THE PENNSYLVANIA STATE UNIVERSITY
SCHREYER HONORS COLLEGE

DEPARTMENT OF PSYCHOLOGY

THE ROLE OF HOLISTIC PROCESSING IN PERCEIVED ATTRACTIVENESS

ANDREA K. FRANK
SPRING 2017

A thesis
submitted in partial fulfillment
of the requirements
for a baccalaureate degree
in Psychology
with honors in Psychology

Reviewed and approved* by the following:

Reginald B. Adams
Associate Professor of Psychology
Thesis Supervisor

Richard Carlson
Professor of Psychology
Honors Adviser

* Signatures are on file in the Schreyer Honors College.

ABSTRACT

This thesis focuses on the concept of holistic processing and the disruption of it. It reviews the previous literature relating to holistic processing as it relates to symmetry and attractiveness. I hypothesize that when holistic processing is disrupted, faces will be perceived as more symmetrical and attractive. Furthermore, I apply this concept to in-group versus out-group attractiveness, with the prediction that individuals find out-group faces to be more symmetrical and attractive. In the experiment, in-group and out-group faces were artificially created by telling participants that they would be viewing faces of students and alumni from Penn State and the University of Michigan. In reality, these faces were from a data set that did not come from Penn State or the University of Michigan. The faces were presented in a randomized order with a randomized border of either Penn State or University of Michigan logos. The experiment consisted of two studies. In Study 1, participants rated faces on symmetry; and in Study 2, different participants rated faces on attractiveness. I expected differences in ratings of in-group and out-group, same-sex and opposite-sex faces. The results lean towards supporting my hypothesis, but they also show that the relationship between symmetry and attractiveness is more complex than previous research has claimed. Finally, I discuss the implications of this research and future research that can be done to build on my results.

Key words: holistic processing, in-group, out-group, symmetry, attractiveness

TABLE OF CONTENTS

LIST OF FIGURES

ACKNOWLEDGEMENTS

I am filled with gratitude for the support that I have received throughout the process of completing this thesis. I would like to thank Penn State University for awarding me the Erickson Discovery Grant in the summer of 2016, which allowed me to stay at Penn State through the summer to work on my experiment programming and operationalization. The work during the summer made it easier to get my experiments up and running in the fall semester of 2016.

I would also like to thank Troy Steiner, the graduate student of social psychology who has helped me to complete this project by mentoring and teaching me every step of the way. Thanks to Troy, I have learned to complete each aspect of a research project, including developing a strong hypothesis, programming experiments, and analyzing data. I have learned a great deal from him, and he was patient throughout the entire process. I would also like to thank Dr. Adams for having me as a research assistant in his lab, as well as letting me complete my research for my thesis with the study hours and supplies in the lab.

Finally, I would like to thank the Schreyer Honors College for its continued support throughout my undergraduate studies. The resources provided to me through this program allowed me to succeed in my educational pursuits and to become a more well-rounded individual.

Chapter 1

Introduction

Attraction is an extremely important topic to study, because the attractiveness of a person can affect many aspects of life. A person's attractiveness can influence the likelihood of being hired for a job, getting bonuses, receiving empathetic acts from others, and much more; this is known as the attractiveness bias (or "What is Beautiful is Good" hypothesis) (Shahani-Denning, 2003). Additionally, attractiveness may play a role in objectification (Bar-Tal & Saxe, 1976). I am interested in how attractiveness is perceived, because attraction and perception are pertinent to most situations in life, whether one is aware of it or not.

Facial symmetry is perceived as attractive: the more symmetrical a face is perceived to be, the more attractive that person tends to be considered (Grammer & Thornhill, 1994). And faces are perceived and processed either piece-wise or holistically (Pellicano & Rhodes, 2003). We are fine-tuned to holistically process faces of in-group members, whereas holistic processing is disrupted when processing faces of out-group members (Michel et al., 2006). But it is unknown how symmetry and attractiveness are perceived differently in faces that are processed less versus more holistically.

I am hypothesizing that if holistic processing is disrupted, faces will be perceived as more symmetrical and attractive. I am theorizing that localized processing of an out-group face will lead to a decrease in the perception of overall asymmetry, which will cause the perception that an out-group face is more symmetrical and attractive. Within this paper, I am aiming to define, conceptualize, operationalize, and gain a deeper understanding of the core concepts behind this

hypothesis. Later, I will discuss the methods used to experimentally study my hypothesis, followed by the results and a discussion of my findings. The concepts I will be discussing in this chapter include holistic processing, as well as the process of disrupting it, and attractiveness as predicted by symmetry.

