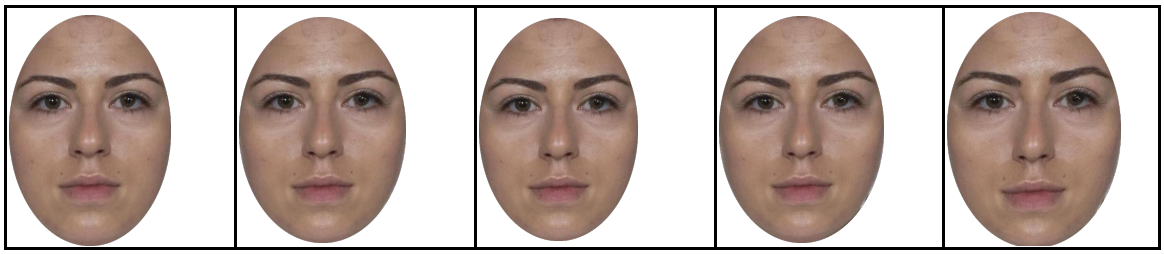


Figure 2: The face transformations used in this experiment were created through the morphing of asymmetrical faces to an attractive composite face. The unattractive and symmetrical typical face (difference from typical face, or DFT= 0%) was the beginning of the series and the endpoint was an attractive face (DFT=+100%)

Measurement

To be able to quantitatively measure the faces, every face was marked with 14 corresponding points using the computer software GIMP. The technique utilized in the study performed by Little, Burt, Penton-Voak, and Perrett (2001) was used to measure facial symmetry (Figure 3). The following measurements were taken in this experiment: Cheekbone Prominence (D3,D6), Jaw Height (D9,D8), Face Width (D3,D8), Inner and Outer Pupil Difference from the midline (D1,D2), Nose Width from midline (D4), Lip Width from the midline (D5), and Face Height (D7). These face measurements allowed us to effectively find the midpoint of the face to make the individual composite photos symmetrical.

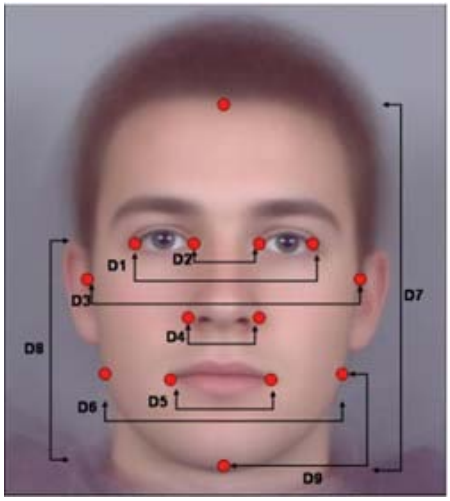


Figure 3: The figure above was taken from the study performed by Little, Burt, Penton-Voak, and Perrett (2001) and used to illustrated how facial symmetry will be measured in this experiment. From the midline, left and right deviations were taken, calculated from distance between the inner pupils for points D1-D6 and then finding the total value by adding each individual score to calculate the facial symmetry of each "original" and "synthetic" face.

Face Trustworthy Judgment Task

This tested the linkage between facial symmetry and trustworthiness by explicitly manipulating the facial symmetry to vary naturally, then having the participants rate the faces on attractiveness or trustworthiness. The experiment will be operated on George Mason's SONA software.

Procedure

Participants first completed a consent form, followed by a demographic survey. The survey gathered information regarding age, gender, and ethnicity for the individual

participants. After the completion of the form and survey, participants were asked to complete the behavioral study. In the face trustworthy judgment task, participants were randomly presented a set of 150 morphed "synthetic" faces. On a scale of 1 (definitely not [trait]) to 9 (definitely [trait]) Participants were asked to rate the faces on how trustworthy they perceived the face to be. This task took approximately 25 minutes to complete. Participants were asked to rate the faces on a scale of 1 to 9 on how attractive they perceived the face to be. This task took approximately 25 minutes to complete. After the completion of the task, a debrief script ran immediately for each participant.

