Perceived Facial Attributes and Personality Traits

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Abstract

Face perception plays a crucial role in social interaction. The sociological aspect of face perception is related to the availability of information from non-identity specific facial cues like facial hair (beard) or skin color. The present study aimed to investigate the role of non-identity specific cues like facial hair e.g. beard and skin tone variations on assessment of facial attractiveness along and the relationship of personality traits of the individuals assessing the attractiveness of faces. A sample of (N = 299 ; Age = 21.9 ± 1.65 years) students pursuing college education were administered the stimulus set comprising of bearded/non-bearded and lighter/ darker skin pigmentation facial images that were obtained and developed from the facial images of 45 individuals. The participants were asked to rate the attractiveness of the images on 7-point scale. Participants also filled up personality questionnaires of 16PF and NEO-FFI. Overall, preference for bearded images over non-bearded facial images and lighter skin pigmentation over darker skin pigmentation was found. Facets of Big 5 Personality theory were found to have a significant association with certain factors of 16PF. The results were further analyzed to assess if personality traits of the raters were responsible behind facial attractiveness assessments. Findings will have implications in domains of mate selection, interpersonal relationships and recognition of faces.

Keywords: beardedness; facial attractiveness; face perception; skin tone variations. Big-five personality traits

1. Introduction

Facial characteristics in determining physical attractiveness have been found to play a paradoxical role in choice of mates. Often this is determined by masculine traits in males and feminine traits in females. Features of facial masculinity are inclusive of facial shape, protruding brow ridge, wider cheekbones, a thick jaw line and narrow eyes. These are determined by testosterone levels throughout the course of fetal development to adulthood (Mareckova et al., 2011; Whitehouse et al., 2015 & Roosenboom, 2018). In case of human beings, the shape of the face and facial hair (beard) are considered to have maximum striking variations evolutionarily (Dixson et al., 2016). The human beard is an androgen-dependent trait which differs significantly among men of all ages and generations (Randall, 2008). It is considered as one of the visually salient features of a male face. Beard as a sign of masculinity is associated with higher mating and reproductive success (Rhodes, Simmons & Peters, 2005). Presence of the beard has also been found to enhance a man's age, provide information about his sexual maturity, presence of dominance and aggression than in comparison to faces without any beard (Addison, 1989; Dixson & Vasey, 2012; Neave & Shields, 2008; Saxton et al., 2016 ; Craig, Nelson, & Dixson, 2019). Earlier studies indicate that males with beards have greater feelings of masculinity (Wood, 1986); and show preference for higher masculine gender roles than in comparison to clean-shaven men (Oldmeadow & Dixson, 2016).

Despite this evidence, women's preferences for facial hair tend to vary and are usually mixed. (Rhodes, 2006). In certain instances facial masculinity has also been associated with reduced attractiveness (Perett et al., 1998; Geniole et al., 2015). Cultural comparison studies have also found that bearded male faces are not found to be more attractive than clean shaved faces (Dixson & Vasey, 2012). These variations are often explained in terms of higher masculinity been associated with anti-sociality, less warmth, care and romance (Perrett et al., 1998, Kruger, 2006). This study is aimed to explore these inconsistencies existing in the Indian sub-context using real-world static facial images. Also research in the area of beardedness and facial attractiveness on a global scale is based on Western judgments and Asian studies in this domain are limited. In this study we assess both male and female preferences for bearded faces over clean-shaved faces.

Another important phenotypic trait is skin pigmentation. Skin pigmentation as an attribute is considered to have the most variations and is also the most noticeable feature. The intensity of skin pigmentation is dependent upon the intensity of melanin (Maitra, Chatterjee and Bandyopadhyay, 2019). Human skin color tends to vary across males and females and plays an important role in preferences for mate selection (Carrito et al., 2016). Skin color is also considered to be a strong indicator of perceived attractiveness (Scott et al., 2010; Stephen at al., 2012). With reference to the Indian context, the presence of cross-roads of migration is

considered a significant event in the genome studies of variations in skin pigmentations (Cann, 2001). The population in India has also witnessed and underwent complex admixture events across a long span of time (Bamshad, et al., 2001). These events are considered responsible for the variations existing in skin-pigmentation in this part of the world. This present study aims to investigate variations in skin color in the domain of facial attractiveness in the Asian context.

