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TITLE **THE INFLUENCES OF ETHNICITY, GENDER, AND SKIN-TONE IN RATINGS OF FACIAL ATTRACTIVENESS**

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THE INFLUENCES OF ETHNICITY, GENDER, AND SKIN-TONE IN RATINGS OF FACIAL ATTRACTIVENESS

By

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DISSERTATION

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This work is dedicated firstly to my parents. Without their guidance and support this would not be possible. Secondly, all of the psychology staff at the University of Detroit Mercy. They have been instrumental in mentoring me to become a clinical psychologist. Lastly, my clinical supervisors who have encouraged me throughout my time as a graduate student.

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CHAPTER 1

Introduction

Research in human facial attraction results from the collaboration of various subdisciplines in psychology including biological, cognitive, evolutionary, and social (Gangestad & Thornhill, 2005; Gangestad, Thornhill, & Yeo, 1994; Hill, 2002; Rhodes & Zebrowitz, 2002; Rhodes, Simmons & Peters, 2005; Rhodes et al., 2005; Rhodes, Hayward, & Winkler, 2006; Thornhill & Gangestad, 1993). It draws its origins from evolutionary and ethological theory. A novel understanding of these complementary theories is essential to understand not only the facial features humans find attractive but how mate selection evolved based on the characteristics and presentation of one's face. Darwin's (1859) theory of sexual selection introduced the idea that animal behaviors were naturally selected over time as a means to increase the ability to reproduce and survive. Over time, ethological theory evolved from Darwin's work to understand animal behaviors at progressive levels. Tinbergen (1951) suggested that in order to understand the origin of a given behavior it must be delineated into its 1) proximate (i.e., cultural) effects, 2) ontogenetic (i.e., developmental) origins, 3) functional components (i.e., evolutionary), and 4) phylogenetic origins (i.e., across species). The contributions of natural selection and Tinbergen's theory facilitate the understanding of how phenotypical traits in humans (and other species) have evolved to guide mate selection.

The predisposition to find certain physical features attractive is not limited to humans. Multiple studies have investigated color schemes in primate bodies and faces. One commonly studied primate is the Mandrillus Sphinx which has vivid coloration in the buttocks and face. In the male mandrill, color variations in the face have been correlated with social status, fluctuating testosterone levels, and reproductive success, among other sex characteristics, while in females coloration changes correspond to sexual reproductive age (Setchell & Dixon, 2001; Setchell, Wickings, & Knapp, 2006). Correlations of physical traits with hormone levels and reproductive ability have been shown in other primate species as well (Berstein, Rose, & Gordon, 1974; Kingsley, 1982; Isbell, 1995). However, variations in facial features that serve as a guide to predict health, reproductive ability, and social status are hardly unique to primates.

Humans are equally equipped to derive information from the face in making decisions about mate potential. In fact, the attractiveness of a face, with all its constituent characteristics, contributes a significant amount of information about how humans determine an individual's potential as a mate. Previous research has speculated that facial attractiveness may be indicative of parasite-resistance, virility, and developmental quality, all suggestive of good genotype (Thornhill & Gangestad, 1993; Li & Kenrick, 2006). Facial attraction is so important in understanding mate selection in humans that raters of different cultures, ages, and genders all seem to confirm each other's preferences for what faces are attractive (Rhodes, 2006; Rhodes & Zebrowitz, 2002; Thornhill & Gangestad, 1999). This is even true for infants, who tend to stare longer at faces that adults have judged as attractive (Rhodes & Zebrowitz, 2002). Faces account for the largest proportion of the variance in predicting overall attraction for females and males (Currie & Little, 2009; Peters, Rhodes, & Simmons, 2007). However, the construct of facial attractiveness is composed of several characteristics that affect the overall attractiveness of the face. This minimally includes a face's symmetry, "averageness," as well as variations in the face that are preferentially determined by each gender in ratings of potential opposite sex mates.

Symmetry. Symmetry is one of several components that contribute to facial attractiveness. In part, one can understand the influence of symmetry by recognizing the influence of aberrations from symmetry. It contributes to a biological understanding of facial attractiveness. Having symmetrical facial features provides information about a body's resistance to parasites (Thornhill & Gangestad, 1993). A symmetrical face is an indication of a body's ability to fight off infection early on in development. The influence of symmetry is so ingrained that females and males may not be able to verbally recognize manipulations to a face's symmetry when rating an attractive face (Scheib, Gangestad, & Thornhill, 1999). This is true even when the experimenters made the raters aware of the changes in a face's symmetry (Perrett, et al., 1999). Both females and males are more likely to rate a face as more attractive if it is symmetrical regardless of the gender of the face (Perrett, et al., 1999). Likewise, asymmetric faces tend to be rated as less attractive. Gangestad et al. (1994) defined the paradigm of fluctuating asymmetry as deviation from bilateral facial features from which the distance between any two points to the left and right side in the population mean is equal to zero. Such fluctuations are inversely related to facial attraction when controlling for other variables that are thought to potentially influence attractiveness of a face (e.g., age, height, feature size). It should also be mentioned that humans *naturally* show a preference for the left-side of the face (Burt & Perrett, 1997; Wolff, 1933). This is true even in children as young as five (Balas & Moulson, 2011). Suggestion from neuroimaging studies using fMRI that there is greater activation (i.e., lateralization) in the right-side in an area of the fusiform gyrus (i.e., fusiform face area) provides evidence for specific neurological responses to facial stimuli specifically (Kanwisher, McDermott, & Chun, 1997) though it remains to be confirmed, via neuroimaging, of a specific left-sided preference.

Nonetheless, symmetry does not explain all of the biological variance of facial attractiveness. Some research has suggested that perfectly symmetrical faces are less attractive than their normally symmetrical counterparts (Jones, DeBruine, & Little, 2007). One potential explanation for this is that people may be turned off by *perfect* faces as they may increase the awareness of one's own imperfections (Rhodes & Zebrowitz, 2002). Part of the variance that makes a symmetrical face attractive can be accounted for by average features.

Averageness. Although the definition of what makes a face average has been debated in the literature, it is most commonly known as a face which results from a number of face composites (Langlois, Roggman, & Musselman, 1994). In early research, it was suggested that these facial composites were more attractive because they enhanced the feminine or masculine features of a particular face (Rhodes, Sumich, & Byatt, 1999). However, later research suggests that the appeal of an averaged face is likely because it is perceived as more familiar (Rhodes, Halberstadt, Jeffrey, & Palermo, 2005). Although such faces do not exist in the real world, they are likely to be perceived as familiar because they may bear resemblance to someone familiar. These faces are a result of a composite of sample faces representing a given population. Though symmetry and averageness help to understand the underlying biological influences of facial attractiveness, gender preferences interact with these traits, resulting in varying desirability of specific traits that impact attractiveness.

Gender. There are significant discrepancies between respective facial features that are found to enhance attractiveness in female and male faces (Gangestad, Thornhill, & Yeo, 1994; Grammer & Thornhill, 1994; Li & Kenrick, 2006). For male faces, chin length and width (i.e., large jaw, wide mouth) along with cheekbone prominence are more favored. For females, there are two types of features that are rated as more attractive: neotenous features, including large wide-spaced eyes, smaller nose and chin as well as features of sexual maturity: cheekbone prominence, narrow cheeks, highly set eyebrows, wide pupils, and a large smile (Cunningham, 1986; Grammer & Thornhill, 1994). It should be mentioned that the appeal of large eyes in females has not been consistently replicated (Grammer & Thornhill, 1994). Cunningham (1986) maintains that, for males, such features are attractive because they enhance the perception of social dominance. For women, however, the neotenous features are associated with nurturance. Likewise, sexually dimorphic faces (i.e., female or male faces that have attenuated features associated with femininity and masculinity) are rated as more attractive (Rhodes, Simmons, & Peters, 2005). Such traits are indicative of high estrogen, having fewer health and fertility problems (in females) and high testosterone levels (in males), which yield a phenotype indicative of good genotype. Neotenous facial features contribute more variance to female attractiveness, youthfulness, and fertility than waist-to-hip ratio (Furnham & Reeves, 2006). Interestingly, the presence of neotenous features is most pronounced following puberty when levels of sex hormones affect the growth of these facial structures (Johnson & Franklin, 1993). The preference for neotenous female faces has been established cross-culturally (Cunningham, Roberts, Wu, Barbee, & Druen, 1995; Henss, 1995; Zebrowitz, Montepare, & Lee, 1993). However, Jankowiak, Hill, and Donovan (1992) maintain that females more so than males tend to incorporate personality attributions to the attractiveness ratings of opposite sex stimuli despite reporting that they based their rankings on “good looks.” Symmetry is also correlated with the prominence of secondary sexual traits, suggesting an interaction of symmetry and secondary sexual traits in determining attractiveness (Thornhill & Gangestad, 1993).

Gender also interacts with averageness in determining attractive characteristics in the face. When controlling for gender, it was concluded that averaged female faces, not averaged male faces, were rated as more attractive (Grammer & Thornhill, 1994). In an earlier study, Cunningham, Barbee, and Pike (1990) suggested that the effects of averaging individual male photos decreased the prominence of secondary sex traits. However, for females, averaging enhanced such traits making the female composite faces more attractive. Symmetry, averageness, and gender all contribute to our understanding of the biological underpinnings of facial attractiveness. However, Tinbergen (1951) acknowledged that cultural influences further contribute to understanding the mechanisms of attraction. As humans have evolved, cultural influences have altered the way people attenuate facial features to maximize attractiveness.

Influences of Culture

Culture has had an increasing influence on what traits are attractive on what faces. For example, humans are prone to favor redness and yellowness as a cue to healthy looking faces (Stephen, Law Smith, Stirrat, & Perrett, 2009). Correspondingly, symmetrical faces tend to have the appearance of healthier looking skin (Jones, Little, Burt, & Perrett, 2004a; Jones, et al., 2004b). This has resulted in the manipulation in both the color and tone (i.e., shading) of one’s face in order to maximize one’s attractiveness. The biological aspects of facial attractiveness (i.e., symmetry, averageness, gender) also contribute to understanding how humans have come to desire certain colors and tone of skin as well. These characteristics have implications for how certain manipulations to Black or White faces have become selected over time to enhance attractiveness in US culture.

Skin color. In the US, ratings based on skin color appear to be mediated by familiarity. However, participants evidence bias in how they process the familiarity of a face. Regardless of race, own-race face stimuli are examined more holistically (i.e., face is processed without decomposing the face into parts) and likewise participants are more sensitive to alterations made in similarly-raced stimuli resulting in such stimuli being rated as less familiar (Rhodes, Hayward, & Winkler, 2006; Tanaka & Farah, 2003). Ryan et al. (2007) as well as Zebrowitz, Bronstad, and Lee (2007) found that Black participants rated both Black and White faces equally familiar whereas White participants only rated White faces as familiar. Similarly, Rhodes et al. (2005) found that even with mixed-race composite faces (i.e., faces composed of a blend of two races), White raters tended to prefer mixed-race composite faces that were weighted more towards their own race.

While the familiarity bias leads to in-group favoritism amongst White, Korean, and Black raters (i.e., perceive faces as more familiar) this does not result in own-race faces being rated as more attractive (Zebrowitz, Bronstad, & Lee, 2007). However, the more attractive an other-race face was rated, the more familiar it was rated as well. Familiarity appears to mediate the effect of preference for own-race versus other-race faces. Subsequently, this preference disappears when controlling for familiarity (Zebrowitz, Bronstad, & Lee, 2007). Though familiarity plays a significant role in rater preferences for attractiveness, it is also mediated by the rater's gender.

Females and males differ on their preferences depending on the respective skin color of rater and stimuli. Wade and Bielitz (2005) found that White females rated Black faces as more attractive than did White males. An earlier study by Murstein, Merighi, and Malloy (1989) suggested that there also may a tendency for Black males to rate White females as more attractive than Black females based upon a tendency for Black men to seek out interracial relationships more often than Black females. These findings suggest that gender and skin color of rater influence the ratings of same-race and other-race faces. However, such trends can be further understood in terms of preferences for skin tone within respective skin colors (i.e., Black, White).

Skin tone. Cross-culturally there is a tendency for people to adjust their skin tone in order to match one's face with the cultural ideal of the respective gender. In Japan, Ashikari (2005) noted there was a huge demand for make-up that enhanced a paler, whiter, appearance. In the US, beauty products for Black women have been traditionally designed with the intention of lightening up the face (Hunter, 1998). Historically in the U.S., fairer skin was associated with upper-class status as it increased the likelihood that one did not work in outdoor manual labor. However, currently there is some increased popularity for a more tan appearance. Contrary to historical views on skin tone, darker hues may be associated with health and higher status (i.e., those who tan for aesthetic reasons) (Fink, Grammer, & Thornhill, 2001). Not surprisingly, gender influences the preferences for lighter or darker hues of Black and White faces.

Li and Kenrick (2006) discovered that females generally prefer darker features on male faces while males tend to prefer lighter features on female faces; though this latter pattern was not significant. Historically, it was thought that the lighter toned women would be attractive because it signaled youth and fertility (Frost, 1988). However, with current popularity for a more tan appearance, it may be the case that this trend may not apply for White females. Fink, Grammer, and Thornhill (2001) found that color saturation in faces (which gave a more tan appearance) was positively correlated with attractiveness in female faces. Hill (2002) discovered that in an African-American sample, female facial attractiveness increased as skin tone lightened with the lightest skin tone receiving the highest attractiveness rating. The preference for lighter skin tone in female faces is possibly influenced by its signaling of fertility and ovulation when skin tone tends to be the lightest (Frost, 1988). During the infertile stages of menstruation female skin tone is slightly darker. This is also true during pregnancy. From an evolutionary perspective, these variations in skin tone allowed adult human males to distinguish fertility differences between prepubescent and postpubescent females (Van den Berghe & Frost, 1986). In fact, after males screen for fecundity, they appraise other facial features (i.e., neoteny) to further narrow down their selection of a potential mate (Furnham & Reeves, 2006). It just so happens that, as mentioned previously, neotenous features are most pronounced post-puberty (Johnson & Franklin, 1993). The preference for lighter female faces extends to other cultures as well (Frost, 1988).

The tendency to prefer darker features in male faces is also true for Black females who do not show a preference for lighter skin mates (Ross, 1997). This is confirmed by Wade and Bielitz (2005) who found that darker skin tends to be rated more favorably for African American males while a lighter tone is preferred for African American females. Even more, darker-skinned Black males even rate themselves as more attractive than their lighter-skinned counterparts (Wade, 1996). While gender plays a role in skin tone preferences in Black and White faces, the mere presentation of a Black or White face can influence subsequent attractiveness ratings of an other-race face.

Levin and Banaji (2006) discovered that Black and White faces attenuate their respective colors. That is, Black faces make White faces appear whiter than they actually are and White faces make Black faces appear darker than they actually are. The authors noticed that this tendency was driven by the perceptions of participants in identifying the race of a given face. Black and White participants almost always rated an ambiguous face as Black if it was darker toned. Furthermore, these same subjects took longer to identify the race of a Black face when the luminance was equal to that of a White reference face. The luminance of both White and Black faces may influence rater perception of attractiveness depending on how the faces are presented (i.e., simultaneous versus single face presentations). A significant amount of literature confirms the effects of gender, skin color of rater and stimuli, and skin tone in perceptions of facial stimuli. However, previous research has been limited to primarily subjective ratings (i.e., self-report). Moreover, research in the attraction literature usually does not include analysis of variables of interest such as investigating facial attraction specifically, or has not evaluated the effects of gender or skin color in either rater or stimuli.

Limitations to Previous Research

The need to supplement subjective data with objective measures in facial attraction research has been suggested as a way to better understand how participants make their ratings (Krupp, 2008). Much of the existing literature includes subjective ratings as a primary outcome measure. In addition, many studies utilized a single population for stimuli (i.e., only females or males, Black or white faces). For example, the studies investigating skin color and skin tone preferences in African Americans did not utilize facial attraction ratings based on presentation of facial stimuli. These studies utilized questionnaires to deduce preferences for skin tone and skin color (Ross, 1997; Wade & Bielitz, 2005). Other studies limited ratings to a single gender and single skin color.