Data Collection/Analysis

Data collection and analysis was gathered through the Inquisit software. "Synthetic" faces and "Original" faces will be manually separated through the data collected. This, in turn, allowed for the production of an excel spreadsheet that was then exported into SPSS for further analysis. A one-way analysis of variance using ANOVA was conducted to determine whether there are any statistically significant differences between the means of the independent tasks completed, the Control Task and the Face Trustworthy Judgment task. Tukey and Bonferroni Adjustment Post Hoc were used in the analysis since they are both in the middle among conservative and liberal options for applicable data understanding.

Prediction

In unity with the results from the behavioral study, we expect to see a significantly higher selection among the "synthetic" faces attributed with the factor of trustworthiness. Our hypotheses are rooted in the following theory, if an individual has greater face symmetry, the higher the likelihood of perceived trustworthiness.

RESULTS

Due to a technical error, subjects were not randomly assigned to the trustworthiness task, therefore only data for the attractiveness task was collected in this study. A total of 188 volunteers were received for the attractiveness task. We averaged the 3 repetitions of 5 faces for each participant. Of the 188 subjects, exclusions included 38 individuals. These 22 subjects aborted the experiment early, 12 provided false data or dummy response by rapidly pushing the number 5 for the entirety of the experiment, and 4 individuals we did not receive enough demographic information on to be able to effectively utilize their data. Of the 150 participants used in this experiment, 100 were females and 50 were males.

Attractiveness Task Data Analysis

A linear mixed effects (LME) mathematical model was used to examine the effects of morphing the unattractive/symmetrical faces to the attractive/asymmetrical face on ratings of attractiveness. Based on the methods used by Sofer and colleagues (2015), we examined the effects of sex (female=0, male=1), morph level (linear effects), morph level squared (quadratic effects), and the interaction between these predictors. Sex, linear, and quadratic effects were treated as fixed effects, while participant was treated as a random effect. Similar results were observed when linear and quadratic effects were

treated as random effects. All predictors were mean-centered with unit variance prior to running the model. The LME results indicated no significant main effect of sex, $B = -0.069$, s.e. = 0.168, $p > 0.05$. The linear effect of morph level was significant, $B = 0.547$, s.e. = 0.049, $p < 0.0001$, and the quadratic effect of morph level was also significant, $B = -0.508$, s.e. = 0.049, $p < 0.0001$. The interaction between sex and the linear effect was significant, $B = -0.241$, s.e. = 0.085, $p < 0.005$, and the interaction between sex and the quadratic effect was also significant, $B = 0.266$, s.e. = 0.085, $p < 0.005$. Figure 4 shows the mean attractiveness ratings for each morph level for males (red circles) and females (blue circles), with the quadratic effect for each sex (+/- s.e.) plotted as dashed lines.

To compliment these results, we ran a Repeated Measures General Linear Model (GLM), to examine the mean ratings of attractiveness among both males and females. In Omnibus test, the results of the GLM revealed a significant effect of attractiveness, $F(2.96, 438.72) = 13.81$, $p<0.001$, Greenhouse-Geisser correction. The GLM had both a significant linear, $F(1, 148) = 8.456$, $p<0.05$, and in the quadratic, $F(1,148) = 69.02$, $p<.0001$. The interaction between attractiveness and sex was not significant for the linear effect, $F(1,148)=.18$, $p>0.05$) but the attractiveness by sex was significant for the quadratic effect, $F(1,148)=8.713$, $p<0.005$). There was no significant effect of sex on ratings of attractiveness, $F(1,148)=0.171$,$p>0.05$.

Table 1: Attractiveness Mean Ratings

Dependent Variable	Mean	Standard Error (SE)	N
Female Average (0)	4.192	0.098	100
Male Original (1)	4.122	0.139	50

As the synthetic faces grew more attractive and less symmetrical or less asymmetrical, both the male group and female group rated the faces as being more attractive. In Figure 4 it can be seen that the male ratings increased significantly, then flattened off. Females alternatively, had a greater increase than males, flattened off for a shorter span, then dropped off just as the male ratings did.