Forest before Trees

One of the most crucial things that must be covered and clearly understood in order to understand my hypothesis is the concept of holistic processing. Holistic processing (also referred to as global processing, specifically by Navon, 1977) is the way in which an individual perceives something and automatically attends to the whole picture or image before the details – the forest before the trees. A key research experiment conducted in 1977 demonstrated just how primarily important this processing type is when attempting to take in an image (Navon, 1977). In the first part of the experiment, participants viewed letters made of smaller letters and had to identify either the larger letters or the smaller letters – the whole picture or its parts (see Figure 1 for an example borrowed from Watson, 2013). Participants automatically attended to the larger image first, even when told to attend to the smaller letters. And in another part of the experiment, participants saw isosceles pyramid formations made up of smaller isosceles triangles, which could either be pointing in the same or different directions. Participants automatically first attended to the direction in which the larger isosceles triangle was pointing, even when they were told to attend to the direction of the smaller triangles.

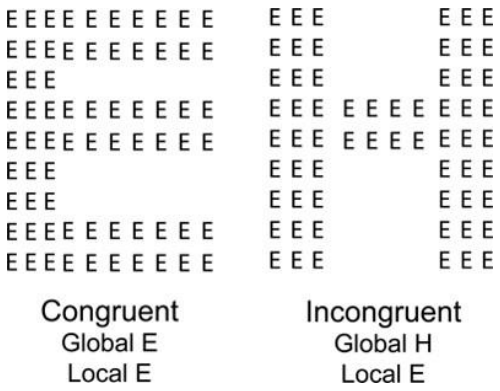

Figure 1. Example of Navon figures

Both of the studies that comprised Navon's experiment (1977) provide evidence that holistic processing is the first and automatic source of information processing when an individual perceives an image. In both letters and triangle patterns, participants automatically first attended to the larger image before the details; this is holistic processing. Holistic processing was shown to precede any local processing, which is the processing of the individual details within a larger picture. An ubiquitous amount of research since then has built upon this basic understanding of holistic processing, of which I hope to provide contribution with my research.

Although this experiment was (and still is) extremely influential in the subfield of perception, the studies contained shapes and letters that were made of discrete, smaller pieces. This limits the findings to objects, specifically ones which are made in a very controlled manner. The question that follows naturally is: is holistic processing also the primary form of processing when perceiving faces? How is facial processing distinct or different from other image processing? In order to be able to generalize and build upon the findings of Navon's study, faces must be used as the stimuli. Research done by Tanaka & Farah (1993) took the next step to understand this.

Facial Processing

One method to understand the processing of faces is to use a forced-choice experiment. Tanaka & Farah (1993) used this procedure in three studies to understand the uniqueness of facial processing in contrast to processing of other images. In the first study in their experiment, participants viewed and memorized faces that were either in a normal configuration (meaning that all facial features were in the correct location on a face) or a scrambled configuration (with the facial features in other random locations on a face). Participants were then tested on which facial feature was on a face they had previously seen. Participants were best able to identify the original facial feature if it was presented on a face that was in a normal configuration; this was in comparison to facial features that were presented on a face in a scrambled configuration or in isolation (meaning that just the facial feature was presented).

In the second study by Tanaka and Farah (1993), participants saw faces that were either upright or inverted (turned upside-down 180°) and were then given a forced-choice task that was identical to that of study 1. They found that participants were best able to identify the original facial feature if it was presented on a face in an upright orientation; this was in comparison to facial features that were present on a face in an inverted orientation or in isolation (either by upright or inverted). And in study 3, participants viewed either upright, normal-configuration faces or houses, and then they completed a forced-choice task for facial features or house features. Participants were better able to identify the original facial feature of a face if it was presented on the face, rather than in isolation. And there was no difference between correct identification of house features whether the feature was presented on a house or in isolation during the forced-choice task.

Both studies 1 and 2 provide strong evidence that faces are processed holistically when in their original configuration and upright, as shown by the significantly higher proportion of correct responses. And study 3 provides further evidence that faces are processed in a unique way from objects. This is important, because it hones in on the idea that faces are perceived in a special way by people. This processing means that we do not look at a face and process it as a nose, two eyes, and a mouth; rather, we look at a face as a whole, as a person, and only later attend to such details independently.

The inverted faces used in study 2 lead well into the next question that follows. How can a face or situation be altered to cause it to be processed less holistically? One way to do this is to invert the faces, which disrupts the processing of the image as a "face," as has been used in many other studies besides this one (for example, Abbas & Duchaine, 2008; McKone & Yovel, 2009). Another method of diminishing holistic processing, which uses in-group and out-group faces, is discussed next.