For example, Jones, DeBruine, and Little (2007) asked participants to rate only female faces of a single skin color. Across two experiments, raters looked simultaneously at two images of a single face to decide which one was more attractive while manipulating the face's symmetry in the former and its averageness in the latter. An additional group of participants then rated these faces on perceived similarity. The findings helped to confirm the importance of minimizing variability in facial structure as well as being aware of the influences of an average looking face. However, given that the stimuli were only female and the participants were overwhelmingly female, this prevented any analysis of gender interaction in both stimulus and participant.

Similarly, Levin and Banaji (2006) investigated the effects of luminance on participant's ratings of white and Black faces. They asked participants to rate a composite (i.e., averaged) Black or white face and then manipulated the respective darkness or lightness of each face (6 gradations in either direction). The authors demonstrated a rating bias inherent when presenting ambiguous face stimuli that were composites of Black and white faces. If the face was presented with a lighter luminance, it was seen as a White face. However, if the same face was presented with a darker luminance it was identified as a Black face. This study provides important guidelines on how the influence of luminance and skin-tone variation can bias ratings of the faces. However, it was not without limitations. The participant sample was overrepresented by White participants, it did not incorporate female stimuli, and did not assess the influence of raters' gender or skin-tone. Previous research confirms the importance of controlling for and minimizing what are considered biological markers of facial attractiveness (i.e., symmetry, averageness) as well as identifying the significant effects of luminance and skin color distribution. However, the conclusions about participants' ratings in the abovementioned studies have been limited to dependent variables (i.e., subjective report of participant) and have not investigated the effects of rater-independent variables (i.e., ethnicity, gender, skin-tone).

A few studies have addressed equivalent gender participant samples as well as investigated the effects of rater gender. Gangestad, Thornhill, and Yeo (1994) utilized a participant sample that was gender equivalent to investigate the effects of fluctuating asymmetry on attractiveness ratings of both females and male stimuli. While the authors did find an effect for male physical attractiveness, the authors did not investigate the effects of rater gender. Moreover, the authors focused on body attractiveness and not the specific effects of fluctuating asymmetry on the face (i.e., they partialled out specific effects of the ears, head, eyes, among other features and derived an aggregate measure for each side of the face). However, the findings did not address the influence of rater gender in the attractiveness. Fink, Grammer, and Matts (2006) also investigated the effects of gender of participant in rating female stimuli varying the perceived age of the facial stimuli based on skin tone variation. The authors found that male raters more accurately identified age related changes to the facial stimuli (as manipulated in the lab by skin color distribution) than did female raters. An earlier study using composite female faces also confirmed the importance of healthy skin tone in female facial attractiveness (Fink, Grammer, & Thornhill, 2001). One potential explanation for males' increased sensitivity to age-related changes in rating stimuli that is relevant to the present study includes the perception of the opposite-sex stimuli as potential mates. While this study provides some feedback into male ratings of female stimuli, it raises additional questions about the effects of cross-gender ratings (i.e., female to male), rater skin tone, the incorporation of other-race stimuli, and again are limited to subjective ratings.

Perhaps the most relevant study to the current study is the work done by Perrett and others (1999). They investigated the effects of rater sex on facial attractiveness ratings manipulating the stimuli's symmetry. The authors used both female and male stimuli and concluded that regardless of rater or stimuli sex, attractiveness ratings of symmetrical faces were significantly higher than the nonsymmetrical stimuli. As mentioned earlier, what is interesting about this study is that when experimenters asked the raters what they based their judgments on (e.g., eyes, mouth) none of the raters mentioned a face's symmetry, even after being told by the experimenters that the face had been modified to be more symmetric.

Another study by Donovan, Hill, and Jankowiak (1989) investigated specifically rater effects on ratings of physical attractiveness. This study was able to accrue male and female heterosexual and homosexual participants who were asked to rank-judge male and female stimuli. The authors concluded that consistency of ratings were more prominent in rating female stimuli rather than male stimuli. Moreover, significant differences were found between heterosexual and homosexual males in rating male stimuli. Homosexual male raters demonstrated more preference for ranking male faces (e.g., 1-20) than heterosexual males. This study confirms the importance of considering sexual orientation of rater and its potential effects on ratings of attractiveness. However, this study incorporated only White participants. In the current study, the inclusion of Black participants and stimuli provided information on the trends of Black raters and White raters rating faces that are both same and opposite ethnicity and same and opposite sex.

These previous studies provided important considerations of cross-gender and same-gender ratings. However, there were no variations in skin color of the facial stimuli. In addition, conclusions were limited to the dependent variable of subjective report in determining how the participants made their judgments. The need for an objective measure of visual attention of participants is a necessary complement to the subjective ratings of facial stimuli.

Visual attention has been identified to provide an objective measure to supplement subjective ratings of attractiveness and can be assessed using eye-tracking software (Krupp, 2008; Suchinsky, Elias, & Krupp, 2007). For example, Lykins, Meana, and Strauss (2008) found that both females and males view opposite sex faces longer than same-sex faces. However, when rating a face's attractiveness, males look longer and more extensively at female faces whereas females looked at female and male faces in similar duration and fixation (Alexander & Charles, 2009). This pattern also seems to be the case appraising the entire body suggesting that face ratings may provide some inference on whole-body ratings (Lykins, Meana, & Strauss, 2008). Visual attentiveness serves a guide to understand people's preferences for faces as it corresponds to mate selection and serves to decipher health, fertility, and parasite resistance of a potential mate just by looking at the face (Krupp, 2008; Suchinsky, Elias, & Krupp, 2007; Li & Kenrick, 2006; Buss, 2003).

The Present Study

The present study attempted to contribute to previous literature and assessed the impact of ethnicity, gender, and skin-tone on facial attractiveness in Black and White female and male faces while measuring the distribution of visual attention (i.e., oculomotor activity). In addition, same-gender ratings were incorporated to confirm and elucidate the findings in

Donovan, Hill, and Jankowiak (1989). It also provided data regarding non-white raters and Black stimuli. Rhodes (2006) maintains that there have been few studies to examine same-gender ratings as preferences tend to diverge between gender groups. Much of the research to date has used a single gender or ethnicity as either an independent variable (i.e., participant) or dependent variable (i.e. facial stimuli) and has yet to include skin-tone manipulations. This study investigated both main effects and interactions of rater ethnicity, gender, and skin-tone on Black and White facial stimuli that were presented with modified skin-tones. The addition of eye-tracking technology served as an objective measure to supplement subjective self-report and provided data on the distribution of visual attentiveness of the participants. Photographic stimuli of darker- and lighter skin Black and White female and male faces were used and rated by a similar diverse participant sample. The conceptual model is demonstrated by three categorical independent variables: rater sex (female or male), ethnicity (Non-white or White), and skin-tone (dark or light) (*Figure 1*).

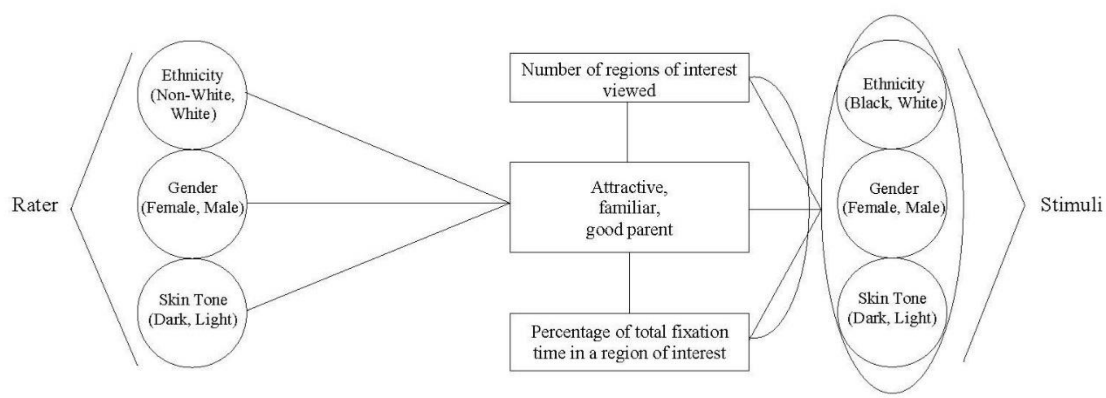


Figure 1. Conceptual Model. The between-subjects independent variables are shown left. The dependent variables (shown right) include the subjective ratings (center) with the eye-tracking variables at top and bottom. The independent within-subjects variables of the stimuli are shown to the right.

There were three dependent variables measured by self-report including attractiveness, familiarity, and good-parent. The first two variables were specifically investigated in the current study. Attractiveness was the primary variable and familiarity was included to confirm previous research demonstrating the relationship between familiarity and attractiveness (Rhodes, et al., 2005). The data from the good-parent variable were collected and will be used for future research to investigate the relationship between participants' ratings of attractiveness and the stimuli they perceive as good-parents. The rationale for collecting data for the good-parenting variable will be to gain insight about a participant's rating of a potential mate's parenting ability. In addition, two dependent variables were derived from the use of the eye-tracking software: 1) number of targeted regions of interest and 2) the proportion of time spent per region. The former measurement assessed the variability in areas evaluated by the participants and the latter measured the variability in the time spent in a given facial region (e.g., eye area, forehead area, nose area, mouth area, etc.). More specifically, it was predicted that there would be between-within interaction effects of both rater and stimuli ethnicity, gender and skin-tone to ratings of facial attractiveness as well as where and for how long one looked at a region or regions of the face to make their ratings:

Rating Hypotheses:

1. An interaction of rater ethnicity (Black, White) x rater gender (Female, Male) x rater skin-tone (Dark, Light) x stimuli ethnicity (Black, White) x stimuli gender (Female, Male) x stimuli skin-tone (Dark, Light). Participants will rate same-gender faces that are similar in ethnicity and skin tone of the rater as more attractive than same-gender facial stimuli that differ from the rater's skin tone (Buss, 2003).

2. An interaction of stimuli ethnicity (Black, White), gender (Female, Male), and skin-tone (Dark, Light) for ratings of attractiveness. Black light-toned female facial stimuli will be rated as more attractive than their dark-toned counterparts (Li & Kenrick, 2006). However, White dark-toned females will be rated as more attractive than their light-toned counterparts (Fink, et al., 2001).
3. An interaction of rater gender (Female, Male) x stimuli gender (Female, Male) x stimuli skin-tone (Dark, Light) for ratings of attractiveness. Females will rate dark-toned Black and White males as more attractive than their light-toned counterparts (Li & Kenrick, 2006).
4. An interaction of rater ethnicity (Non-white, White) x rater gender (Female, Male) x stimuli ethnicity (Black, White).
    a. White females will rate Black facial stimuli as more attractive than ratings by White males.
    b. No gender differences will be significant for Black (Non-white) raters rating Black or White facial stimuli with the exception of hypothesis five (Ryan, et al., 2007; Wade & Bielitz, 2005).
5. An interaction of rater ethnicity (Black (Non-white), White) x rater gender (Female, Male) x stimuli ethnicity (Black, White) x stimuli gender (Female, Male). Black (Non-white) males will rate White females as more attractive than ratings by Black (Non-white) females (Murstein, Merighi, & Malloy, 1989).

Visual Attention Hypotheses:

6. An interaction of rater gender (Female, Male) x stimuli gender (Female, Male) and rater gender (Female, Male) x stimuli gender (Female, Male) x region of interest (Left eye, Right eye, Nose, Mouth).
    a. Male raters will:
        i. View more regions of interest on the face when rating opposite sex versus same sex faces (Alexander & Charles, 2009) and
        ii. spend more time viewing a given region when looking at opposite versus same sex faces.
    b. In contrast, female raters will:
        i. Demonstrate nonsignificant differences in the number of regions of interest viewed when rating opposite versus same sex faces and
        ii. demonstrate nonsignificant differences in the proportion of time spent per region of interest when rating opposite versus same sex faces.
7. An interaction of rater ethnicity (Non-white, White) x stimuli ethnicity (Black, White). Raters will view more regions when rating other-ethnicity faces versus own-ethnicity faces (Rhodes, Hayward, & Winkler, 2006).

CHAPTER 2

Method

Participants

A total of 34 females and 28 males (ages 18-65) were recruited for participation. The sample was 66% Caucasian, 23% African-American, and 11% other (comprised of Latino, Asian, and Other/Mixed). Eighty-nine percent of the participants identified as predominately heterosexual. Participants were recruited from a voluntary subject pool at an urban university in Detroit, MI as well as the surrounding community. Participants recruited from the university were offered extra credit for participating in the research or, as with non-student participants, were offered $5 compensation for full participation. In addition, all participants who complete the ratings were entered in a drawing for a chance to win a prepaid VISA. Participants were not aware of the objectives of the project until debriefing. This project was funded privately with no financial conflicts of interest. Participants reported none of the following: visual deficits (i.e., unable to see photographs presented on a computer screen, color blindness), history of flicker-induced epileptic seizures, or fine motor deficit.

Measures

Apparatus. Stimuli were presented on a 17-inch color monitor controlled by an Intel processor. The computer system's graphics adapter was used at a refresh rate of 60 Hz. The eye tracker was controlled by EYETRACK software (see http://blogs.umass.edu/eyelab/software/).

Stimuli. The facial stimuli used in this study were drawn from multiple face databases. White female and male faces were drawn from the Radboud face database (Langner, et al., 2010). Black female and male faces were selected from the MORPH and MUCT databases (Ricanek & Tesafaye, 2006; Milborrow, Morkel, & Nicolls, 2010). All faces had neutral expressions in order to minimize the effect of emotion (Rhodes & Zebrowitz, 2002). Two independent judges prescreened faces from each database in order to exclude faces that had facial hair, grossly abnormal facial anomalies, or prominent blemished skin. Then each judge cross-referenced the selected faces to confirm which faces would be most appropriate for the study. Faces that were matched were selected for final consideration. The final selections included five stimuli of each gender and skin color. Specific identification numbers of each picture were recorded from the original database to preserve consistency for purposes of replication. The final twenty stimuli were then further screened for size consistency. Stimuli underwent alignment so that eyes, nose and mouth were all within a specified area and were cropped to reveal only the face (i.e., no ears, neck, or hair) using Adobe Photoshop version CS5. Manipulations in skin tone were then made using several of the coloration features of Photoshop. Specific manipulations can be solicited from the primary investigator. Grey backgrounds were imposed behind each face in order to minimize the effects of lighting effects and Black or white backgrounds which have been found to enhance lighting or darkening effects on faces (Levin & Banaji, 2006). The measured distance between participants and the screen was approximately 55 cm. The measured visual angle based on the horizontal measurement of the stimuli on the screen was 130°. The dimensions of the stimuli were 1024 x 681 with a resolution of 72 dpi. Twenty-four facial stimuli were used that included three faces of each stimulus category. Participants rated each face twice (e.g., the dark-tone and light-tone version). The final sorting provided eight stimuli groups: AAF – African-American female (dark and light), AAM – African-American male (dark and light), WF – White female (dark and light), and WM – White male (dark and light).

Rating. Booklets were provided to each participant containing five seven-point Likert scales (i.e., 1-not at all, 7-very) for the following ratings: attractiveness, familiarity, and good-parent. The familiarity variable was used to support and confirm the relationship with attractiveness (Rhodes, Halberstadt, Jeffrey, & Palermo, 2005). The good-parent variable will provide data for future research. Basic demographics were gathered after the ratings were completed and included ethnicity, gender, sexual orientation, skin-tone, and current dating status. Sexual orientation was recorded using the Kinsey scale (Donovan, Hill, & Jankowiak, 1989). The purpose was to allow the researchers to investigate the influences of non-white raters, determine patterns ratings of the Black stimuli, and have the opportunity to collect data about potential differences between heterosexual and homosexual raters. Skin-tone was rated on a Likert-scale (i.e., 1-light-toned, 4-medium, 7-dark-toned). Instructions were provided (i.e., select the choice that describes you the best) so as to minimize participants' ambiguity about selecting skin-tone. Dating status was used to analyze the relationship of rater's dating status on subsequent ratings (Li & Kenrick, 2006; Jankowiak, Hill, & Donovan, 1992).