Every individual is characterized by certain individual personality traits which are associated with certain other factors in their daily lives. It is an aspect which can be defined in various dimensions. Personality characteristics also influence a person's attractiveness in terms of his behavioral dispositions and overall demeanor. Existing research has already highlighted the fact that attractive people are generally considered to have positive personality characteristics (Tartaglia and Rollero, 2015). This is generally based on the stereotype that "what is beautiful is good" (Dion, Berschied & Walster, 1972). Personality is often described based on traits as explained by various models. A sought after model for this domain is the Big-Five personality theory which classifies people on the dimensions of Neuroticism, Extraversion, Openness, Agreeableness and Conscientiousness. This model has also shown a greater amount of cross-cultural applicability (Costa & McCrae, 1999). These dimensions have also proved to be effective for self-evaluation and also from the perspective of an observer (McCrae & Terracciano, 2005). Additionally 16PF based on Cattell's model of personality was also used for an in-depth analysis of personality traits of the observers rating the images. Both NEO-FFI and 16PF are based on the Five-Factor Model of Personality (Rossier, Stadelhofen and Berthoud, 2017).

Present Study

Face perception is crucial in social interaction in terms of information which is visible in faces and the processes involved in extraction of this information (Little, Jones & DeBruine 2011).The seminal model of face recognition (Bruce & Young, 1986), proposes that face perception begins structural encoding of the human face, followed by activation of 'face recognition units' and 'identity-specific semantic codes'. Another set of operations, namely, identity-non specific information occurs in parallel which includes sex, age, emotional expression and facial attributes like skin color, texture and symmetry (Quinn & Macrae, 2011). This non-specific information has a higher social relevance and act as a cue for perception of facial attractiveness (Carbon, Gruter & Gruter, 2013). This study would cater to the social aspects of face perception in terms of facial attractiveness with emphasis on non-specific identity cues. The aim of the study was three-fold. At first preferences for bearded or clean-shaved faces were to be assessed. Secondly, inclinations towards skin tone-pigmentation were investigated. The third objective was to examine whether personality traits

of the subjects rating the images had any role behind the selection of those faces considered as attractive over others.

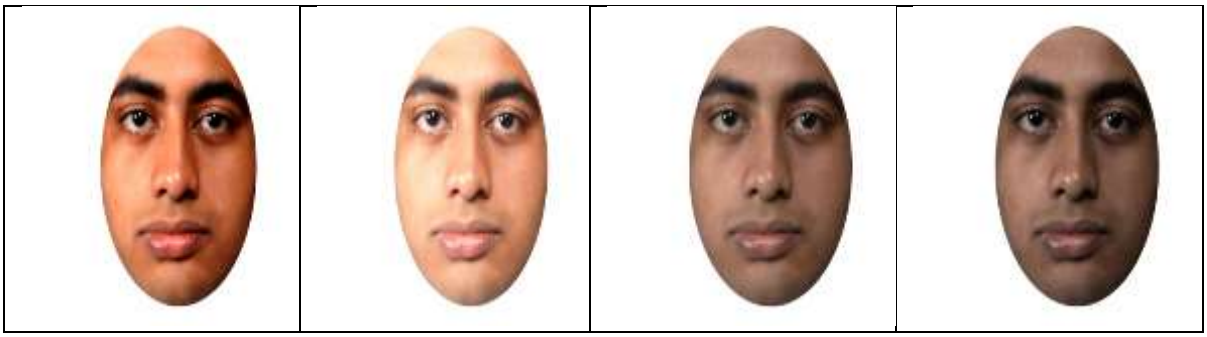
2. Method

Stimuli

Forty-five male college students (Mean age = 23.71 ± 2.039 years) of Indian origin and pursuing college education in West Bengal were photographed with a beard or clean shaved based upon subject preference. Photographs were taken under controlled lighting conditions in the laboratory. Faces were cropped uniformly into an oval shape only to reveal the face leaving out other external facial and body features using Adobe Photoshop CC6 (Figure 1 and Figure 2). For Study 1 consisting of bearded and clean shaved images, the images were converted to grey scale. For Study 2 on skin color variations, the images were displayed in chromatic format.

Figure 1: Static facial images depicting the presence of beards and clean shaved images as shown to the participants

Figure 2: Static facial image with variations in skin tones as shown to the observers



Procedure

Preliminary study was done in the initial stages to finalize the stimuli. A pool of (N=20) bearded and non-bearded images were sent to college students aged between 18 to 25 years and residing in Kolkata, West Bengal, India for their ratings. Based on those ratings, the two most attractive images and the two least attractive images were left out from the study to avoid large-scale physical discrepancies (Luo, Rossion & Dzhelyova, 2019). Finally a sample of (N=16) images were finalized for the study. From this particular set of images, 7 photographs were selected randomly for each participant and that consisted of the stimulus set of facial images for each participant. These photographs were then arranged in a questionnaire format and sent to the students via Google forms. The participants were to rank the images on a 7 point rating scale. The anchor points ranged from 1= Most attractive to 7= Least attractive and the same format was applied for the rest of the study.