In-Group versus Out-Group

One of the most pertinent forms of in-group/out-group grouping in real life is race. As such, any in-group/out-group differences in facial processing should be seen when studied by using different races. Researchers Michel and colleagues (2006) sought to understand whether faces of other races are processed differently from faces of one's own race. To do this, they used two task in their experiment: an old/new face recognition task and a composite face task.

In both tasks, participants were Caucasian students from the United States and Asian students from Korea. In the old/new face recognition task, participants viewed a set of faces,

half of which were Caucasian and the other half Asian. Then, the participants viewed Caucasian and Asian faces and were asked to indicate whether each face was a face viewed in the first set or was a new/novel face. The composite face task used what is known as the *composite face paradigm*. Forty composite faces of each race were created based on 10 original faces of each race. For each original face, four composite faces were created: (1) one face that consisted of the top half of the original face and the bottom half of a different face, aligned; (2) one face that consisted of the top of the original face and the bottom half of a different face, not aligned; (3) one face that consisted of a different top half and different bottom half, aligned; and (4) one face that consisted of a different top half and different bottom half, not aligned. An example of this (borrowed from Hugenberg & Corneille, 2009) is shown in Figure 2. Participants were shown the original faces. Then, the participants viewed composite faces and were asked to indicate whether the top half of the face was the same or different from an original face. This task should elicit the composite face effect, whereby a face comprised of two different faces is processed more holistically when aligned than when not aligned, demonstrating a gestalt perception of the face.

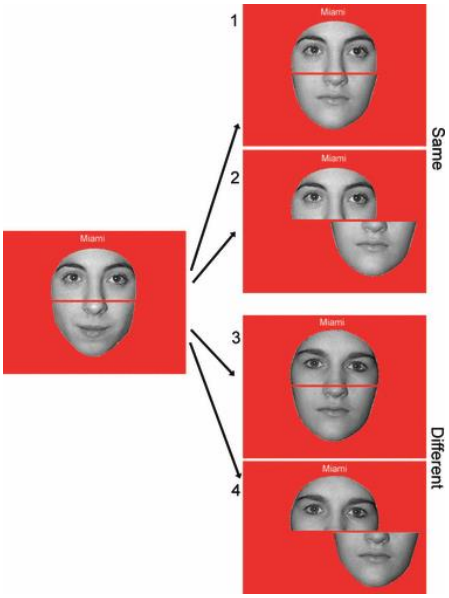

Figure 2. Example of the composite face paradigm

In the old/new face recognition task of the Michel and colleagues (2006) study, Caucasian participants were better at correctly determining whether a new Caucasian face was present in the original set of faces than they were when the faces were Asian; and Asian participants showed the same behavior, as they were better able to determine whether an Asian face was a new or original face than with Caucasian faces. Additionally, both Asian and Caucasian participants demonstrated significantly faster response times (RTs) for same-race faces than for other-race faces. In the composite face task, there was a three-way interaction of participant race, face race, and aligned or misaligned condition. Caucasian participants showed a greater difference in accuracy between aligned and misaligned faces when the faces were Caucasian. This indicates that the participants processed the same-race aligned faces more holistically than the other-race aligned faces. Asian participants demonstrated the same effect with Asian faces.

Combining these two sets of results, Michel and colleagues (2006) found support for both the *other race effect* and the *composite face effect* on holistic processing. The study provides evidence that people are better at recognizing and differentiating between individuals of one's own race than they are at doing so with other race individuals. And the composite face effect provides evidence that we process faces holistically when in a continuous image. The stronger composite face effect for same-race than for other-race faces provides evidence that in-group faces are processed more holistically than out-group faces. But can this be generalized beyond race?

A more recent study by Hugenberg and Corneille (2009) aimed to answer that question. In their study, only same-race faces were used, and the manipulated variable was the school that the student in each picture supposedly attended. The participants completed a composite face task that was nearly identical to that of the study by Michel et al. (2006), with added variable of same-school or opponent-school. The composite faces were placed on one of two backgrounds, and the participants were led to believe that the individuals in the pictures either attended the same school as the participants or a rival football school. The results supported the hypothesis that a social category manipulation is able to affect holistic processing. With same-school, in-group faces that were aligned, participants were worse at correctly determining whether the test upper-face was the same as the original face when the faces when compared to their responses to opponent-school, out-group faces. This is indicative of disrupted holistic processing of the aligned faces when it was simply *perceived* that the faces were of out-group members, despite the fact that these faces were same-race.