Procedure

Participants entered the lab and after a brief description of the study, completed the informed consent. They were then fitted with the head-mounted Eyelink II eye tracking headband. Each session started with a 9-point calibration of the eye tracker. To ensure minimal discrepancy between participants' actual oculomotor activity and what the eye tracker reported, an eye drift correction was performed before the presentation of each trial. Each trial was always initiated from the center of the nose bridge of each facial stimulus. Brief instructions were presented orally and then the participants were instructed to rate the first face on the variables of interest. Participants were shown each face for 5s (Alexander & Charles, 2009). All 24 faces were presented randomly for each participant. The experimenter initiated the next trial by striking a key on the keyboard of the experimenter's computer that controlled the presentation of the faces. This process was repeated until all 24 faces were presented. Upon completion of the study, the experimenter provided each participant with an envelope containing a debriefing of the study and the monetary compensation. Participants were given an opportunity to ask questioned and then were escorted from the laboratory.

CHAPTER 3

Results

A total sample size of 62 participants provided data that could be used for analysis. A total of 7 of the participants had missing data as a result of both program error (i.e., face was not presented on the screen and therefore no eye-tracking data was recorded) or experimenter error (i.e., one page of the booklet was left blank and subsequently ratings of the faces were not recorded). All subjects with missing data were White participants (5 females). All demographic information was obtained through participant self-report. The distribution of gender and ethnicity of the sample is seen in *Table 1* and dating status in *Table 2*. The current participant sample included only four individuals identifying as primarily bisexual or homosexual. The data of these participants were retained for analysis after nonsignificant differences were found between the participants identifying as bisexual or homosexual and a gender and aged matched sample of heterosexuals for ratings of attractiveness, familiarity, and average regions viewed $F(2, 4) = .736$, $p=.534$ (attractiveness ratings); $F(2, 4) = .506$, $p=.637$ (familiarity ratings); $F(2, 4) = .567$, $p=.607$ (number of regions viewed). The number of missed days since menstruation for female participants ranged from 0 to 394 days. Five female participants did not record the number of days since menstruation.

Table 1. Demographics of participant sample. The first number represents the total number of the participants in each ethnicity category. The number in parentheses represents the percentage of the total number of participants.

	Ethnicity (Percent of total sample)				
Gender	White	Black	Latino	Asian	Other
Female	23 (37.1)	6 (9.7)	1 (1.6)	1 (1.6)	3 (4.8)
Male	18 (29)	8 (12.9)	2 (3.2)	0	0
Total	41 (66.1)	14 (22.6)	3 (4.8)	1 (1.6)	3 (4.8)
Age *M (SD)* 32.1 (12.2)	31.8 (12)	32 (11.2)	27.3 (11)	65	32.1 (12.2)

Table 2. Dating status of participant sample by ethnicity and gender.

		Rater Date Status		
Rater Gender	Rater Ethnicity	Single	Short-term	Long-term
Female	Non-white	7	1	3
	White	7	1	15
Total		14	2	18
Male	Non-white	8	0	2
	White	4	3	11
Total		12	3	13

The ethnic distribution of the participants resulted in a predominantly White sample followed by African-American. Latinos, mixed/other, and Asian comprised the rest of the sample. Given the unequal distribution of ethnicities represented in the sample, ethnicity was dichotomized by Non-white and White to allow for comparison between ethnicity.

A 2 (ethnicity of rater) X 2 (gender of rater) X 2 (skin-tone of rater) X 2 (ethnicity of stimuli) X 2 (gender of stimuli) X 2 (skin-tone of stimuli) mixed ANOVA expecting between-within interactions was used to assess the influence of the independent variables on participants' ratings of attractiveness, familiarity, and good-parenting. In addition, a 2 (ethnicity of rater) X 2 (gender of rater) X 2 (skin-tone of rater) X 2 (ethnicity of stimuli) X 2 (gender of stimuli) X 2 (skin-tone of stimuli) X 4 (regions of interest: left ear, right ear, nose, mouth) mixed ANOVA was used to assess the influence of the independent variables on participants' oculomotor activity including proportion of time spent in a given region (four regions) and the average regions viewed (*Note*. Regions (4) was not part of the mixed ANOVA for average regions viewed). The statistical model is shown below (*Figure 2*).

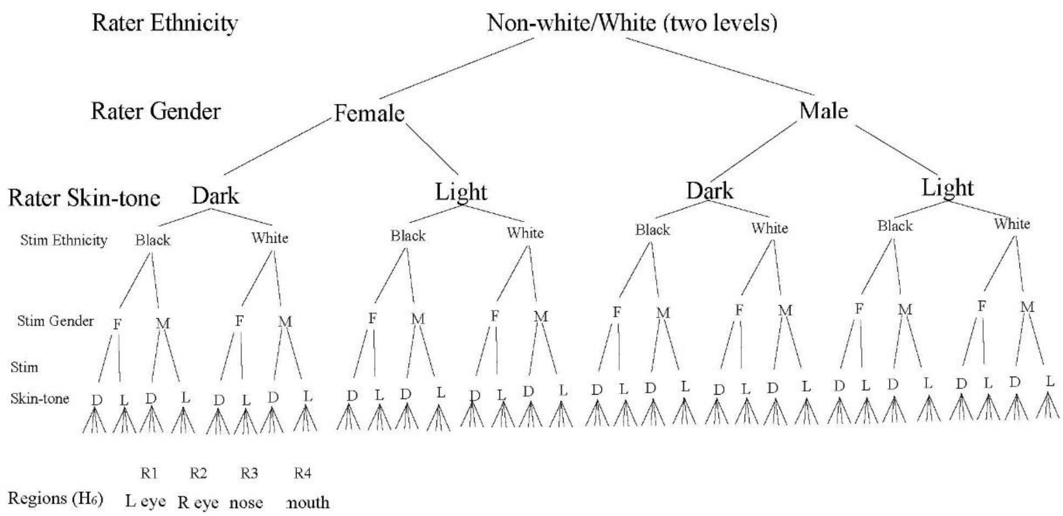


Figure 2. Statistical model of ANOVA.

Dating status was excluded as a covariate as it added a small but statistically negligible effect on the dependent variables. There were significantly more raters that identified as light- or medium-toned. Therefore, those who rated themselves as medium skin-tone (4 or higher on the scale) were re-categorized as dark-toned. Collapsing these groups allowed for more equitable groups for the final analysis. Distribution of between-group variables (i.e., ethnicity, gender, skin-tone) are provided in the below tables. Univariate tests will be described below for each hypothesis.

Ratings.

The ANOVA results for each rating are provided below in *Table 3*. The means of level of rater for each rating (i.e., attractiveness, familiarity, good-parent) are presented in *Tables 4-6*.

Table 3. ANOVA Table of ratings by rater and stimuli variables.

Main Effect/ Interaction	Rating	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
ethnicstim	Attract	29.048	1	29.048	23.899	.000	.332
	Familiar	4.585	1	4.585	3.063	.087	.060

	Good Parent	17.360	1	17.360	17.107	.000	.263
ethnicstim * Ethnicity	Attract	5.709	1	5.709	4.697	.035	.089
	Familiar	23.921	1	23.921	15.977	.000	.250
	Good Parent	3.384	1	3.384	3.335	.074	.065
ethnicstim * Gender * Ethnicity	Attract	.267	1	.267	.219	.642	.005
	Familiar	.067	1	.067	.045	.833	.001
	Good Parent	.202	1	.202	.199	.657	.004
Error	Attract	58.340	48	1.215			
(ethnicstim)	Familiar	71.867	48	1.497			
	Good Parent	48.709	48	1.015			
genderstim	Attract	14.742	1	14.742	18.420	.000	.277
	Familiar	.014	1	.014	.026	.873	.001
	Good Parent	26.056	1	26.056	30.911	.000	.392
genderstim * Gender	Attract	.012	1	.012	.015	.902	.000
	Familiar	2.764	1	2.764	4.951	.031	.094
	Good Parent	.390	1	.390	.463	.500	.010
genderstim * Ethnicity	Attract	.037	1	.037	.046	.830	.001
	Familiar	2.231	1	2.231	3.997	.051	.077
	Good Parent	.547	1	.547	.649	.425	.013
genderstim * Skin Tone	Attract	.260	1	.260	.325	.571	.007
	Familiar	3.202	1	3.202	5.737	.021	.107
	Good Parent	.062	1	.062	.073	.788	.002
genderstim * Gender * Ethnicity	Attract	3.511	1	3.511	4.387	.042	.084
	Familiar	.113	1	.113	.203	.654	.004
	Good Parent	.058	1	.058	.068	.795	.001
Error	Attract	38.416	48	.800			
(genderstim)	Familiar	26.791	48	.558			
	Good Parent	40.460	48	.843			
skintonestim	Attract	1.874	1	1.874	3.521	.067	.068
	Familiar	2.338	1	2.338	4.065	.049	.078

	Good Parent	.273	1	.273	.467	.497	.010
skintonestim * Ethnicity	Attract	3.470	1	3.470	6.519	.014	.120
	Familiar	1.005	1	1.005	1.747	.192	.035
	Good Parent	.414	1	.414	.710	.404	.015
skintonestim * Skin Tone	Attract	2.155	1	2.155	4.049	.050	.078
	Familiar	.253	1	.253	.440	.510	.009
	Good Parent	.926	1	.926	1.586	.214	.032
Error	Attract	25.547	48	.532			
(skintonestim)	Familiar	27.607	48	.575			
	Good Parent	28.012	48	.584			
ethnicstim * genderstim	Attract	.022	1	.022	.047	.829	.001
	Familiar	.968	1	.968	1.254	.268	.025
	Good Parent	2.803	1	2.803	6.972	.011	.127
ethnicstim * genderstim * Gender * Ethnicity	Attract	.158	1	.158	.333	.567	.007
	Familiar	.361	1	.361	.468	.497	.010
	Good Parent	.370	1	.370	.920	.342	.019
Error	Attract	22.760	48	.474			
(ethnicstim*	Familiar	37.050	48	.772			
genderstim)	Good Parent	19.300	48	.402			
ethnicstim * skintonestim	Attract	9.385	1	9.385	33.993	.000	.415
	Familiar	.423	1	.423	.615	.437	.013
	Good Parent	.077	1	.077	.213	.647	.004
Error(ethnicstim *skintonestim)	Attract	13.251	48	.276			
	Familiar	33.006	48	.688			
	Good Parent	17.430	48	.363			
genderstim * skintonestim * Gender	Attract	.004	1	.004	.015	.904	.000
	Familiar	.675	1	.675	.968	.330	.020
	Good Parent	.823	1	.823	3.491	.068	.068
Error	Attract	12.859	48	.268			

(genderstim*	Familiar	33.448	48	.697			
skintonestim)	Good Parent	11.310	48	.236			
ethnicstim * genderstim * skintonestim	Attract	.001	1	.001	.004	.950	.000
	Familiar	.090	1	.090	.128	.723	.003
	Good Parent	.605	1	.605	1.710	.197	.034
ethnicstim * genderstim * skintonestim * Gender * Skin Tone	Attract	.396	1	.396	1.766	.190	.035
	Familiar	4.406	1	4.406	6.216	.016	.115
	Good Parent	.056	1	.056	.158	.692	.003
ethnicstim * genderstim * skintonestim * Gender * Ethnicity * Skin Tone	Attract	.015	1	.015	.067	.797	.001
	Familiar	.092	1	.092	.129	.721	.003
	Good Parent	.009	1	.009	.025	.875	.001
Error	Attract	10.775	48	.224			
(ethnicstim*	Familiar	34.025	48	.709			
genderstim* skintonestim)	Good Parent	16.978	48	.354			

Note. ethnicstim – Stimuli ethnicity; genderstim – Stimuli gender; skintonestim – Stimuli skin-tone; Gender – Rater gender; Ethnicity – Rater ethnicity; Skin Tone – Rater skin-tone

Table 4. Attractiveness ratings of stimuli group by rater group.

Rater			Stimuli Group *M* (*SD*) BFD	BFL	BMD	BML	WFD	WFL	WMD	WML
Non-white	Female	Dark (N=9)	2.44 (.81)	2.87 (1.01)	2.34 (.94)	2.67 (1.07)	3.57 (1.13)	3.05 (.93)	3.50 (.96)	3.03 (.95)
		Light (N=2)	3.50 (.47)	4.80 (.90)	3.22 (.40)	3.97 (1.70)	3.92 (1.30)	4.68 (1.91)	4.28 (.21)	4.17 (.47)
	Male	Dark (N=8)	3.07 (.78)	3.74 (1.10)	2.85 (.73)	3.79 (1.48)	3.79 (1.48)	4.26 (.90)	3.54 (1.51)	3.25 (1.51)
		Light (N=2)	2.83 (.24)	4.00 (.00)	2.00 (1.41)	2.83 (1.65)	2.83 (1.65)	3.50 (.71)	2.33 (.47)	2.50 (.71)
White	Female	Dark (N=3)	3.33 (.88)	3.88 (.38)	2.67 (.00)	2.77 (.79)	5.33 (1.20)	5.33 (1.20)	4.22 (1.26)	3.44 (.19)
		Light (N=18)	3.11 (.76)	3.33 (.71)	2.58 (.80)	2.68 (.79)	4.25 (.84)	4.07 (1.05)	3.80 (.89)	3.38 (.99)
	Male	Dark (N=4)	2.00 (.86)	2.00 (.86)	2.00 (.98)	2.25 (1.07)	3.25 (.63)	3.19 (.98)	3.17 (.96)	2.67 (1.41)
		Light (N=10)	2.38 (.98)	2.78 (1.19)	2.18 (.82)	2.43 (.79)	3.64 (.76)	3.58 (1.11)	3.20 (1.36)	3.16 (1.53)

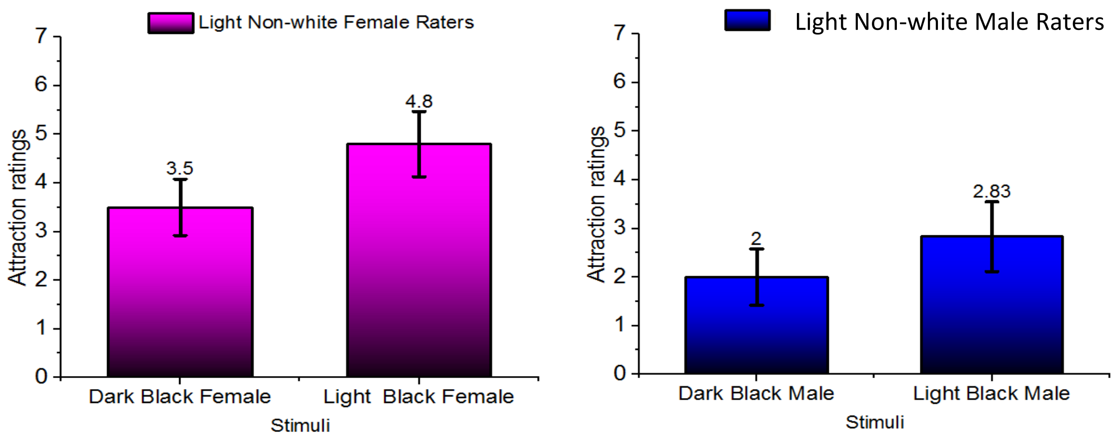
Note. BFD – Dark-toned Black female stimuli; BFL - Light-toned Black female stimuli; BMD - Dark-toned Black male stimuli; BML - Light-toned Black male stimuli; WFD – Dark-toned White female stimuli; WFL – Light-toned White female stimuli; WMD – Dark-toned White male stimuli; WML – Light-toned White male stimuli.

Table 5. Familiarity ratings of stimuli group by rater group.