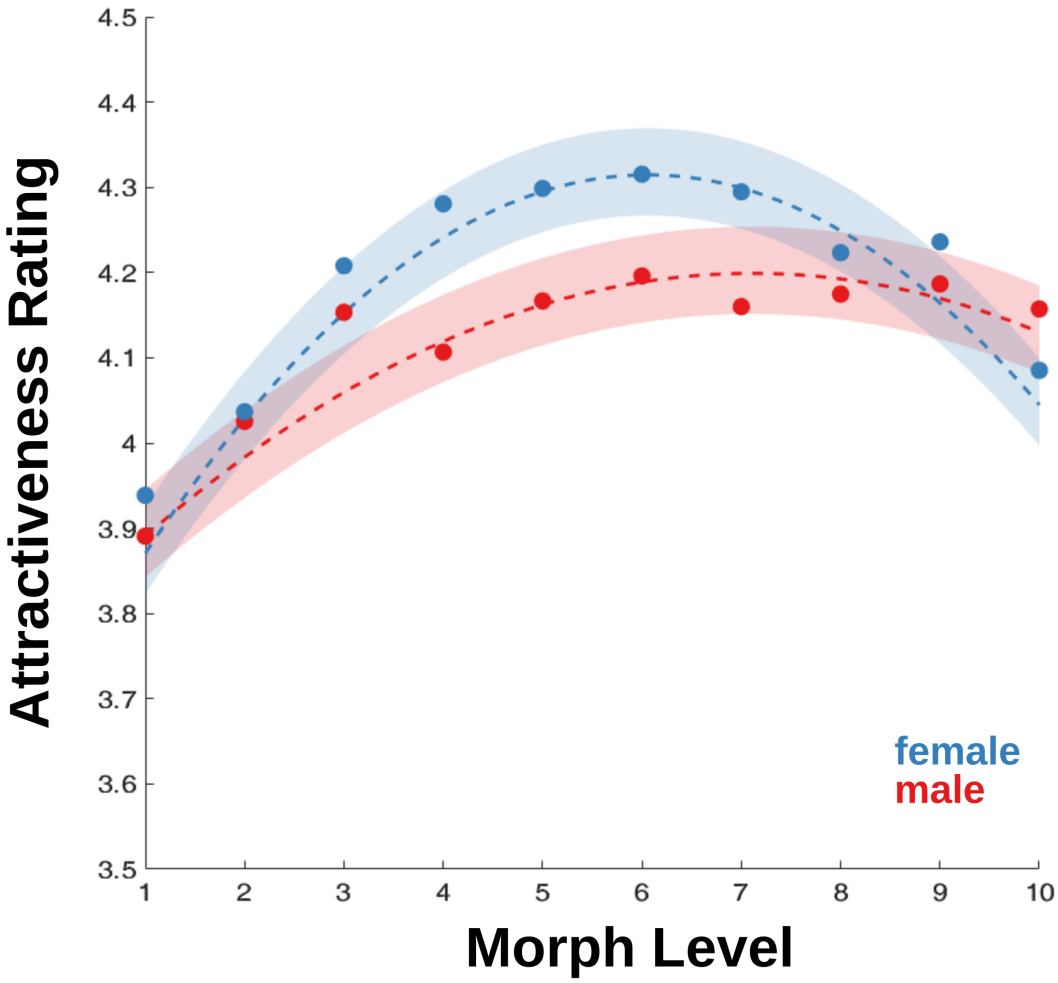


Figure 4: Estimated Marginal Means of Attractiveness in Males (red) and Females (blue)

DISCUSSION

Due to a technical error we were unable to include the trustworthiness component, therefore we only observed data from the attractiveness task. It is evident that symmetry does play a role in attractiveness for both males and females. However, in the following experiment, we found evidence suggesting that males and females perceive attractiveness differently. Both genders found symmetrical faces attractive to a degree until the ratings either flat-lined or dropped off. These findings strongly support the hypotheses that a high degree of facial symmetry may have a minor negative effect on attractiveness judgments (Kowner, 1996; Grammer &Thornill, 1994). Similar with that of the literature, it can be interpreted that male's perception of attractiveness reduces as asymmetry increases in females (Rhodes, Proffitt, Grady, & Sumich, 1998; Perrett et al., 1999). Alternatively, females appear to be less sensitive than males to asymmetry. Asymmetry appeared to be less substantial to females since it contributes less to their ratings of attractiveness.