These research results are important to my experiment, because I will be using a same-school vs. opponent-school set-up to elicit more or less holistic processing of faces. In the next

section, I will review research on symmetry and attractiveness in order to lead into the other key aspect of my research question: how does holistic processing, as well as the disruption of it, affect perceptions of attractiveness and symmetry?

Symmetry and Attractiveness

What is the relationship between attractiveness and other, more concrete aspects of faces? A key study done by Grammer and Thornhill (1994) used images of faces and composite images of multiple faces to study this. They had participants rate individual faces and composite faces on a handful of characteristics, including symmetry, dominance, and attractiveness. The composite faces were each were a random combination of two of the individual faces averaged together. The composite faces were significantly more symmetrical for both male and female faces. Female composite faces were rated significantly more attractive than individual female faces, indicating that the more symmetrical female faces were more attractive to people. However, male composite faces were rated as less attractive than individual male faces, indicated that symmetry was not predictive of attractiveness in male faces. Male individual faces were considered to be more dominant and more attractive, indicating that dominance is predictive of attractiveness in males. The individual male faces were more likely to contain dominant features, like a strong jaw line and thick eyebrows, because these features would be averaged out when two faces were combined to create the male composite images.

These results are important, because I am interested to find out how facial processing may make symmetry a predictor of attractiveness in faces. Because it was only predictive of females, however, the results may be different for males than females.

Summary of Literature

As demonstrated in the review of literature, it has been established that holistic processing is the way in which humans process many types of information, and especially faces. However, holistic processing can be disrupted in a variety of ways; these include misaligned faces, face inversion, and use of out-group faces. When holistic processing is disrupted, we tend to notice individual features, as opposed to the whole picture. This may affect the perception of symmetry in a face, and symmetry is a predictor of attractiveness. Based upon this foundation of literature, I am predicting that the disruption of holistic processing will lead to a greater level of perceived symmetry. I think that this will happen, because it will be harder for someone to perceive overall asymmetry in a face when they are processing the face locally, one feature at a time. If perceived symmetry is greater in faces that are processed less holistically, then these faces should also be perceived as more attractive, at least for female faces.

I will be testing this hypothesis with a two-part experiment, where participants will rate in-group and out-group faces for symmetry in Study 1 or attractiveness in Study 2. I expect that out-group, opposite-sex faces will be rated as more symmetrical and attractive than in-group, opposite-sex faces. This phenomenon is important to study, because processing a face or body less holistically means that it is being processed more similar to an object, which is objectification. The results of this study may provide new insight into the perceptual process behind objectification, as well as lead to potential future research paths into face processing and differences in perception that result from it.

Chapter 2

Methods

My experiment consisted of two studies. In both studies, students at Penn State University participated for course credit in a psychology course. The studies consisted of an electronic consent form, a rating task, a scale measuring sexuality, and demographics. In the rating task, participants viewed faces of men and women from the FACES database (Ebner, 2010). The faces were cropped and placed on a background. The background was bordered with a school logo, either the Penn State logo or the University of Michigan logo. Figure 1 shows two examples of images that could have been rated by participants. All logo borders and faces were randomized in combination of face-logo combination and order of display, and each face was only seen one time by each participant. Participants were told that the experiment was one being done in collaboration with the University of Michigan, and they were led to believe that the faces were of students and alumni at Penn State and the University of Michigan, in order to produce a valid in-group/out-group experience.

In Study 1, participants were instructed to rate each face for symmetry on a Likert scale of 1 (not at all symmetrical) to 7 (completely symmetrical). In Study 2, participants were instructed to race each face for attractiveness on a Likert scale of 1 (not at all attractive) to 7 (extremely attractive). After the rating task, participants completed the Kinsey scale, which is a well-known scale that measures an individual's sexual orientation on a continuum. Appendix A contains the Kinsey scale in its entirety for reference.

Figure 3. Examples of stimuli

Chapter 3

Results and Discussion

Before analyzing the data we collected, we needed to remove participants' data in any case that it would skew the results for a few reasons. Behavioral outliers were removed if they failed to follow instructions or failed to complete the study; and behavioral outliers also included any participant who responded within one standard deviation for each of their rating responses, which indicates that they rated all faces in the study as the same level of symmetry or attractiveness. We also removed participants who scored a between a 3.0 and 4.0 on the Kinsey Scale (see *Appendix A* for more information), indicating that the participant leans toward bisexuality. We chose to do this, because we expected that bisexual individuals would behave differently from individuals with a leaning toward heterosexuality or homosexuality. We rationalized that, if bisexual people are likely to be more equally attracted to both sexes, they may also tend to be more equally attracted to both in-group and out-group individuals, which would be an exception to what we expected the results to show for all other participants.