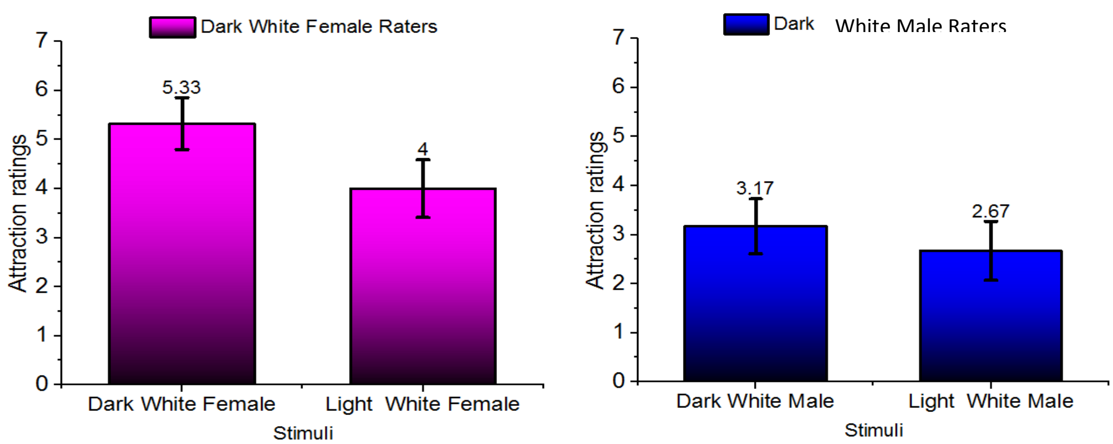
Rater			Stimuli Group *M* (*SD*) BFD	BFL	BMD	BML	WFD	WFL	WMD	WML
Non-white	Female	Dark (N=9)	3.28 (1.36)	3.40 (1.66)	3.61 (1.40)	3.51 (1.99)	3.60 (1.27)	3.67 (1.10)	2.92 (1.73)	3.89 (1.56)
		Light (N=2)	4.75 (1.06)	4.88 (.78)	4.18 (1.28)	3.98(1.30)	3.92 (1.30)	5.35 (.49)	4.15 (.45)	3.92 (.12)
	Male	Dark (N=8)	3.39 (1.34)	3.74 (1.27)	3.20 (1.64)	4.02 (1.59)	2.97 (1.41)	3.30 (1.28)	3.73 (1.44)	3.57 (1.88)
		Light (N=2)	3.67 (1.89)	4.00 (2.36)	3.17 (2.59)	3.50 (2.12)	2.33 (1.41)	2.67 (.94)	2.17 (1.65)	2.67 (1.89)
White	Female	Dark (N=3)	3.00 (.88)	4.33 (1.33)	4.33 (2.30)	2.56 (1.26)	5.44 (1.50)	4.67 (1.00)	5.33 (1.33)	4.89 (.19)
		Light (N=18)	2.79 (1.25)	2.48 (.85)	2.29 (.96)	2.54 (.90)	2.95 (1.08)	3.36 (1.34)	3.33 (.83)	3.36 (1.12)
	Male	Dark (N=4)	3.00 (1.51)	3.00 (1.41)	3.58 (1.00)	3.58 (1.26)	3.25 (.74)	4.08 (.92)	4.35 (1.07)	4.83 (1.50)
		Light (N=10)	3.17 (.90)	3.51 (1.28)	3.25 (.92)	3.36 (1.28)	3.37 (1.09)	3.75 (1.61)	3.79 (.97)	3.98 (.94)

Note. BFD – Dark-toned Black female stimuli; BFL - Light-toned Black female stimuli; BMD - Dark-toned Black male stimuli; BML - Light-toned Black male stimuli; WFD – Dark-toned White female stimuli; WFL – Light-toned White female stimuli; WMD – Dark-toned White male stimuli; WML – Light-toned White male stimuli.

Hypothesis 1. An interaction of rater ethnicity (Black, White) x rater gender (Female, Male) x rater skin-tone (Dark, Light) x stimuli ethnicity (Black, White) x stimuli gender (Female, Male) x stimuli skin-tone (Dark, Light). Participants were expected to rate facial stimuli that were ethnicity, gender and skin-tone matched to the rater as more attractive than same-gender facial stimuli that differ from the rater's ethnicity and skin-tone (i.e., light-toned non-white females will rate light-toned Black females as more attractive than dark-toned Black females). The interaction was not significant $F(1, 48) = .067$, $p=.797$. Further examination of the data revealed that comparison of the means was in the direction consistent with the hypothesis. Non-white light-toned raters rated gender-matched light-toned Black stimuli as more attractive than dark-toned Black stimuli (*Figures 3-4*).



Figures 3-4. Attractiveness ratings of Black dark- and light-toned stimuli by non-white female and male raters.



Figures 5-6. Attractiveness ratings of W dark- and light-toned stimuli by White female and male raters.

However, for White raters, dark-toned White raters rated gender-matched dark-toned White stimuli as more attractive than light-toned White stimuli (*Figures 5-6*).

Of note, dark-toned non-white raters and light-toned White raters rated stimuli that were opposite skin-tone as more attractive than stimuli that matched the rater's skin-tone.

Hypothesis 2. An interaction of stimuli ethnicity (Black, White) x stimuli gender (Female, Male) x stimuli skin-tone (Dark, Light). It was predicted that Black light-toned female stimuli would be rated as more attractive than dark-toned counterparts while for White female stimuli, dark-toned stimuli would be rated as more attractive than light-toned White female stimuli. The interaction was not significant $F(1, 48) = .004$, p=.950. Further examination of the data revealed that comparison of the means was in the direction consistent with the hypothesis but the differences were not significant (see *Table 4*; *Figures 3 & 5*). Again, observation of the data across rater ethnicity and gender reveals that light-tone Black female stimuli were rated as more attractive that dark-toned Black female stimuli. However, dark-toned White female stimuli were not rated as more attractive than light-toned White female stimuli by all rater groups. In fact, non-white raters rated light-toned White female stimuli as more attractive than dark-toned White female stimuli.

Hypothesis 3. An interaction of rater gender x gender of stimuli x skin-tone of stimuli. It was expected that female raters would rate dark-toned male stimuli as more attractive than light-toned male stimuli. The interaction was not significant $F(1, 48) = .534$, p=.468. Further examination of the data revealed that comparison of the means was in the direction consistent with the hypothesis but the difference between ratings of the dark and light-toned male stimuli was not significant (*Figure 7*).

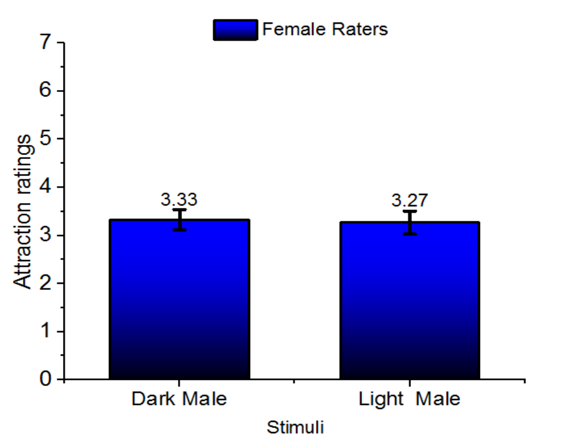


Figure 7. Ratings of male stimuli by female raters.

Examination of the mean attractiveness ratings by female raters (*Table 4*) revealed that only dark-toned White male stimuli were rated as more attractive than light-toned White male stimuli which is consistent with the hypothesis. Across all rater groups, light-toned Black stimuli were rated as more attractive than dark-toned Black stimuli which is not consistent with the hypothesis.

Hypothesis 4. An interaction of rater ethnicity x rater gender x stimuli ethnicity. It was predicted that White female raters would rate Black stimuli as more attractive than ratings by White males, but no gender differences would be significant for Non-white raters rating Black or White faces with the exception noted below for hypothesis five. The interaction was not significant $F(1, 48) = .219$, p=.642. Further examination of the data revealed that comparison of the means was in the direction consistent with the hypothesis (*Figure 8*). However, the differences were not statistically significant.

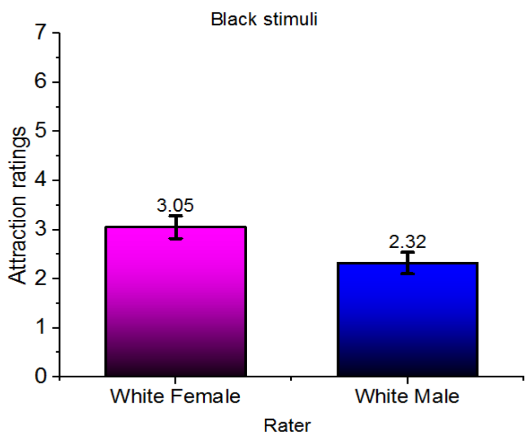


Figure 8. Ratings of Black stimuli by White raters.

The latter part of the hypothesis cannot be directly addressed due to inadequate sample size of Black participants. Non-white raters showed higher attractiveness ratings for White and Black stimuli depending on the gender of the stimuli.

Hypothesis 5. An interaction of rater ethnicity x rater gender x stimuli ethnicity x stimuli gender. It was predicted that Black (non-white) male raters would rate White female stimuli as more attractive than ratings made by Black (non-white) female raters. The interaction was not significant $F(1, 48) = .333$, $p=.567$. Further examination of the data revealed that comparison of the means was not in the expected direction. Non-white female raters rated White female stimuli as slightly more attractive than ratings by non-white male raters (*Figure 9*).

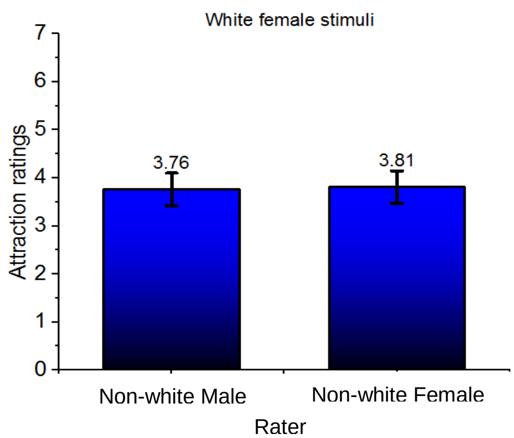


Figure 9. Ratings of White female stimuli by non-white raters.

Eyetracking.

In regard to the eyetracking data, eyebrows and forehead were removed from the final analysis as the distribution was overwhelmingly skewed towards zero fixations. Therefore, the final regions for the percent dwell time analyses included the eyes (left and right), nose, and mouth. For the hypotheses that addressed total regions, non-salient regions were retained in order to determine if the excluded regions were viewed at any time during tracking of oculomotor activity. The ANOVA tables are shown below for percentage of total fixations and average regions viewed (*Tables 6 & 7*).

Table 6. ANOVA Table of percentage of fixation by rater and stimuli variables.

Main effect/Interaction	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
ethnicstim	.041	1	.041	10.454	.002	.185
ethnicstim * Gender	.027	1	.027	7.062	.011	.133
ethnicstim * Gender * Ethnicity * Skin Tone	.028	1	.028	7.199	.010	.135
Error(ethnicstim)	.179	46	.004			
region	3.325	3	1.108	14.651	.000	.242
Error(region)	10.440	138	.076			
genderstim * region * Gender	.014	3	.005	.811	.490	.017
Error(genderstim*region)	.788	138	.006			
ethnicstim * genderstim	.022	1	.022	7.981	.007	.148
Error(ethnicstim*genderstim)	.124	46	.003			
ethnicstim * genderstim * skintonestim	.028	1	.028	8.362	.006	.154
ethnicstim * genderstim * skintonestim * Gender * Ethnicity	.015	1	.015	4.361	.042	.087
Error(ethnicstim*genderstim*skintonestim)	.155	46	.003			
skintonestim * region	.037	3	.012	3.596	.015	.073
skintonestim * region * Gender	.028	3	.009	2.698	.048	.055
skintonestim * region * Gender * Skin Tone	.029	3	.010	2.754	.045	.056
Error(skintonestim*region)	.479	138	.003			

Note. ethnicstim – Stimuli ethnicity; genderstim – Stimuli gender; skintonestim – Stimuli skin-tone; Gender – Rater gender; Ethnicity – Rater ethnicity; Skin Tone – Rater skin-tone

Table 7. ANOVA Table of average number of regions viewed by rater and stimuli variables.

Main effect/Interaction	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
ethnicstim * Ethnicity	.058	1	.058	.119	.731	.003
Error(ethnicstim)	21.996	45	.489			
genderstim	7.763	1	7.763	16.579	.000	.269
genderstim * Gender	.133	1	.133	.283	.597	.006
genderstim * skintonestim * Gender	2.375	1	2.375	5.072	.029	.101
Error(genderstim)	21.072	45	.468			
genderstim * skintonestim	1.258	1	1.258	3.813	.057	.078
genderstim * skintonestim * Gender	1.674	1	1.674	5.075	.029	.101

genderstim * skintonestim * Ethnicity	1.330	1	1.330	4.032	.051	.082
genderstim * skintonestim * Gender * Ethnicity * Skin Tone	1.273	1	1.273	3.859	.056	.079
Error(genderstim*skintonestim)	14.845	45	.330			

Note. ethnicstim – Stimuli ethnicity; genderstim – Stimuli gender; skintonestim – Stimuli skin-tone; Gender – Rater gender; Ethnicity – Rater ethnicity; Skin Tone – Rater skin-tone.

Means of percentage of total fixations and average regions viewed are provided below (*Tables 8 & 9*).

Table 8. Percentage of total fixations of stimuli ethnicity and gender by rater ethnicity and gender.

		Stimuli Group				Stimuli Group			
		Left eye				Right eye			
Rater		BF *M(SD)*	BM *M(SD)*	WF *M(SD)*	WM *M(SD)*	BF *M(SD)*	BM *M(SD)*	WF *M(SD)*	WM *M(SD)*
Non-white	Female (N=11)	.14 (.10)	.12 (.10)	.15 (.13)	.12 (.10)	.14 (.09)	.15 (.08)	.12 (.08)	.12 (.07)
	Male (N=10)	.13 (.10)	.14 (.10)	.17 (.12)	.17 (.13)	.14 (.07)	.12 (.12)	.16 (.12)	.12 (.12)
White	Female (N=22)	.18 (.09)	.17 (.10)	.17 (.08)	.16 (.12)	.17 (.09)	.19 (.09)	.16 (.08)	.16 (.11)
	Male (N=11)	.12 (.06)	.13 (.06)	.14 (.08)	.12 (.07)	.15 (.06)	.16 (.05)	.17 (.05)	.16 (.07)
		Nose				Mouth			
		BF *M(SD)*	BM *M(SD)*	WF *M(SD)*	WM *M(SD)*	BF *M(SD)*	BM *M(SD)*	WF *M(SD)*	WM *M(SD)*
Non-white	Female (N=11)	.28 (.09)	.33 (.15)	.30 (.12)	.26 (.11)	.12 (.09)	.12 (.09)	.11 (.07)	.13 (.09)
	Male (N=10)	.30 (.17)	.32 (.20)	.27 (.19)	.30 (.22)	.13 (.12)	.14 (.14)	.09 (.06)	.10 (.08)
White	Female (N=22)	.23 (.08)	.27 (.11)	.23 (.06)	.22 (.10)	.15 (.05)	.16 (.07)	.13 (.05)	.14 (.08)
	Male (N=11)	.25 (.06)	.27 (.10)	.26 (.08)	.24 (.08)	.16 (.06)	.18 (.08)	.13 (.05)	.13 (.05)

Note. BF –Black female stimuli; BM - Black male stimuli; WF – White female stimuli; WML –White male stimuli.

Table 9. Average regions viewed of stimuli group by rater group.

			Stimuli Group *M* (*SD*)							
Rater			BFD	BFL	BMD	BML	WFD	WFL	WMD	WML
Non-white	Female	Dark (N=9)	3.33 (.87)	3.37 (1.17)	3.44 (1.13)	3.37 (.82)	3.30 (.65)	3.07 (.62)	3.59 (1.15)	3.67 (.80)
		Light (N=2)	3.83 (.24)	3.33 (.47)	4.67 (.47)	4.50 (.24)	3.83 (.24)	3.83 (.71)	4.67 (1.41)	4.17 (.24)
	Male	Dark (N=8)	3.08 (1.09)	2.96 (1.35)	3.04 (1.27)	3.13 (.91)	3.13 (.92)	3.04 (.93)	3.08 (1.11)	3.08 (1.15)
		Light (N=2)	3.50 (.24)	2.50 (.24)	3.33 (.47)	4.50 (.24)	3.83 (.24)	2.50 (.24)	3.33 (.00)	4.17 (.24)
White	Female	Dark (N=3)	3.33 (1.00)	4.22 (.38)	4.11 (.77)	3.78 (1.07)	3.56 (.84)	3.33 (.33)	3.11 (.51)	3.89 (1.07)
		Light (N=18)	3.70 (.61)	3.94 (.87)	4.02 (.70)	3.80 (.43)	3.94 (.42)	3.81 (.78)	3.87 (.98)	4.06 (.80)
	Male	Dark (N=4)	4.11 (.84)	3.33 (.33)	4.44 (1.07)	4.11 (1.02)	4.00 (.00)	4.22 (.77)	4.67 (.33)	4.67 (.88)
		Light (N=10)	3.71 (.52)	3.75 (1.02)	3.92 (.66)	4.17 (.36)	4.00 (1.04)	4.13 (.69)	4.29 (.60)	4.29 (.60)

Note. BFD – Dark-toned Black female stimuli; BFL - Light-toned Black female stimuli; BMD - Dark-toned Black male stimuli; BML - Light-toned Black male stimuli; WFD – Dark-toned White female stimuli; WFL – Light-toned White female stimuli; WMD – Dark-toned White male stimuli; WML – Light-toned White male stimuli.