The order of images to be ranked was randomized between trials for the participants. In Study 1, the stimulus set consisted of 7 bearded and non-bearded images. Every randomized set had one bearded and one clean shaved image compulsorily. Previous research has indicated that color/skin tone preferences do not differ between laboratory and online studies (Lefevre et al., 2013). For Study 2, out of the images recorded in Study 1, a single image of a male, clean shaved was selected with masked external features of hair and ears. This selection was done based on judgment by the supervisors and other laboratory fellow mates. The image was selected based on the criteria of clarity, adequate focus for images, and neutral skin tone representative of the Indian context. This particular image was then color coded into 20 shades of skin tone based on the brightness quotient and color saturation on a gradient scale with variation of 10 units on brightness scale for each image of a trail using Adobe Photoshop CC6. This was sent to students for their ratings. Based on those ratings, the two most attractive images and the two least attractive images were left out from the study to avoid large-scale physical discrepancies (Luo, Rossion & Dzhelyova, 2019). Finally a sample of (N=16) images were finalized for the study. From this particular set of images, 7 photographs were selected randomly for each participant with both darker and lighter skin pigmentation and that consisted of the stimulus set of facial images for each participant. These photographs were then arranged in a questionnaire format and sent to the students pursuing college education in Kolkata, West Bengal. India via Google forms. After completion of the stimulus based task, the participants were asked to fill up the personality questionnaires for NEO-FFI and 16PF attached with the questionnaire.

Statistical Analysis

Analysis I included computation of basic descriptive statistics for the whole sample, across males and females and across bearded and clean-shaved images. This was followed by a

comparison between the rankings of bearded and clean-shaved images and examining gender differences between these rankings. The computational software used is SPSS version 23.0. Analysis II consisted of selecting the items of the personality questionnaires which were of similar nature, so that the number of predictors under the domain of personality could be considerably reduced. For this chi-square was computed followed by odds ratio amongst those items reporting a significant chi-square association were selected (NEO-FFI = 42 and 16PF = 55 items). This was done on R-Studio.

In order to examine the role of personality factors as a predictor of preferences for bearded or non-bearded faces, the idea of binary logistic regression seemed to be appropriate. Finally, logistic regression was computed followed by Stepwise Regression (Backward) to prepare a model consisting of personality factors that best predicts the likelihood of choosing a bearded face over a non-bearded face.

3. Results

Study 1

The final sample size was (N = 155, age = 21.10 ± 1.924 years), males (N= 63, age = 21.25 ± 2.272 years); females (N = 92, age = 21 ± 1.651 years) .Bearded images received an average ranking of (males = 3.5661 ± .98165; females = 3.7267 ± .96654). Non-bearded (clean shaved) faces received an average ranking of (Males = 4.55 ± 1.068; females = 4.34 ± 1.083). Wilcoxon Signed rank test indicated that significant differences exist between ranking of bearded and clean shaved images (Z = -4.675, p = .000). No significant gender differences were found between rankings on bearded and clean -shaved images (Mann Whitney -U Test: Z = -.809, p = .419).

For the execution of logistic regression, preferences for bearded faces were coded as '0', N = 94, for participants who had Mean Ranking of Bearded images < Mean Ranking of clean shaved images and preference for clean-shaved face was coded as '1', N=45. The personality scales initially consisted of 60 items from NEO-FFI and 187 items of 16PF. After odds ratio was reduced to 42 from NEO-FFI and 55 from 16PF. Thus the total number of predictors used in the initial logistic regression is 97. In the initial stages the logistic regression model was computed using these items as the predictors of the model. The results obtained indicated a R-square value of .979. Classification of accuracy is about 98.5%. However a major problem of this model was in the huge number of predictors used. Often including too many input variables can dilute true associations or identify spurious associations (Ranganathan, Pramesh and Aggarwal, 2017). This was followed by stepwise logistic regression (Backward Conditional) in order to obtain the best model for analysis. In this model, the predictors were reduced to (NEO-FFI = 22 items & 16PF = 26 items, total = 48 predictors). The classification accuracy value obtained was 98.6%. Thus, it can be

concluded that the backward stepwise method shows a better result with potential of reduction in the large number of predictors by almost 50%.