Study 1 on facial symmetry was originally completed by 72 participants (37 male, 35 female). Eleven males were removed: one who did not complete the entirety of the study, nine for a standard deviation less than one, and one for sexuality. Nine females were removed: three for a failure to follow instructions, three for a standard deviation less than one, and three for sexuality. After removing all outliers, 52 participants' data remained (26 male, 26 female).

Study 2 on facial attractiveness was originally completed by 55 participants (26 male, 29 female). Eight males were removed: one who failed to follow instructions, five for a standard

deviation less than one, and two for sexuality. Eight females were removed: one who failed to follow instructions, four for a standard deviation less than one, and three for sexuality. After removing all outliers, 39 participants' data remained (18 male, 21 female).

Study 1: Symmetry

The data that remained after removing outliers was submitted to a 2 (stimulus sex: male or female) x 2 (school: Penn State or Michigan) x 2 (participant sex: male or female) mixed Analysis of Variance (ANOVA). Some interesting results were found. There was a large main effect of stimulus sex, F (1,51) = 21.43, $p < .001$, $\eta_p^2 = .30$. Female faces ($M = 4.32$, $SE = .11$) were rated to be more symmetrical than male faces ($M = 3.92$, $SE = .11$). There were no other significant main effects. There was a medium-sized interaction between stimulus sex and school, F (1,51) = 2.21, $p = .143$, $\eta_p^2 = .04$. Female Michigan faces ($M = 4.37$, $SE = .12$) were rated to be more symmetrical than female Penn State faces ($M = 4.26$, $SE = .13$). However, there was not a significant difference in ratings between male Michigan faces ($M = 3.89$, $SE = .12$) and male Penn State faces ($M = 3.95$, $SE = .12$) (Figure 4). To elaborate on this interaction, a simple-effects analysis revealed that this effect was primarily driven by the difference in ratings of female faces from Michigan versus Penn State, t (51) = 1.18, $p = .244$. The effect was only slightly driven by the difference in ratings between male faces from Michigan as compared to Penn State, t (51) = -.67, $p = .503$. Based off the simple effects analysis, it is likely that the interaction is driven by the relative effect of the difference between in-group and out-group female stimuli, but it is possible that the difference between in-group and out-group male stimuli is contributing to this slightly. Although the effect was not significant for male faces, the data

does show a trend in the direction of higher ratings for out-group than in-group male faces. It is possible that this effect would become significant if more participants were included in this experiment, because social effects are generally small to moderate in size and thus harder to see with small sample sizes.

There were no other significant interactions, and participant sex did not have any significant effect. The data does support an in-group/out-group effect, at least for females, whereby the out-group, which is processed less holistically, was rated to be more symmetrical than the in-group.

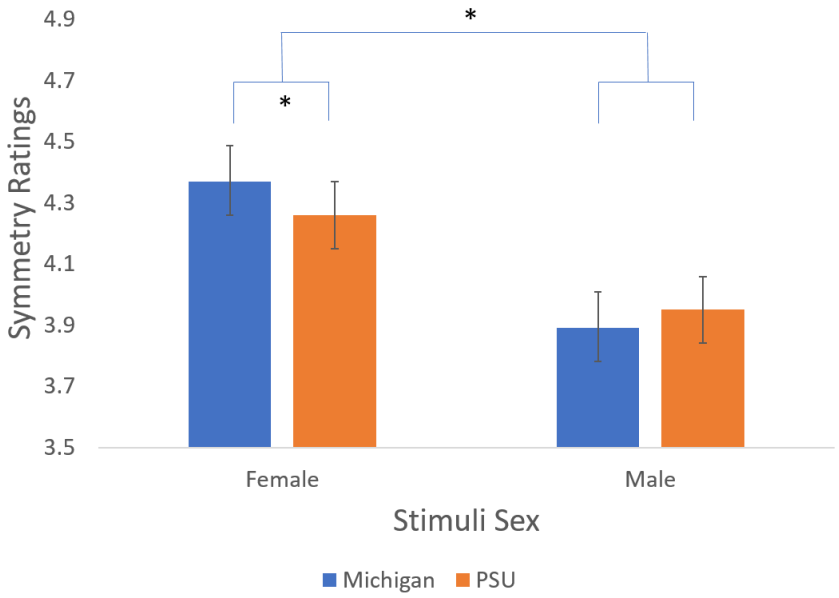

Figure 4. Significant results of symmetry

Study 2: Attractiveness

The data that remained after removing outliers was submitted to a 2 (stimulus sex: male or female) x 2 (school: Penn State or Michigan) x 2 (participant sex: male or female) mixed Analysis of Variance (ANOVA). There was a large main effect of stimulus sex, F (1, 39) =