Hypothesis 6. Two different interactions were part of the hypothesis. An interaction of rater gender x stimuli gender for number of regions viewed and rater gender x stimuli gender x region of interest. There were two hypotheses contained within hypothesis six. 1) It was predicted that male raters would view more regions and evidence a greater percentage of time spent in a given region when rating opposite sex faces. 2) Female raters would demonstrate nonsignificant differences between faces of same and opposite sex for number of regions viewed or time spent in a given region. The interaction of rater gender x stimuli gender x region of interest was not significant $F(3, 138) = .811$, $p=.490$. The interaction of rater gender x stimuli gender for number of regions viewed was also not significant $F(1, 45) = .283$, $p=.597$.   However, the interaction of rater gender x stimuli gender x stimuli skin-tone was significant for number of regions viewed $F(1, 45) = 5.08$, $p=.029$, partial $\eta^2=.101$ (*Figure 10*).

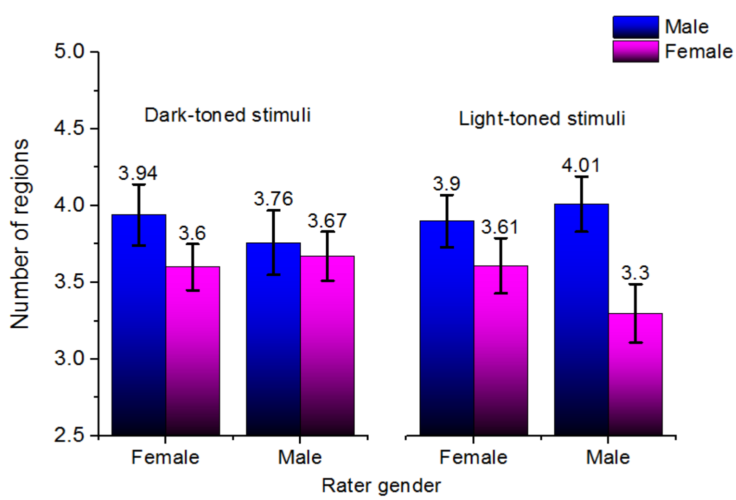


Figure 10. Average regions viewed of stimuli gender and skin-tone by rater gender.

In contrast to the hypothesis, males viewed significantly more regions of male stimuli than female stimuli for light-toned faces. Moreover, females viewed significantly more regions of male stimuli than female stimuli. These findings suggest that males view more regions of light-toned same-gender faces than light-toned opposite-gender faces while females view more of opposite-gender faces than viewing female and male faces similarly.

Hypothesis 7. The interaction of rater ethnicity x stimuli ethnicity. It was predicted that raters would view more regions when rating other-ethnicity versus own-ethnicity faces. The interaction was not significant $F(1, 45) = .119$, p=.731. Examination of the data revealed that both non-white and White raters viewed more regions of White stimuli compared to Black stimuli. Non-white raters viewing more regions of White stimuli is consistent with the hypothesis but the differences were trivial and not statistically significant.

Unexpected Findings

Several results of the ANOVA were significant but were not applicable to the hypotheses and are mentioned below. Main effects are mentioned initially followed by interactions. Results are separated by the dependent variable of rating (i.e., attractiveness, familiarity, good-parent) and the oculomotor activity.

Attractiveness. There were significant interactions of attractiveness ratings. Rater ethnicity x stimuli ethnicity was significant $F(1, 48) = 4.70$, p=.035, partial η^2=.089 (*Table 10*).

Table 10. Attractiveness ratings of stimuli ethnicity by rater ethnicity.

	Stimuli ethnicity		
Rater	Black *M (SE)*	White *M (SE)*	*p*
White	2.68 (.159)	3.64 (.187)	.035
Non-white	3.18 (.206)	3.55 (.242)	

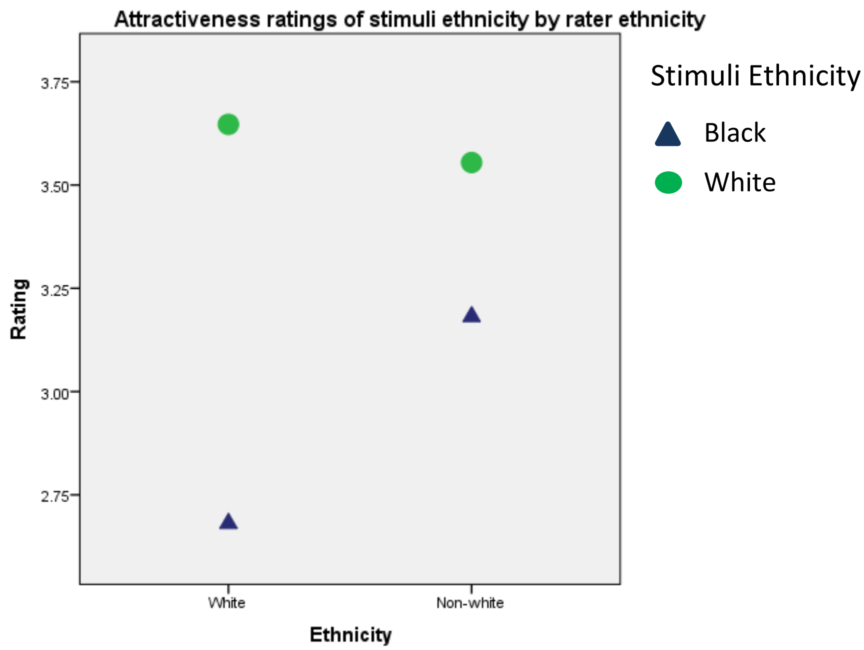


Figure 11. Pattern of attractiveness ratings of stimuli ethnicity by rater ethnicity.

White stimuli were rated as more attractive by both W and non-white raters. However, Black stimuli were rated significantly more attractive by non-white raters than by White raters (*Figure 11*). Rater ethnicity x stimuli skin-tone was significant $F(1, 48) = 6.52$, p=.014, partial η^2=.120 (*Table 11*).

Table 11. Attractiveness ratings of stimuli skin-tone by rater ethnicity.

	Stimuli skin-tone		
Rater	Dark *M (SE)*	Light *M (SE)*	*p*
White	3.20 (.154)	3.13 (.170)	.014
Non-white	3.17 (.200)	3.60 (.220)	

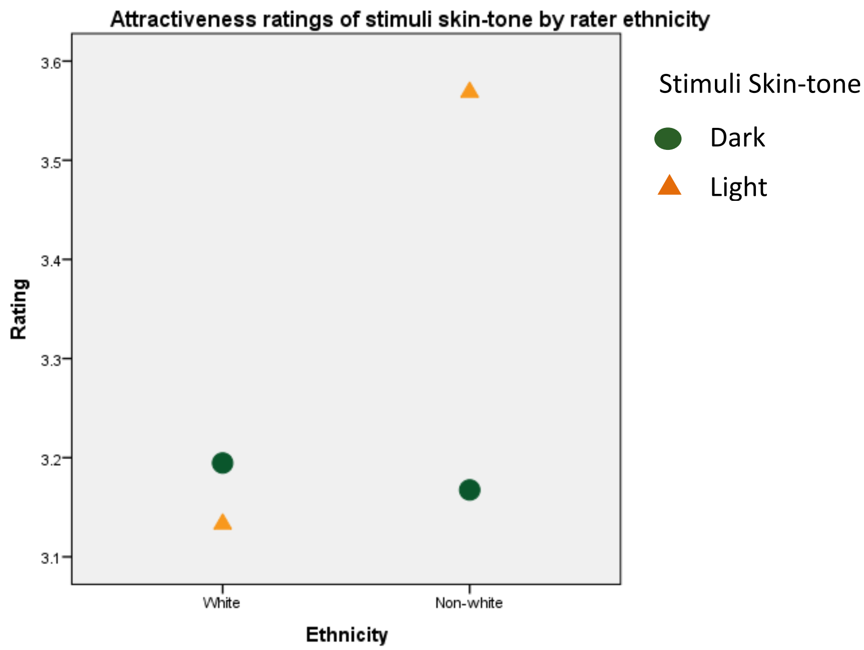


Figure 12. Pattern of attractiveness ratings of stimuli skin-tone by rater ethnicity.

Non-white raters rated light-toned stimuli as more attractive than dark-toned stimuli. Ratings of attractiveness by White raters were not significantly different (*Figure 12*). Rater skin-tone x stimuli skin-tone was significant $F(1, 48) = 4.05$, p=.050, partial η^2=.078 (*Table 12*).

Table 12. Attractiveness ratings of stimuli skin-tone by rater skin-tone.

	Stimuli skin-tone		
Rater Skin-tone	Dark *M (SE)*	Light *M (SE)*	*p*
Light	3.14 (.193)	3.49 (.213)	.050
Dark	3.22 (.163)	3.21 (.179)	

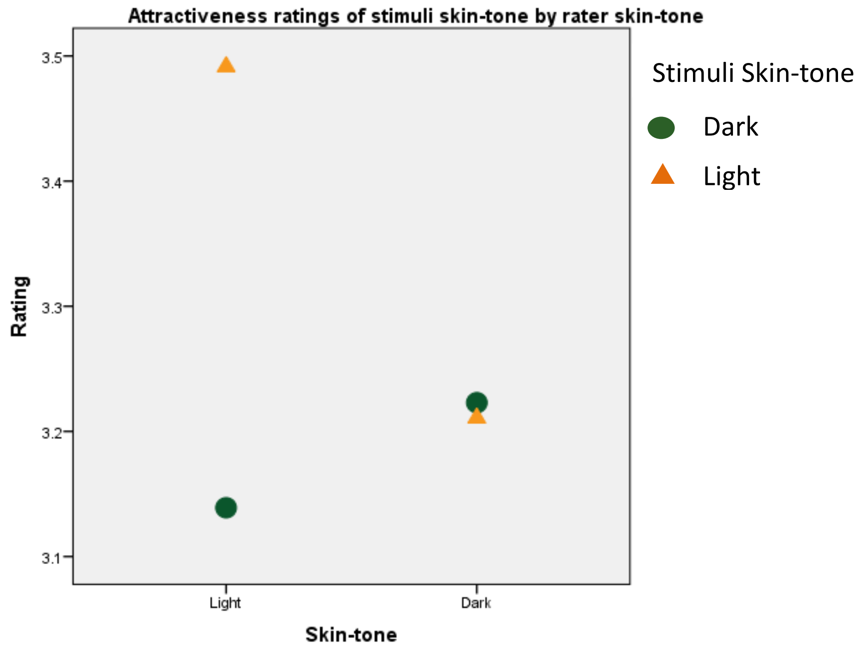


Figure 13. Pattern of attractiveness ratings of stimuli skin-tone by rater skin-tone.

Light-toned raters rated light-toned stimuli as more attractive than dark-toned stimuli. Ratings by dark-toned raters did not significantly differ (*Figure 13*).

An interaction of stimuli ethnicity x stimuli skin-tone was significant $F(1, 48) = 33.99$, $p<.001$, partial $\eta^2=.415$ (*Table 13*).

Table 13. Attractiveness ratings of stimuli ethnicity by stimuli skin-tone.

	Stimuli skin-tone		
Stimuli ethnicity	Dark *M (SE)*	Light *M (SE)*	*p*
Black	2.66 (.122)	3.21 (.154)	<.001
White	3.71 (.159)	3.50 (.172)	

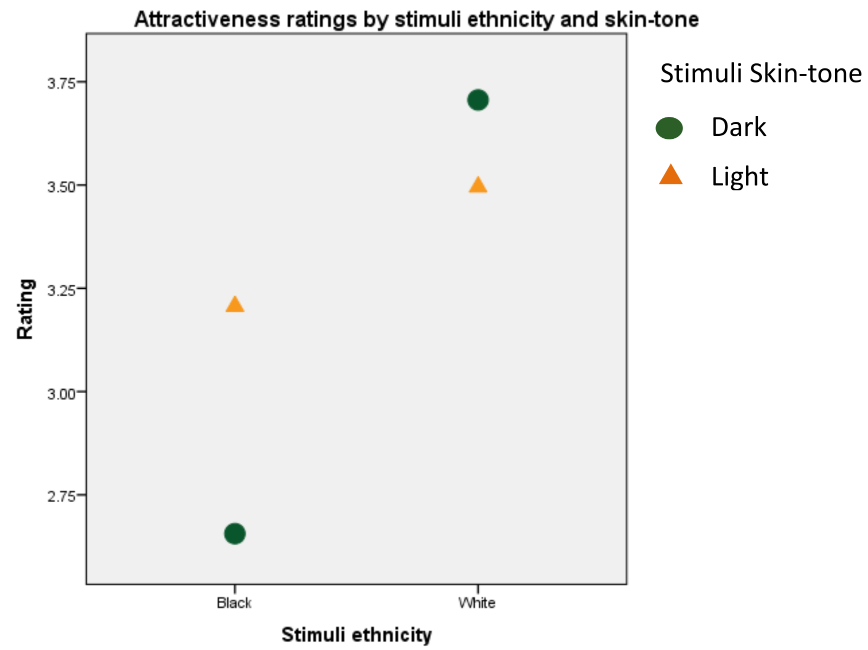


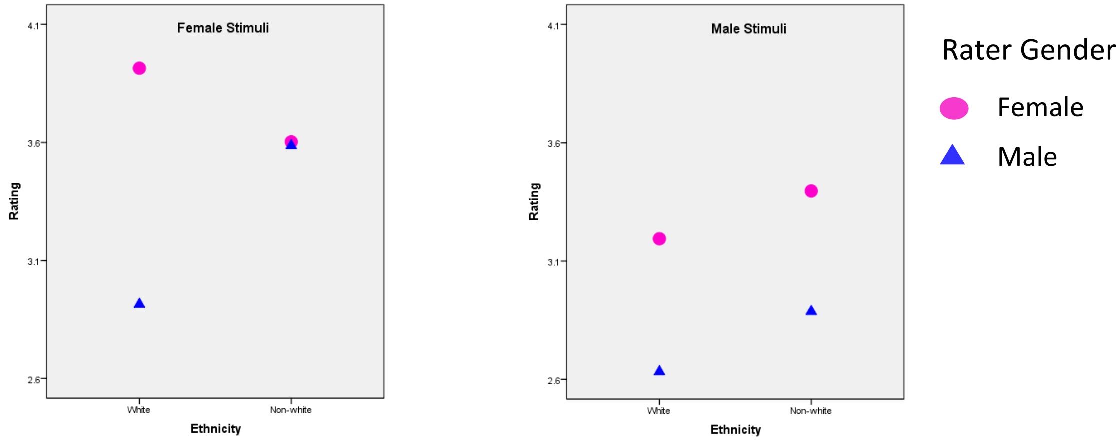
Figure 14. Pattern of attractiveness ratings by stimuli ethnicity and skin-tone.

Light-toned Black stimuli were rated more attractive than dark-toned Black stimuli. However, for White stimuli, dark-toned stimuli were rated more attractive than light-toned stimuli (*Figure 14*).

A three-way interaction of rater ethnicity x rater gender x stimuli gender was also significant $F(1, 48) = 4.39$, p=.042, partial η^2=.084 (*Table 14*).

Table 14. Attractiveness ratings of stimuli gender by rater ethnicity and gender.