There has been a gamut of studies performed on females and their preference of symmetry in male partners in animals and humans, however far less is known about male preferences (Moller 1992; Thornhill 1992; Gangestad et al. 1994). Singh (1995) found that males judged symmetrical breasts on females as being more attractive than asymmetrical ones. In another study, the Japanese Scorpionfly, otherwise known as

cerambycid beetles, were recorded preferring to mate with females dawning symmetrical antennae than asymmetrical antennae (Moller & Zamora-Munoz, 1997).

Although symmetry is important to an extent in attraction for females, is it is not the primary factor. These results support the notion that symmetry is not the primary leading factor in attraction in humans (e.g. Hume & Montgomerie, 2001; Jones et al., 2001; Scheib, Gangestad, & Thornhill, 1999; Zaidel & Marjan, 2010). By showing the influence of attractiveness between males and females, our results display a new finding on gender preferences of attractiveness and the importance of perception and cognition.

What did this study tell us?

We expected that this study would show an uncontrollable bias of the brain, such as perceived trustworthiness based off of face symmetry. Using a visual task face trustworthy judgment task, we were trying how this bias may emerge across the majority of the sample population.

The experiment that we performed may be a new finding that males are significantly more sensitive and prefer symmetry more than females do. Our results are consistent with the findings by Grammer and Thornhill (1994) and Cunningham et al. (1995), who found differences between males and females in the use of symmetry in judgements of attractiveness. In their study, the found that males rated female faces as more attractive if the faces were more symmetrical, whereas females rated male faces as less attractive if they were more symmetrical. This suggests that men and women might rely on different cues to judge the attractiveness of faces. One major difference between

the study of Grammer and Thornhill (1994) and mine was that in my study participants only rated female faces. We chose to only use female faces in order to minimize confounds in the perception of trustworthiness from faces. It is possible that there is a difference between how men and women use symmetry to judge the attractiveness of others. Another explanation could be that males are less sensitive to faces of any sort, thus, less sensitive to asymmetry or attractiveness. Alternatively, my results might indicate that sex differences in the use of symmetry extend primarily to judgments of only female faces. I did observe that both men and women increased ratings of attractiveness at the first few morph levels. However, the significant interaction between linear increase along the attractiveness/asymmetry direction and sex might suggest that the female participants were less sensitive to the increasing asymmetry of the faces.

The quadratic effect of morph level indicated that for both male and female participants, ratings of attractiveness dropped as the face became the most symmetric. This effect was greater in the females than males, suggesting that when female participants did start to notice the asymmetry their perceptions of attractiveness dropped. For males, my results showed that after only a few steps of increased attractiveness/asymmetry, ratings of attractiveness plateaued. For females, ratings of attractiveness continued as the faces increased in attractiveness/asymmetry for several more steps that for the males, until ratings dropped more rapidly than in the males. Future research might help understand these effects of asymmetry on ratings of attractiveness in males and females.

That being said, we are unsure whether or not this is sexual attractiveness, since we do not know the sexual orientation of the participants. This means it could be interpreted as overall aesthetic pleasantness rather than sexual attractiveness.

Future Implications

There are several directions that future work can build upon regarding studies of face symmetry in correlation with perceived trustworthiness. One path is to examine in more detail the neural basis of visual system processing by monitoring brain wave activity. For example, a future study may propose that while monitoring the brain activity of human adults while they perform an EEG visual task on face asymmetry and trustworthiness, the N170 component amplitudes in response to asymmetry will increase as perceived trustworthiness decreases. Another path could be studying the brain activity of jury members when they are first subject to seeing the accused in a trial scenario to better understand the uncontrollable bias shown in this study. A third route to investigate would be the differences of perceived trustworthiness in gender between males and females. Lastly, and alternatively, a study could be performed on the symmetry of untrustworthy faces. The results of the study are not conclusive of the initial experiment that was planned to run on the correlation of perceived trustworthiness with face symmetry due to a technical error.

The current study offers a relatively simple method to draw inferences about difference in gender attractiveness perception. Future studies may incorporate male facial ratings to overcome the limitation of solely using female faces in this experiment.

Alternatively, only Caucasian ‘white’ females were used in this experiment, this could be extended to additional ethnicities for comparison. Results could also be analyzed by age range, sexual orientation, or race. Thus, a future model could provide much greater insight into the perceptions of attractiveness not only between males and females, but also races and other areas.

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