21.61, $p < .001$, $\eta_p^2 = .36$. Female faces ($M = 3.83$, $SE = .11$) were rated to be more attractive than male faces ($M = 3.27$, $SE = .14$); interestingly, female faces were not significantly higher than average (4 on a seven-point Likert scale), while men were rated to be lower than average. This effect was larger than the main effect of stimulus sex seen in the symmetry results. There were no other significant main effects. There was a large interaction between stimulus sex and school, F (1, 39) = 4.95, $p = .032$, $\eta_p^2 = .11$. This interaction was larger for attractiveness than for symmetry. Michigan male faces ($M = 3.35$, $SE = .14$) were rated to be significantly more attractive than Penn State males ($M = 3.21$, $SE = .14$). However, there was not a significant difference in ratings of attractiveness between Michigan female faces ($M = 3.78$, $SE = .12$) and Penn State female faces ($M = 3.86$, $SE = .12$) (Figure 5). To elaborate on this interaction, a simple-effects analysis revealed that this effect was primarily driven by the difference in ratings of male faces from Michigan as compared to Penn State, t (39) = 1.95, $p = .058$. The interaction was not driven by the difference in ratings of female faces from Michigan versus Penn State, t (39) = -.78, $p = .439$. Based off the simple effects analysis, this interaction is driven by the relative difference between in-group and out-group male attractiveness ratings. Although Penn State females were rated as more attractive than Michigan females, the difference is not significant and is thus not contributing to the interaction. There were no other significant interactions.

These results do support a difference in in-group and out-group perceived attractiveness, at least for males, whereby the less holistically-processed out-group was perceived to be more attractive than the more holistically-processed in-group. However, the relationship between symmetry and attractiveness does not seem to be as clear-cut as previous research has argued. Female faces drove the effect for symmetry, while male faces drove the effect for attractiveness.

As would be expected, however, the significant interaction was larger for attractiveness than for symmetry, indicating that attractiveness is more subjective of a valuation of a face than symmetry is.

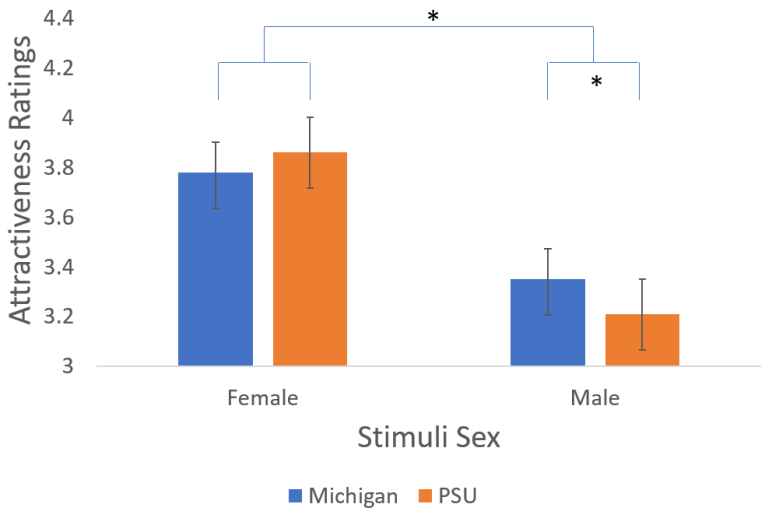

Figure 5. Significant results of attractiveness

Chapter 4

General Discussion

The results we found lend some support the general hypothesis that an out-group face, whose holistic processing is disrupted, is found to be more symmetrical and attractive. Although there is not a significant difference between ratings of symmetry between Penn State and Michigan male faces, the difference is at least trending in the right direction toward a higher rating of symmetry in Michigan faces than in Penn State faces, which was seen to be significant in female faces. This difference in male in-group and out-group faces may have become significant if there had been a larger sample size; as was mentioned earlier, social effects, such as in-group and out-group, are more likely to be seen with a larger sample size, because they are generally small or moderate effects, which can be hard to pick out with too few participants.

Additionally, Michigan male faces were rated as significantly more attractive than Penn State male faces. This also lends support to the simpler hypothesis that out-group faces are perceived as more attractive than in-group faces because of the disruption of holistic processing. However, there was no significant difference in ratings of attractiveness for Penn State or Michigan female faces. The effect is only one-sided, which makes it harder to generalize these findings to a total support of the in-group/out-group hypothesis. However, taken together with the symmetry results, it is clear that we are honing in on something happening with differential facial processing of in-group and out-group.