		Stimuli gender		
Rater		Female *M (SE)*	Male *M (SE)*	*p*
Female	White	3.91 (.218)	3.19 (.264)	.042
	Non-white	3.60 (.273)	3.40 (.331)	
Male	White	2.91 (.207)	2.63 (.251)	
	Non-white	3.59 (.276)	2.89 (.335)	



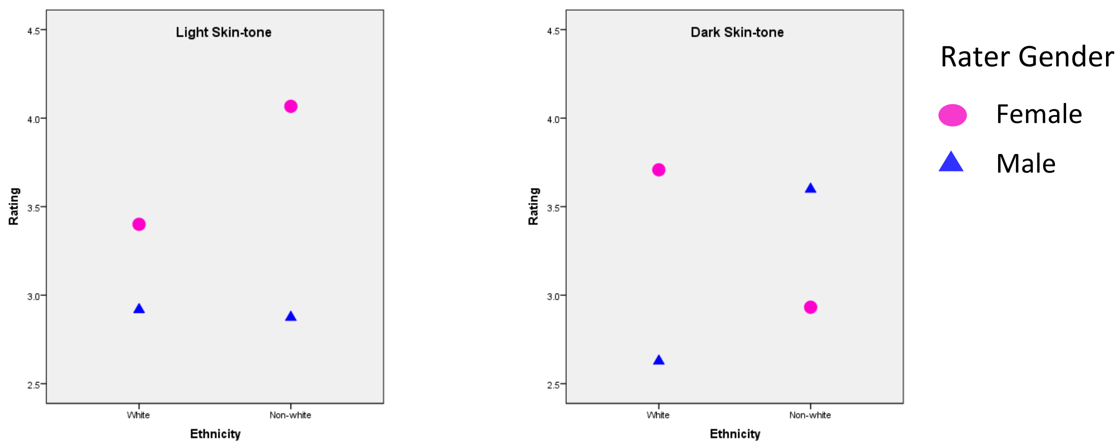
Figures 15-16. Pattern of attractiveness ratings of female and male stimuli by rater ethnicity and gender.

Female raters generally gave higher ratings for both female and male stimuli. However, for male raters, non-white males rated female stimuli more attractive compared to ratings by White male raters. This pattern was not observed for ratings of male stimuli (*Figures 15-16*).

A three-way interaction of rater ethnicity x rater gender x rater skin-tone was significant $F(1, 48) = 3.06$, p=.017, partial η^2=.112 (*Table 15*).

Table 15. Attractiveness ratings by rater ethnicity, gender, and skin-tone.

	Rater	Rater Skin-tone		
Rater Gender	Ethnicity	Dark *M (SE)*	Light *M (SE)*	*p*
Female	White	3.71 (.410)	3.40 (.167)	
	Non-white	2.93 (.237)	4.07 (.502)	.017
Male	White	2.63 (.355)	2.92 (.225)	
	Non-white	3.60 (.251)	2.88 (.502)	



Figures 17-18. Pattern of attractiveness ratings by rater ethnicity, gender, and skin-tone.

Non-white light-toned female raters gave higher attractiveness ratings than W light-toned females while no significant differences were observed between dark-toned male raters. However, for dark-toned raters, White females gave higher attractiveness ratings than non-white female raters while non-white males gave higher attractiveness ratings than White males (*Figures 17-18*).

Familiarity. A main effect of stimuli skin-tone was significant for ratings of familiarity $F(1, 48) = 3.52$, $p=.049$, partial $\eta^2=.078$, Power = .506. Light-toned stimuli were rated as more familiar than dark-toned stimuli (M (SE) = 3.70 (.185)(light-toned); 3.51 (.168)(dark-toned)). An interaction of rater ethnicity and stimuli ethnicity was significant $F(1, 48) = 15.98$, $p<.001$, partial $\eta^2=.250$ (*Table 16*).

Table 16. Familiarity ratings of stimuli ethnicity by rater ethnicity.

	Stimuli ethnicity		
Rater	Black *M (SE)*	White *M (SE)*	*p*
White	3.17 (.228)	4.04 (.229)	<.001
Non-white	3.77 (.294)	3.43 (.297)	

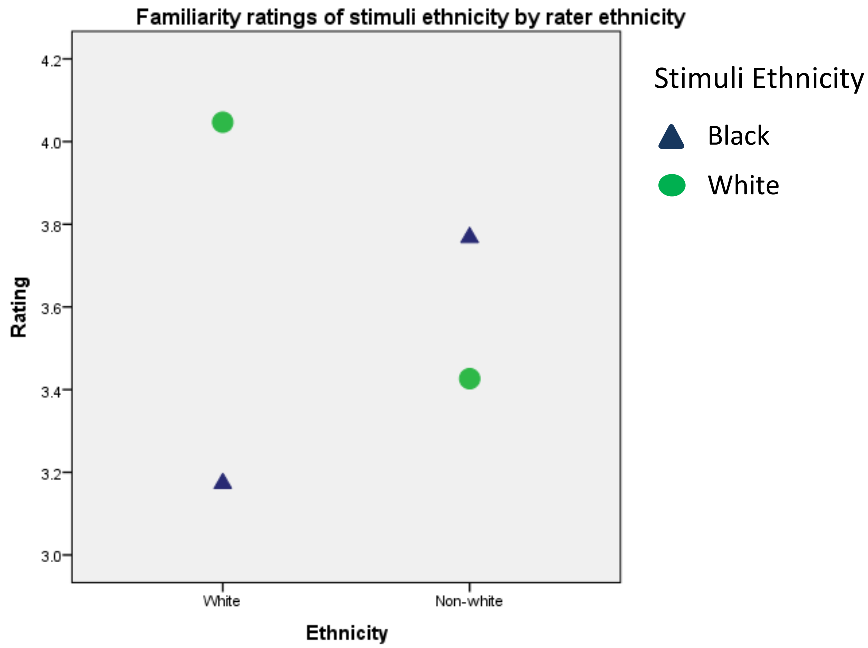


Figure 19. Pattern of familiarity ratings of stimuli ethnicity by rater ethnicity.

White raters rated White stimuli as more familiar than Black stimuli. Non-white raters rated Black stimuli as more familiar but this was not significantly different (*Figure 19*). An interaction of rater gender and stimuli gender was significant $F(1, 48) = 4.95$, p=.031, partial η^2=.094, Power = .587 (*Table 17*).

Table 17. Familiarity ratings of stimuli gender by rater gender.

Rater	Stimuli Gender Female *M (SE)*	Male *M (SE)*	*p*
Female	3.76 (.175)	3.30 (.212)	.031
Male	3.33 (.243)	3.55 (.254)	

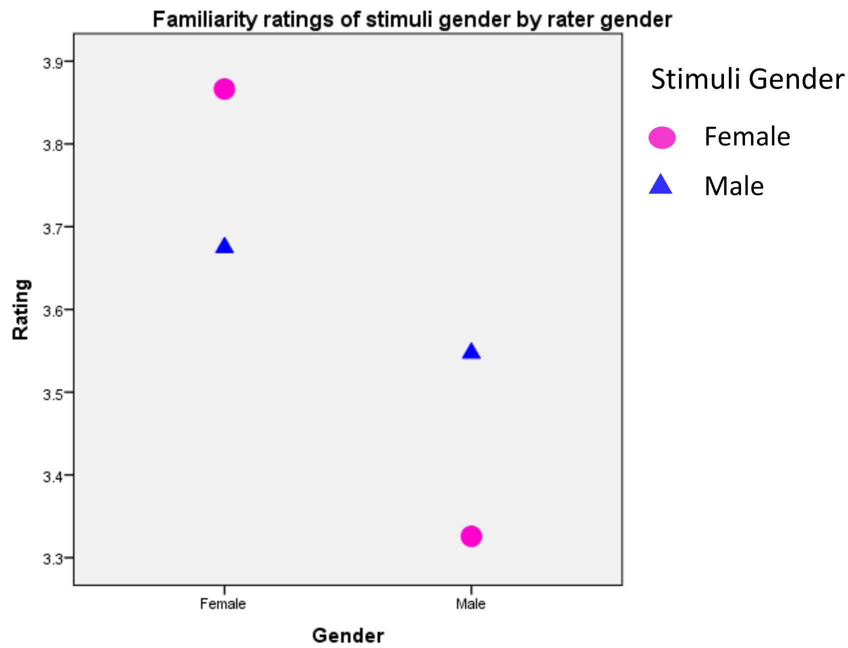


Figure 20. Pattern of familiarity ratings of stimuli gender by rater gender.

Female and male raters both rated same-gender stimuli as more familiar. However, females rated female stimuli significantly more familiar than male stimuli (*Figure 20*). An interaction of rater skin-tone and stimuli gender was significant $F(1, 48) = 5.74$, p=.021, partial η^2=.107 (*Table 18*).

Table 18. Familiarity ratings of stimuli gender by rater skin-tone.

	Stimuli Gender		
Rater skin-tone	Female *M (SE)*	Male *M (SE)*	*p*
Dark	3.63 (.223)	3.87 (.233)	.021
Light	3.56 (.264)	3.35 (.277)	

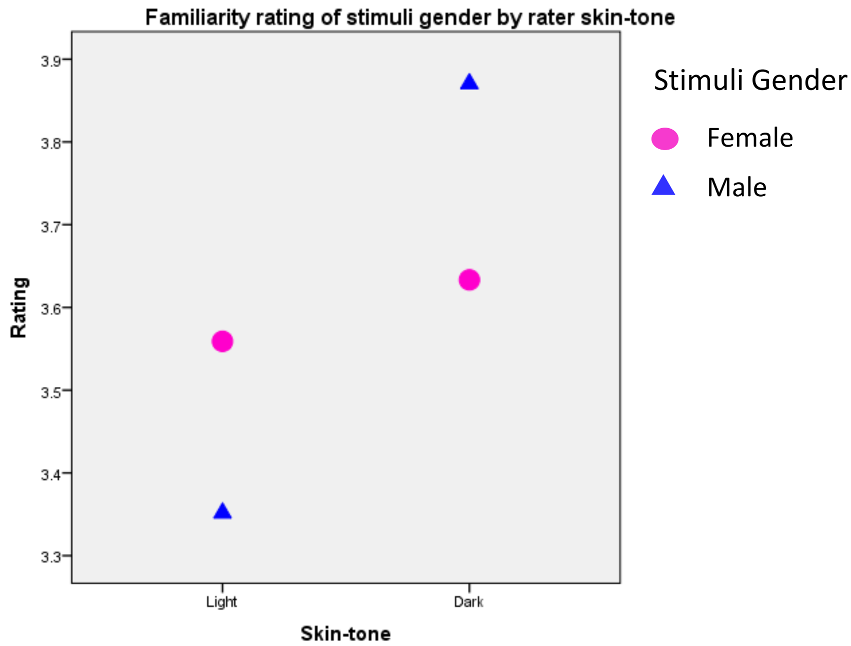


Figure 21. Pattern of familiarity ratings of stimuli gender by rater skin-tone.

Female stimuli were rated similarly in familiarity by dark and light-toned raters. However, dark-toned raters rated male stimuli as more familiar than light-toned raters (*Figure 21*).

A five-way interaction of rater gender x rater skin-tone x stimuli ethnicity x stimuli gender x stimuli skin-tone was significant $F(1, 48) = 6.22$, p=.016, partial η^2=.115, Power = .686.

Eyetracking percent fixation duration. A main effect of stimuli region was significant for percentage of fixation duration $F(3, 138) = 14.65$, p<.001, partial η^2=.242. The nose was looked at 27% (2.0%) of the duration of time compared to other regions of interest which were all viewed relatively equally (*Figure 22).*

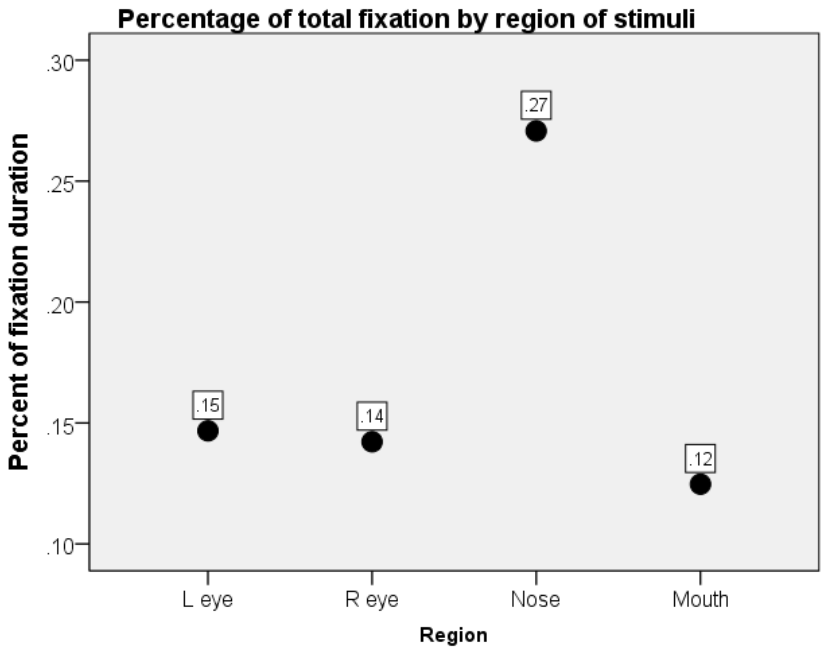


Figure 22. Percentage of total fixations per region of the stimuli.

The tendency to look at the nose longer relative to the other regions of interest is reflected in the four way interaction of rater gender x rater skin-tone x stimuli skin-tone x region which was significant $F(3, 138) = 2.75$, $p=.045$, partial $\eta^2=.056$. Examination of the data revealed that regardless of rater gender (female, male), rater skin-tone (dark, light) or stimuli skin-tone (dark, light), the nose was looked at longer than the eyes and mouth. Another four-way interaction of rater ethnicity x rater gender x rater skin-tone x stimuli ethnicity was significant $F(1, 46) = 7.20$, $p=.010$, partial $\eta^2=.135$. Examination of the data revealed that female raters, regardless of ethnicity (White, non-white) or skin-tone (dark, light), had a greater total fixation percentage viewing Black stimuli than White stimuli. However, for White male raters, light-toned White males had a greater total fixation percentage looking at Black stimuli than White stimuli. Dark-toned White male raters had a greater total fixation percentage viewing White stimuli than Black stimuli. Trivial differences were observed between light- and dark-toned non-white male raters. For female raters, it appears they looked around less when viewing Black than White stimuli. For male raters, skin-tone appears to have some influence for White males. Light-toned White males looked around less for Black stimuli compared to White stimuli. However, dark-toned White males looked around more when viewing Black stimuli compared to White stimuli. These differences were not observed with non-white male raters, regardless of skin-tone.

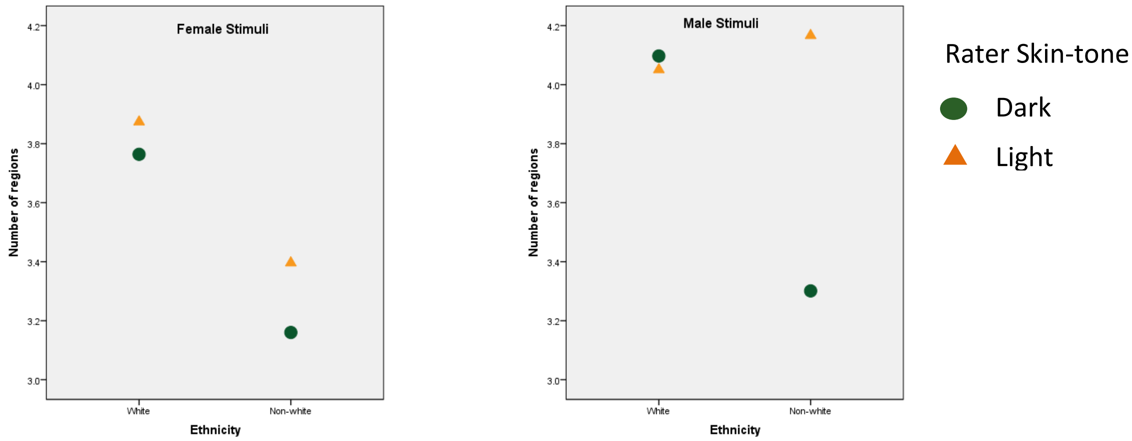
A five-way interaction of rater gender x rater skin-tone x stimuli ethnicity x stimuli gender x stimuli skin-tone was significant $F(1, 46) = 4.36$, p=.042, partial η^2=.087. Examination of data revealed that for light-toned female raters, light-toned Black female stimuli had a greater total fixation percentage than dark-toned Black female stimuli. However, for Black male stimuli, dark-toned Black male stimuli had a greater total fixation percentage than light-toned Black male stimuli. It appears that light-toned female raters looked around less when viewing light-toned Black female stimuli compared to dark-toned Black female stimuli, but looked around less when viewing dark-toned Black male stimuli compared to light-toned Black male stimuli. This pattern was also true for light- and dark-toned male raters as well. Dark-toned female raters showed no significant preferences between Black stimuli. Lastly, no significant differences appeared between percentages of fixations for White stimuli.

Eyetracking number of regions viewed. There were also significant interactions for number of regions viewed. An interaction of rater ethnicity x rater skin-tone x stimuli gender was also significant $F(1, 45) = 5.07$, p=.029, partial η^2=.101 (*Table 19*).

Table 19. Number of regions viewed of stimuli gender by rater ethnicity and skin-tone.

Rater Ethnicity	Rater Skin-tone	Stimuli Gender Female *M (SE)*	Male *M (SE)*	*p*
White	Light	3.87 (.12)	4.05 (.15)	.029
	Dark	3.76 (.23)	4.10 (.29)	

Non-white	Light	3.40 (.28)	4.17 (.36)
	Dark	3.16 (.14)	3.30 (.17)



Figures 23 & 24. Average number of regions viewed of stimuli gender by rater ethnicity and skin-tone.

For female stimuli, White raters viewed more regions than non-white raters regardless of rater skin-tone. For male stimuli, light-toned raters viewed male faces equally, regardless of ethnicity (non-white, White). However, dark-toned White raters viewed more regions of the male stimuli than dark-toned non-white raters (*Figures 23-24*).

Of note, a 5-way interaction of rater ethnicity x rater gender x rater skin-tone x stimuli gender x stimuli skin-tone approached significance $F(1, 45) = 3.86$, p=.056, partial η^2=.079. Examination of the data revealed that dark-toned White female raters viewed more regions of dark-toned female and male stimuli relative to light-toned stimuli. However, non-white female raters viewed more regions of dark-toned female and male stimuli relative to light-toned stimuli. No differences were observed amongst light-toned White female raters and dark-toned non-white raters. For White male raters, dark-toned White males viewed more regions of dark-toned female and male stimuli relative to light-toned stimuli. For non-white male raters, light-toned non-white males viewed more regions of dark-toned female stimuli. However, for male stimuli, light-toned non-white male raters viewed more regions of dark-toned males compared to light-toned male stimuli. No differences between regions viewed of the stimuli were observed for light-toned White and dark-toned non-white male raters.

CHAPTER 4

Discussion

Ratings of attractiveness, familiarity, and good-parenting of Black and White female and male faces were provided by participants while the number of regions evaluated and the proportion of time spent in a given region were measured by the eyetracking device. The face was chosen to represent attractiveness as it has been shown to be a stronger predictor of overall attractiveness than when shown the face and body (Currie & Little, 2009). Several hypotheses were made regarding expected trends in rating attractiveness (the variable of interest) as well as eye movements.

Overall, most of the hypotheses were neither confirmed nor disproved on the basis of statistical significance. This likely was a result of low N of minority raters and dark-toned White raters. The one hypothesis that attained statistical significance was in the opposite direction of the hypothesis. It was predicted that males would view more regions of female stimuli. However, it turned out that males actually viewed significantly more regions of the face of light-toned male stimuli and female raters viewed more regions of male stimuli regardless of skin-tone. Of the remaining hypotheses, trends of the data were consistent with the hypotheses with the exception of the hypothesis that non-white (Black) males would give higher attractiveness ratings to White female stimuli than ratings by non-white (Black) female raters. Oculomotor activity generated few significant findings in regard to region of interest relative to the findings of average number of regions viewed. The significant finding, data trends, and supplementary findings will be discussed below for each hypothesis.

Mate selection theory postulates that it is an evolutionary advantage to be able to evaluate one’s own attraction in order to increase the likelihood of reproduction by increasing success of selecting the proper mate (Buss, 2003). This study provided provisional support for the hypothesis that there would be an interaction of rater variables (i.e., ethnicity, gender, skin-tone) with the stimuli variables (i.e., ethnicity, gender skin-tone). Raters were predicted to rate stimuli that were matched in ethnicity, gender, and skin-tone as more attractive than stimuli that differed only in skin-tone. Although not statistically significant, comparison of the means was consistent with the hypothesis. Light-toned non-white raters rated light-toned Black stimuli as more attractive than dark-toned Black stimuli. For White raters the opposite trend was true in regard to skin-tone. Dark-toned White raters rated dark-toned White stimuli as more attractive than light-toned White stimuli. Interestingly, for both dark-toned non-white raters and light-toned White raters, they rated the opposite skin-tone faces as more attractive (i.e., dark-toned non-white female rater rated light-toned Black female stimuli more attractive than dark-toned Black female stimuli). Of note, there were few participants in the light-toned non-white groups and dark-toned White groups and these provisional findings need to be interpreted cautiously. Comparison of the means between stimuli groups suggests that skin-tone plays a role in "self-ratings" of attractiveness depending on rater ethnicity. Unexpected findings relevant to the influence of skin-tone include nonsignificant differences between attractiveness ratings of stimuli skin-tone (Dark, Light) for White raters. However, non-white raters rated light-toned stimuli as significantly more attractive than dark-toned stimuli. Moreover, light-toned raters rated light-toned stimuli as more attractive than dark-toned stimuli. Dark-toned raters did not exhibit differences in ratings between dark- and light-toned stimuli. Future research should consider this for Black/non-white participants. It may be that the stigma attached to the darker skin-tone for minority ethnicities, especially for

Blacks, may be reflected in the tendency for dark-toned non-white raters to not rate dark-toned Black stimuli more attractive than light-toned stimuli (Hill, 2002).

Provisional support from the data was also consistent with the second hypothesis regarding participant ratings of female stimuli. Although not statistically significant, light-toned Black female stimuli were found to be rated as more attractive than dark-toned Black female faces. Preference for lighter skin-tone in Black female faces has been demonstrated elsewhere (Hill, 2002). Ratings also were consistent for rater preference of White dark-toned females compared to light-toned White female stimuli. Fink et al. (2001) suggested that the preference for dark-toned White females was the association between tanned skin and health and status (i.e., tanning for aesthetic reasons). However, the preference for dark-toned White female faces was not pervasive across rater groups. Non-white raters actually rated light-toned White female faces are more attractive than dark-toned White female faces which is consistent with Frost’s (1988) conclusions that a lighter skin-tone of female faces was associated with youth and fertility.

Hypothesis three predicted that female raters would rate dark-toned male stimuli as more attractive than light-toned stimuli. There was trivial support consistent with this prediction. Previous research discovered that there was some tendency for dark features to be preferred in males and this has been demonstrated in other cultures (Ashikari, 2005; Li & Kenrick, 2006). However, future research should separate ratings of Black and White male faces especially when investigating effects of skin-tone. In the current study, light-toned Black faces, regardless of gender, were rated as more attractive than dark-toned Black faces. This was true across almost all rater groups.

Previous research suggested that White females may demonstrate less bias than White males in rating Black versus White faces (Ryan, et al., 2007; Wade & Bielitz, 2005). In the current study, comparison of the means was consistent with this hypothesis but was not statistically significant. White females rated Black stimuli as more attractive than ratings by White males. Similarly, Wade and Bielitz (2005) were not able to achieve statistically significant results so the current study also provides some provisional verification that White females evidence less bias in ratings of attractiveness for Black faces. For Black raters, inadequate numbers of Black participants did not allow for adequate comparisons between their ratings of Black and White stimuli. Non-white raters evidenced some preference for both Black and White stimuli depending on rater gender and will be explored in the following hypothesis.

In the current study, no support was found to suggest that non-white males rated White females as more attractive than ratings made by non-white females. In fact, although the difference was trivial, non-white females rated White female stimuli as more attractive than ratings by non-white males. The original hypothesis for Black male raters rating White female stimuli as more attractive than ratings by Black female raters derives from the proposed social advantages linked to having a White female as a mate suggested from social exchange theory (Murstein, Merighi, & Malloy, 1989). Nonsignificant results of the non-white male ratings of White female stimuli relative to non-white female ratings may have been a result of the low representation of Black participants in the current study. However, evidence from the online dating website okcupid.com suggests that the theory may be outdated in terms of dating preferences. Those seeking potential mates preferred opposite sex partners from the same ethnicity (Rudder, 2014). No data on cross-gender ratings were available.

Eyetracking results revealed significant evidence in opposition to the predicted patterns of cross-gender oculomotor behavior. The prediction for male raters to view more regions of female faces was based upon Alexander & Charles's (2009) findings that males preferred to look longer at opposite sex faces compared to females who showed no preference. However, in the current study males viewed more regions of male faces overall and significantly more regions of light-toned male faces compared to light-toned female faces. Likewise, female rater oculomotor patterns also showed more regions viewed for the male stimuli. Alexander and Charles (2009) allowed viewers to increase their view times by pressing a key which accounts for the difference in visual attention toward female stimuli by male raters in their study. Male participants were found to significantly extend their viewing time for only female faces while females increased time for both female and male faces if the facial stimuli were also attractive. The results from this study support the developmental theory of attention structure. Hold-Cavell and Borsutsky (1986) found that amongst preschool-aged children there was a tendency for both boys and girls to demonstrate increased attentiveness towards the male or males in the class who were dominant socially and the group leader. They found that highly regarded males were more effective than females at attracting attention. It is possible that male raters in this study were assessing male stimuli more thoroughly in order to make comparison of dominance status as well as leadership while female may have been assessing these components as well as rating the male stimuli as a potential mate. The social behavior of males establishing dominance within one's social group has been established with primates (Chance, 1967).

The final hypothesis predicted that raters would view more regions of different ethnicity faces than same ethnicity faces. Rhodes, Hayward, and Winkler's (2006) found that faces opposite the ethnicity of the rater were evaluated differently than faces of the same ethnicity. In the current study both non-white and White raters viewed more regions of the White stimuli but these differences were not statistically significant. While non-white raters did view more regions of White stimuli, the difference was trivial. The lack of difference in oculomotor activity in viewing Black and White stimuli for non-white raters may be due to increased exposure to both same and other ethnicity faces (Zebrowitz, Bronstad, & Lee, 2007; Ryan, et al., 2007). Consistent with Hill's (2002) findings, this study also found nonsignificant differences in familiarity ratings of Black and White stimuli by non-white raters while White raters rated White stimuli as more familiar. However, it is unclear why White raters did not view more regions of the Black faces.

Several additional findings were also found for the subjective ratings as well as from the oculomotor behaviors. For attractiveness ratings, White stimuli were generally rated as more attractive by both non-white and White raters. However, non-white raters rated Black stimuli as more attractive than White raters. Overall, females generally gave higher attractiveness ratings for both female and male stimuli. However, for male raters, non-white males rated female stimuli as more attractive than rating by White male raters. Specifically, light-toned non-white female raters gave higher attractiveness ratings that light-toned White females while dark-toned White females gave higher attractiveness ratings than dark-toned non-white females. For male raters, no differences were observed between ethnicity of light-toned raters. For dark-toned male raters, non-white males gave higher attractiveness ratings than White male raters.

There were also significant findings for ratings of familiarity. Light-toned faces were rated as more familiar than dark-toned stimuli. Females also rated female stimuli significantly more familiar than male stimuli; a result not duplicated for male ratings of male stimuli. Lastly, skin-tone also affected familiarity ratings of stimuli gender. Dark-toned raters rated male stimuli as more familiar than light-toned raters; an effect not demonstrated with female stimuli.

Briefly, though the parenting-variable was not of interest in the current study, an interaction of stimuli ethnicity and gender was significant. Regardless of stimuli ethnicity, female stimuli were rated as future good-parents more so than male stimuli.

Unexpected results from the oculomotor behaviors included the tendency for raters to look longer at the nose relative to other parts of the face. Specifically, regardless of rater gender, rater skin-tone, or stimuli skin-tone, the nose was looked at significantly longer than the eyes or the mouth. Part of these results may reflect the convergence point which was placed at the nose bridge of the stimuli. However, it is interesting what role the nose may play in contributing variance to attractiveness ratings and increased focus on it lends less time to evaluate other regions (i.e., eyes, mouth).

Patterns of fixation durations also showed that female raters, regardless of their skin-tone, may look around less (i.e., greater fixations within a particular region of interest) when viewing Black versus White stimuli. For male raters, light-toned White males also looked around less when viewing Black versus White stimuli (i.e., greater fixations with a particular region of interest). However, dark-toned White male raters looked around more when viewing Black compared to White stimuli (i.e., more diffuse fixations across regions of interest). These patterns were not observed with non-white male raters.

Overall, it appears that skin-tone of rater and stimuli contributes some variance how faces are rated as well as influencing the oculomotor activity of the rater. Moreover, its influence often covaries with gender and ethnicity of both rater and/or stimuli. It appears that there is some support for the relative appeal for dark skin-tone, at least for White faces, as it has been linked to the presence of carotenoid in the skin. Carotenoid has been indicated as a signal for health and sexual selection in other species and may also serve as a similar cue in humans (Stephen, Law Smith, Stirrat, & Perrett, 2009). The preference for darker features in males and lighter features in females (based on skin-tone) was not consistently demonstrated in the current study as has been the case in other research (Li & Kenrick, 2006).

Additional Conclusions and Limitations of Study

Limitations of the current study provide some insights into future research of the influence of skin-tone on facial attractiveness as well as its associations to other domains (i.e., parenting ability). The within-subjects independent variable of trial violated the sphericity assumption. A few of the stimuli within a particular stimulus group elicited greater responses than other facial stimuli. However, given that trial was collapsed the sphericity of some of the stimuli data is irrelevant. Likewise, sometimes sphericity was expected as was the case for regions (parts of the face). Future research utilizing the repeated measures paradigm should preselect faces that will be responded to similarly if grouped into a stimulus category. Also, several of the results were significant, or not, as a result of low power. Future research should include larger sample sizes especially for the underrepresented minority groups (i.e., Black participants) in this study. A priori analyses using G* power calculator estimated that minimally 10 participants would be needed to make up each rater group (i.e., light-toned Black, males and females, light-toned White, males and females, etc.) in order to have adequate power to achieve significant results..

Additionally, the facial stimuli were not modified to minimize or maximize secondary sex characteristics or neoteny which are characteristics known to affect ratings of attractiveness for males and females (Rhodes, Simmons, & Peters, 2005; Furnham & Reeves, 2006). Also, due to variation in photo quality and depending on where the light source was in the room where the photo was taken, some of the skin-tone manipulations inevitably modified the relative appearance of color distribution of the face.

Other quality control issues of the stimulus included searching for good quality faces of Black males. A particular difficulty that was encountered was finding Black male faces that did not have facial hair. It was observed that of the hundreds of faces that were searched, many good photos of Black males unfortunately had facial hair that without drastic modification of the face, would not be able to be used. The researchers also noticed that a handful of the participants questioned during the experiment about where the photographs were taken and a few mentioned they appeared to look like mug shots.

Participants were also recruited for the study via convenience sampling. Although the sample was relatively diverse, it was not necessarily a representative population of the metropolitan area, especially in a city where around 80% of the population is Black. Black participants were underrepresented in this study and the inclusion of Black participants have been underrepresented in facial attraction literature. This limited the conclusions that could be made about Black raters as well as dichotomizing the independent variable of rater ethnicity to White and non-white. This made interpretation somewhat difficult as non-white ratings may have reflected similarity to one’s ethnicity as a group (e.g., Black) or identification as a minority. Ratings as well as oculomotor activity may differ between ethnicities (e.g., Asian, Black, Latino, etc.) and hence certain hypotheses were unable to be adequately addressed. Other underrepresented groups included participants identifying as homosexual (N=3). Too few participants identifying as homosexual resulted in an inability to make comparisons and draw conclusions for opposite- and same-sex ratings which has been established in the literature (Donovan, Hill, & Jankowiak, 1989; Rhodes, 2006). It is possible that those who identified as exclusively or primarily heterosexual amongst the participants who were undergraduates may be less reliable (i.e., social desirability; those who are questioning their sexual orientation).