Something that needs to be taken into consideration in future research and that was a limitation in this research is the lack of a *dominance* variable. In the literature review, it was mentioned that, although symmetry is predictive of attractiveness in females, this is not the case with males. Rather, dominance in a face is predictive of attractiveness (Michel et al., 2006). Future research on the effect of holistic processing disruption on facial attractiveness should take into consideration that even though male out-group faces may be perceived as more symmetrical (by way of diminishing a perceiver's ability to notice overall asymmetry in a locally-processed face), they may not necessarily be perceived as more attractive, because a change in processing may actually make it harder to notice dominance cues in a face.

In addition, even though Michel et al. (2006) found that symmetry was predictive of attractiveness in female face, the results only supported this when looking at a main effect of stimuli sex. When looking at the interactions, and especially in the case of female faces, the results were not as clear-cut as expected. Although the female out-group faces were perceived as more symmetrical than the female in-group faces, we did not see the same effect in attractiveness. Other variables, of which we are currently unaware, may additionally be at play in this differential perception, which may be affecting these results. Alternatively, the small sample size may be affecting some of the results, which would need to be corrected in future studies with larger participant pools.

Finally, I want to discuss the implications of this research. As detailed as this hypothesis and research has become, the overall importance comes back to a well-understood objectification process that takes place when a person is processed locally. Local processing is used for objects, such as houses (Tanaka & Farah, 2007), in contrast to holistic processing in faces. When holistic processing is disrupted, such as by the social dynamic of out-group, that out-group is processed

more locally, which is more "object-like". When this happens, it could lead to objectification of an individual, which relates to the lessening of a perception of that individual as a human being. This can lead to racial discrimination and sexism, or it can lead to preferential treatment if one is seen as more attractive. Seeing those who are different from oneself as an object makes it easier for them to be treated as an object. Our research sought to better understand the perception of attractiveness and symmetry in faces which might be viewed as more object-like. Seeking to understand how these processes may work and the effects that occur as a result is an important step to understanding objectification and its role in differential treatment of different "groups" of people. A hopeful outcome from our research is that it may support in-group/out-group interventions, especially in the case of discrimination, in order to lessen the differential treatment that may be a result of a subconscious difference in processing of people's faces when we group them

Appendix A

Kinsey Scale

The Kinsey Scale was developed by Alfred Kinsey in 1948. It is used to operationalize sexual orientation on a heterosexual-homosexual continuum for psychological research (Kinsey Institute, n.d.). The responses to each of the items in the scale are averaged, and the result is a rating number for the individual. Following are the items in the scale, the rating descriptions, and a diagram of the original concept of the continuum by Kinsey (Figure 8).

Scale Items (Psymed.info, 2015)

1. My sexual fantasies are about:
    a. Only the opposite sex
    b. Mainly the opposite sex, rarely about the same sex
    c. Mainly the opposite sex, sometimes about the same sex
    d. Both the same and the opposite sex
    e. Mainly the same sex, sometimes about the opposite sex
    f. Only the same sex
2. The idea of having sexual intercourse with someone of the opposite sex is:
    a. Desirable

   b. Alluring
   c. Interesting
   d. Tolerable
   e. Negative
   f. Disgusting

3. The idea of having sexual intercourse with someone of the same sex is:
   a. Desirable
   b. Alluring
   c. Interesting
   d. Tolerable
   e. Negative
   f. Disgusting

4. I have had sex:
   a. Only with the opposite sex
   b. Almost exclusively with the opposite sex; only experimented with the same sex, did like it
   c. Evenly with the same and the opposite sex
   d. Mainly with the same sex, occasionally with the opposite sex
   e. Only with the same sex
   f. I'm a virgin

5. I identify myself as:
   a. Straight
   b. Straight but open to new sexual experiences

c. Bisexual

d. Homosexual but open to new sexual experiences

e. Strictly homosexual

f. I don't know

6. I feel emotionally bonded to:

a. Only the opposite sex

b. Mainly the opposite sex, and to some extent to the same sex

c. Evenly the same and the opposite sex

d. Mainly to the same, and to some extent the opposite sex

e. Only the same sex

Rating Descriptions (Kinsey Institute)

0 = Exclusively heterosexual

1 = Predominantly heterosexual, only incidentally homosexual

2 = Predominantly heterosexual, but more than incidentally homosexual

3 = Equally heterosexual and homosexual

4 = Predominantly homosexual, but more than incidentally heterosexual

5 = Predominantly homosexual, only incidentally heterosexual

6 = Exclusively homosexual

X = No socio-sexual contacts or reactions

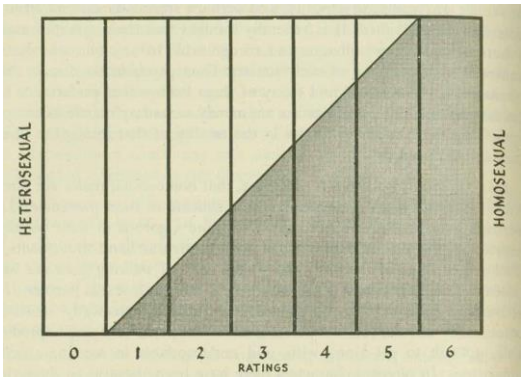

Figure 8. Kinsey Scale Rating Diagram

BIBLIOGRAPHY

Abbas, Z. A., & Duchaine, B. (2008). The role of holistic processing in judgments of facial attractiveness. *Perception*, *37*(8), 1187-1196.

Bar-Tal, D., & Saxe, L. (1976). Physical attractiveness and its relationship to sex-role stereotyping. *Sex roles*, *2*(2), 123-133.

Ebner, N. C., Riediger, M., & Lindenberger, U. (2010). FACES—A database of facial expressions in young, middle-aged, and older women and men: Development and validation. *Behavior research methods*, *42*(1), 351-362.

Grammer, K., & Thornhill, R. (1994). Human (Homo sapiens) facial attractiveness and sexual selection: the role of symmetry and averageness. *Journal of comparative psychology*, *108*(3), 233.

Hugenberg, K., & Corneille, O. (2009). Holistic Processing Is Tuned for In-Group Faces. *Cognitive Science*, *33*(6), 1173-1181.

Kinsey, A. C., Pomeroy, W. B., Martin, C. E., & Sloan, S. (1948). Sexual behavior in the human male.

Kinsey Institute. (n.d.). The Kinsey Scale. Retrieved from https://www.kinseyinstitute.org/research/publications/kinsey-scale.php.

McKone, E., & Yovel, G. (2009). Why does picture-plane inversion sometimes dissociate perception of features and spacing in faces, and sometimes not? Toward a new theory of holistic processing. *Psychonomic Bulletin & Review*, *16*(5), 778-797.

Michel, C., Rossion, B., Han, J., Chung, C. S., & Caldara, R. (2006). Holistic processing is finely tuned for faces of one's own race. *Psychological Science*, *17*(7), 608-615.

Navon, D. (1977). Forest before trees: The precedence of global features in visual perception. *Cognitive psychology*, *9*(3), 353-383.

Psymed. (2016). Kinsey Scale Test. Retrieved from http://psymed.info/kinsey-scale-test.

Shahani-Denning, C. (2003). Physical attractiveness bias in hiring: What is beautiful is good. *Hofstra Horizon*, 14-17.

Tanaka, J. W., & Farah, M. J. (1993). Parts and wholes in face recognition. *The Quarterly journal of experimental psychology*, *46*(2), 225-245.

Watson, T. L. W. (2013). Implications of holistic face processing in autism and schizophrenia. *Frontiers in psychology*, *4*, 414.

ACADEMIC VITA

Academic Vita of Andrea Frank
akf5116@psu.edu

Education
Major: Psychology, B.S., Life Sciences focus
Honors: Psychology

Thesis Title: The Role of Holistic Processing in Perceived Attractiveness
Thesis Supervisor: Dr. Reginald B. Adams, Jr.

Research Experience
August 2015 – May 2017
Undergraduate Research Assistant
Social Perception and Emotion Lab, Penn State University
Dr. Reginald B. Adams, Jr.

Grants Received: Erickson Discovery Grant (May – August 2016)

Awards: Schreyer Honors College Academic Excellence Scholarship, Schreyer Honors College Class of 1942 Memorial Scholarship, Robert A. Love Memorial Scholarship, Liberal Arts College Scholarship, Lola G. Duff and William H. Duff Merit-Based Scholarship

Professional Memberships: Psi Chi – The International Honor Society of Psychology

Presentations: Eastern Psychological Association 2016 Annual Conference

Undergraduate Poster Presentation, Psi Chi 2016 Undergraduate Poster Conference

International Education: University College Freiburg Liberal Arts and Sciences Program via exchange program with Schreyer Honors College (January – June 2015)

Language Proficiency: English