An interesting observation from the demographic make-up of the sample was that, by and large, most participants, regardless of ethnicity, did not rate themselves as dark-toned. Many participants rated themselves as medium-toned. It may be that though perceived as dark-toned by others, people generally see themselves as having relatively *lighter* skin-tone. This may reflect the stigma attached to a dark-tone of skin, especially for African-Americans (Hill, 2002).

Although dating status has been shown to affect attractiveness ratings in other studies, this was not the case of the present study (Currie & Little, 2009; Li & Kenrick, 2006; Jankowiak, Hill, & Donovan, 1992). The current sample included roughly half of participants being single or involved in a long-term relationship. Only a few endorsed being in short-term relationship. In light of this, single participants may have made their ratings assessing stimuli as a potential mate or to determine status and/or leadership, while participants in long-term relationships were likely not evaluating them for mate potential and assessing them more for social status as well as other variables (e.g., parenting ability). Also, the average age of the participant sample (*M* = 32.1) and the fact that all stimuli were adult neutral expression faces, may have minimized the effect of dating status. Future research conducted with younger faces, sexually dimorphic faces, or recruiting a larger number of participants who are engaged in a short-term relationship, may make controlling for dating status of the rater more important. Future studies may also consider having raters guess the age of the facial stimuli. Previous research has shown that the skin-color distribution in the face has been shown to affect perception of age and may influence participants' evaluations of the faces, if assessing them as a potential mate (Fink, Grammer, & Matts, 2006).

This study confirmed the importance of measuring visual attention in subjective ratings of faces (Krupp, 2008). Though many of the results did not reach statistical significance, trends were observed and confirmed differences in the way faces were evaluated by raters of different ethnicities, gender, skin-tone as well as the interaction between raters and within the stimuli. In addition, oculomotor activity was able to objectively confirm the relative influence of skin-tone and demonstrating an effect of both rater and stimuli.

Lastly, given that skin-tone appears to influence rater perceptions of attractiveness, future research investigating skin-tone influences should consider allowing participants to manipulate the skin-tone of a given stimulus along a gradient in order to determine what the ideal tone would be on a given face of a given ethnicity to maximize the attractiveness of the face. Preference for mixed-race faces has been demonstrated (Rhodes, et al., 2005), but there is less known about the skin-tone preferences of these faces and which skin-tone would be preferred for what face. Integrating skin-tone gradients that participants can modify, increasing the numbers and inclusion of ethnicity of both rater and stimuli, and recruiting both heterosexual and homosexual participants will lead to a much more comprehensive understanding of skin tone preferences in other ethnic groups that are not as established in the facial attraction literature as well as better understanding the influences of skin-tone and sexual orientation in same-sex ratings.

Clinical Implications

Perceptions of skin color and skin-tone are not immune from issues that affect both clients and the therapists that help them. Wade and Bielitz (2005) maintain that both African-Americans and Whites react similarly to African-Americans' skin color and some results from this study corroborate this assertion (i.e., preference for light- versus dark-tone). Knowing the trends found in the current study and previous research can help therapists to advise and treat African-American or other minority patients struggling with skin color or skin tone issues. Tummala-Nara (2007) mentions that there are conditions of which skin-tone is a representation of a client's presenting problem which may come out in therapy,

> "An individual may come to question her or his authenticity or sense of belonging in a particular racial/cultural group, and develop feelings of guilt or shame or pride about his or her skin color. In other cases, a person or an entire family unit may come to deny any relevance of skin color in their lives, where they prefer to view themselves as colorblind. Another individual may internalize oppressive images of his or her skin color held by mainstream culture and carry these images into the realm of interpersonal relationships (p. 263)."

The solution is simple. These implications simply encourage that the therapist acknowledge that skin color may be important to the client and can come about in both overt and covert ways. It is important that the therapist be aware of these issues regardless of the therapist's ethnicity and own identification in the sociocultural matrix of skin color issues.

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APPENDIX A

Please rate the faces on the following scales:

	1 – Not at all	4 - Somewhat	7 - Very
How familiar is this face?			
How attractive is this face?			
Is this the face of a future good parent?			

Please provide each of the following:

Age: ________ years

Gender: ______Male ________Female ________Other

Ethnicity:_______African American ________Caucasian ________Latino/a

_______Asian ________American Indian ________Mixed/Other

Your skin tone is: 1 – Very Light ● ● ● 4 - Medium ● ● 7 – Very Dark ●

Current dating status (mark one): ______single ______short-term relationship

______long-term relationship

Your sexual orientation is: 0 – Exclusively heterosexual ● ● ● 3 – Equally hetero-/homosexual ● ● 6 – Exclusively homosexual ●

For females only: number of days since your last period _______

Email (optional): ________________________________

(for a chance to win a prepaid VISA at the conclusion of the study)

APPENDIX B

Behavioral Research Informed Consent

Title of Study: The Specific Influences of Skin Tone, Skin Color, and Gender in Ratings of Facial Attractiveness

Principal Investigator (PI): William Guy, M.A.
Department of Psychology
University of Detroit-Mercy

When we say "you" in this consent form, we mean you; "we" means the researchers and other staff.

Purpose

You are being asked to be in a research study that seeks out people's ratings of faces at the University of Detroit-Mercy's Vision Research Laboratory. The estimated number of study participants to be enrolled is about 60. **Please read this form and ask any questions you may have before agreeing to be in the study.**

In this research study, we will investigate participant preferences for photographs of faces. Additionally, we are interested where and for how long participants look at each face in making their respective ratings.

Study Procedures

If you agree to take part in this research study, you will be asked to complete three scaled (i.e., 1-7) ratings that will be provided in a booklet for a specified number of faces presented on a computer screen during your visit to the laboratory. During these ratings, you will also be asked to wear a head mounted eye-tracking device. It is anticipated that it will take approximately 30 minutes to complete the introduction, experiment, and debriefing. When you consent to participate in the study, you will be assigned a study ID # which will be used to identify your data instead of using your name. The use of this ID # will help us to protect your identity. Your data will be stored separately from the consent form, on which your name will be written.

Benefits

The study will be no direct benefit for you; however, information from this study may benefit yourself or other people in the future.

Risks

By taking part in this study, you may experience the following risks:

- *Emotional risks (e.g., feelings of anxiety)*
- *Social/Economic risks (e.g., possible loss of confidentiality)*
- *Mild Discomfort (e.g., wearing head mounted eye-tracking device)*

Exclusionary Criteria

- significant visual deficit (i.e., unable to see photographs presented on a computer screen
- color blindness
- history of flicker-induced epileptic seizures
- fine motor deficit

There may also be risks involved from taking part in this study that are not known to researchers at this time.

Study Costs

- Participation in this study will be of no cost to you.

Compensation

With your full participation in this study, you are entitled to a $5 stipend or research participation credit. In addition, all participants will be eligible to be entered in a drawing for a $50 prepaid VISA at the completion of the study.

Confidentiality

All information collected about you during the course of this study will be kept confidential to the extent permitted by law. You will be identified in the research records by a code name or number. Information that identifies you personally will not be released without your written permission. However, the study sponsor or the Institutional Review Board (IRB) at University of Detroit Mercy may review your records.

When the results of this research are published or discussed in conferences, no information will be included that would reveal your identity.

Voluntary Participation/Withdrawal

Taking part in this study is voluntary. You have the right to choose not to take part in this study. If you decide to take part in the study you can later change your mind and withdraw from the study. You are free to withdraw from participation in this study at any time. Your decisions will not change any present or future relationship with University of Detroit-Mercy or its affiliates, or other services you are entitled to receive.

The research team may stop your participation in this study without your consent. The PI will make the decision and let you know if it is not possible for you to continue. The decision that is made is to protect your health and safety, or because you did not follow the instructions to take part in the study

Questions

If you have any questions about this study now or in the future, you may contact William Guy or one of his research team members at the following phone number (517) 605-0711. If you have questions or concerns about your rights as a research participant, the Chair of the Institutional Review Board can be contacted at (313) 578-0405. If you are unable to contact the research staff, or if you want to talk to someone other than the research staff, you may also call (313) 578-0481 to ask questions or voice concerns or complaints.

Consent to Participate in a Research Study

To voluntarily agree to take part in this study, you must sign on the line below. If you choose to take part in this study you may withdraw at any time. You are not giving up any of your legal rights by signing this form. Your signature below indicates that you have read, or had read to you, this entire consent form, including the risks and benefits, and have had all of your questions answered. You will be given a copy of this consent form.

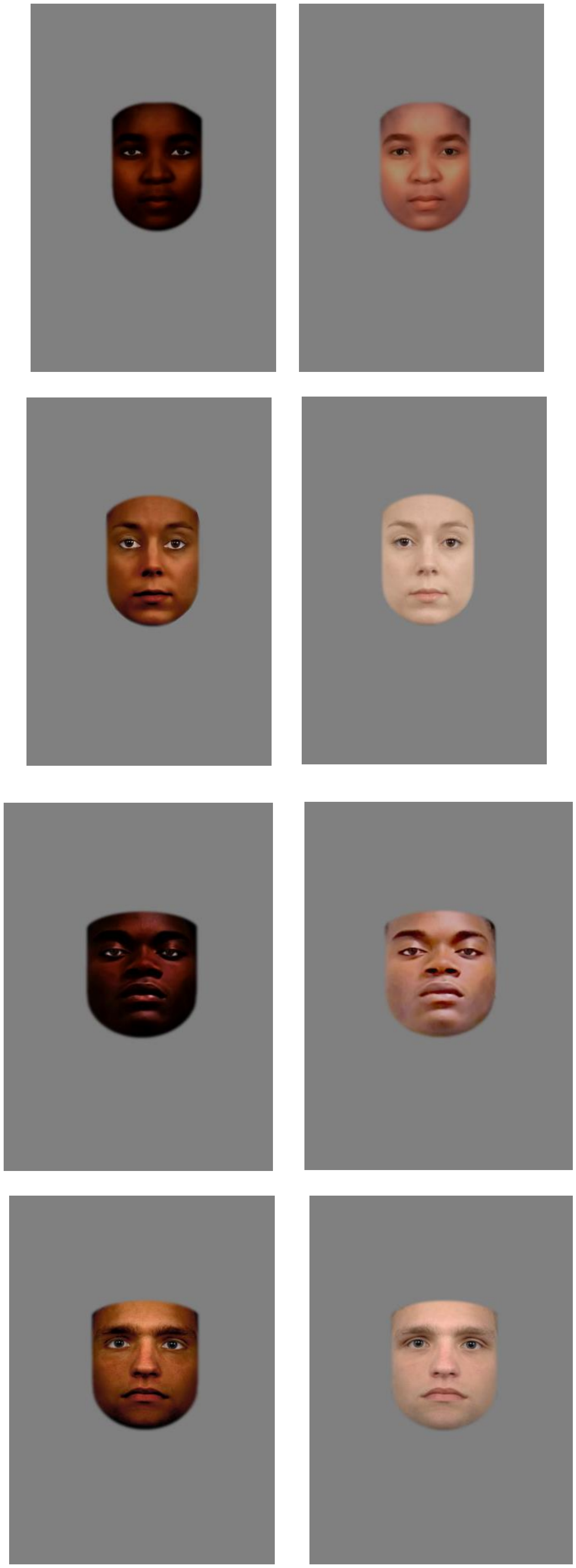
____ ____________
Signature of participant Date

____ ____________
Printed name of participant Time

____ ____________
Signature of person obtaining consent Date

____ ____________
Printed name of person obtaining consent Time

APPENDIX C



ABSTRACT

THE INFLUENCES OF ETHNICITY, GENDER, AND SKIN-TONE IN RATINGS OF FACIAL ATTRACTIVENESS

By

WILLIAM C. GUY

May 2015

Advisor: Dr. Carol Weisfeld

Major: Psychology (Clinical)

Degree: Doctor of Philosophy

The present study investigated the effects of ethnicity, gender, and skin-tone (light versus dark) on ratings of facial attractiveness. Oculomotor activity was measured to understand visual attention. The study assessed the influence of rater and stimuli variables (i.e., ethnicity, gender, skin-tone). Black and White female and male faces were duplicated resulting in light-toned and dark-toned versions. Each face category had three stimuli. Participants rated the face's attractiveness, familiarity, and future parenting ability after being displayed on a computer screen. The number of regions evaluated and the proportion of time spent per region was recorded for each participant. Seven hypotheses were made: 5 regarding the subjective ratings (none of which reached statistical significance) and 2 regarding oculomotor activity. H1: Faces of same ethnicity, gender, and skin-tone would be rated as more attractive by matched participants. Comparison of the means was consistent with the hypothesis for light-toned Black and dark-toned White faces. H2: Light-toned Black females would be rated more attractive than dark-toned, while the reverse would be true for White

females. Comparison of the means was consistent with the hypothesis. H3: Females would rate dark-toned males more attractive than light-toned. Comparison of the means was consistent with this hypothesis. H4: White females would rate Black stimuli as more attractive than White males, but no differences between ratings made by non-white females and males. Comparison of the means was consistent for the former part of this hypothesis. Comparison of the means was neither consistent nor significant for non-white raters. H5: Non-white males would rate White females more attractive than ratings by non-white females. Non-white male raters did not rate White female stimuli as more attractive than non-white female raters. H6: Males would view more regions of opposite sex faces than females. Support was found to disconfirm this hypothesis. Females and males both viewed more regions of male faces. H7: Raters would view more regions of other-ethnicity faces. Comparison of the means revealed both White and non-white raters viewed more regions of White faces (not statistically significant). Overall, provisional support was found for influences of skin-tone in both subjective ratings and oculomotor activity.

William C. Guy was born and raised in Adrian, MI. His initial career interests was in the study of herpetology. However, after being part of a family therapy for one of his family members and taking an introductory course in psychology during high school, the pursuit of a career in psychology was never in doubt. In his free time, he likes to stay active. He enjoys lifting weight, playing basketball and golf, and watching college and professional sports. Socially, he enjoys spending time with family and close friends.

He attended Hope College in Holland, MI where he acquired a Bachelor of Art's degree magna cum laude majoring in psychology and minoring in Spanish. As a junior, he elected to study abroad for a semester in Aberdeen, Scotland. As a senior, he was awarded the Sigma Xi Senior Research Award in psychology and was elected into the Sigma Delta Pi Spanish National Honor Society. In 2007, he was accepted into the clinical psychology PhD program at the University of Detroit-Mercy. He acquired his Master of Arts degree in Clinical Psychology in September 2010 while in pursuit of his doctoral degree which he achieved in May 2015. He served as a graduate assistant under Dr. Barry Dauphin, PhD and his responsibilities included overseeing the administration of intelligence testing and projective testing of both clinical master's students as well as first year doctoral students. His practica experiences included neurocognitive assessment with pediatric neurology research participants at the Children's Hospital of Michigan under the mentorship of Dr. Michael E. Behen, PhD; a position which he retained until beginning his predoctoral internship. He also worked at the Life Stress Center of Detroit Receiving Hospital for one year assessing patients, who were victims of crime, for risk of developing Acute Stress Disorder and PTSD. Additional training experiences included preliminary testing of children with Autism Spectrum Disorders at Autism Center in Novi, MI, performing intake evaluations of children with suspected psychiatric conditions through the pediatric neurology department of Children's Hospital of Michigan, and conducting research under the mentorship of Dr. Cortney Wolfe-Christensen, PhD through the department of pediatric urology at Children's Hospital of Michigan. He did his predoctoral internship at the University of Texas Health Science Center in San Antonio, TX under Dr. Donald McGeary, PhD. His primary clinical rotations were at Laurel Ridge Treatment Center working with acute inpatient adolescents and children and the University Counseling Clinic working primarily with student populations.

Over the course of his graduate study the author was involved in numerous research projects in addition to his personal interest and dissertation work with facial attractiveness. At Children's Hospital of Michigan he was a co-author on papers on his work with children who experienced early severe social deprivation as well as children diagnosed with Sturge-Weber Syndrome. He also co-authored several posters. Future research interests included further investigation of the influences of facial attractiveness and clinical outcomes on children presenting to an outpatient clinic.