Study 2

The final sample size was (N = 144, age = 20.73 ± 2.556 years), males (N= 56, age = 21.14 ± 1.863 years); females (N = 88, age = 20.47 ± 2.893 years). Lighter skin pigmentation received an average ranking of (males = 3.2083 ± .79317; females = (3.4003 ± 1.404). Faces with darker skin-pigmentation received an average ranking of (males = 5.1561 ± 1.0428; females = 4.5235 ± 1.188). Wilcoxon Signed rank test indicated that significant differences exist between ranking of images of lighter skin pigmentation and darker skin pigmentation (Z = -6.688, p = .000). No significant gender differences were found between rankings on images with lighter skin pigmentation (Mann Whitney -U Test : Z = -.626, p = .531). Significant gender differences were found between rankings on images with darker skin pigmentation (Mann Whitney -U Test : Z = -.3301, p = .001)

4. Discussion

The ideas and notions about beauty tend to vary across different cultures. In this study these notions were examined based on non-identity specific cues (beard, skin pigmentation) in the South-Asian context. Preferences were found for bearded faces over clean-shaved faces. Both males and females preferred bearded faces over clean-shaved faces. However, no significant gender differences were indicated between males and females on the basis of their rankings on the facial images. Limited studies exist in this domain with reference to the Indian Context. The findings in this aspect are consistent with recent studies with regard to the beard enhancing a male's attractiveness. Beard can be considered as a signal for intra-sexual formidability (Dixson et al., 2016) as indicating power or strength. In this study we found that both males and females had preferences for bearded faces over clean-shaved faces though the study was based on the premise that preferences for male facial hair are not unanimous throughout the globe. Beards have always found their way back to fashion, often based on the premise that single men are large in number in proportion to fewer women. It is largely used as a means of standing out. Studies as early as 1973 indicate that the amount of facial hair had direct associations with masculinity, maturity, dominance and courage (Pellergini, 1973). This study being conducted in the Indian Context reiterates similar findings. In this regard, it is important to note that preferences for beardedness is mostly context-dependent (Dixson, Rantala & Brooks, 2019; Valentova et al., 2017).

Skin color is an important marker for sexual dimorphism. This aspect is considered to be an objective physical reality. On universal grounds, females generally have a lighter skin color than males (Frost, 1988). Preferences for lighter skin pigmentation have been established extensively across different cultures (Semin & Palma, 2014) and by nature it even escapes

conscious awareness (Carritto & Semin, 2019). The present study has highlighted similar findings. 72.91% of participants from Study 2 indicated their preference for lighter skin pigmentation. The human skin constitutes the outermost part of the human body and is associated with physiological, psychological and physical benefits. In most instances it also defines the identity and overall perception of the individual. This preference for light-skin coloration is known as Colorism in the West. This phenomenon has been linked to colonialism in Asia and Africa. Results of this study also show that gender differences in preferences have been found for images with darker skin pigmentation. Earlier theorists like Eysenck have emphasized on the similarities in preferences of color for both males and females whereas Granger has highlighted the differences in preferences between males and females (Eysenck, 1941 & Granger, 1955). Females obtained mean rank of 63.41 and males received mean rank of 86.79 for images with darker skin hues. Based on these values it may be said that females tend to perceive darker skin hues more favorably than lighter skin hues. Earlier research suggests that women tend to be more tolerant about darker skin hues. Females associate lighter skin tone with aggression, self-assertion and feminine side of males. Darker skin pigmentation in males is considered more masculine, energetic and dependable (Frost, 1989) as perceived by females. Initial studies have highlighted that color biases are much stronger in males than females with regard to the concept of feminine beauty (Allen et al.,

2000). With reference to the Indian context, preferences for lighter skin pigmentation in females are quite distinct in the marriage market (Thappa & Malathi, 2014). This preference is also based on societal constructs of caste, creed, socio-economic status and religion. Urban males with education still prefer lighter skin pigmentation in both social and personal aspects of life (Mishra, 2015). The bias towards lighter skin pigmentation still is prevalent in the present times as highlighted in this present study.

The role of personality aspects in predicting preferences for facial attractiveness has been depicted in Study 1 using regression statistics. Existing research has already suggested that personality traits can be predicted with high precision from facial images. This study aimed to assess the personality traits of the observers of static facial images and explore whether these traits were responsible for the preferences of the observers. Initial studies in this domain have already highlighted positive traits like honesty and helpfulness are considered to be better looking than people with negative traits like rudeness and being unfair and biased (Science daily, 2007). The influence of personality traits of the raters were assessed based on the associated items from both NEO-FFI and 16PF. The selected items are presented in Table 1. The selection was done based on chi-square. NEO-FFI consists of 60 items and 16PF consists of 187 items. To ease computation using both scales, the items were reduced from both scales. This was done by computing the association values using chi-square between items of NEO-FFI and 16PF. For further elaboration, Stepwise Regression (Backward) was

computed to further reduce the number of items. The final list of significant items has been presented in Table 1.

Table 1: Items from NEO-FFI& 16PF indicated as significant predictors for Study 1 using Stepwise (Backward) Regression

Statements (NEO-FFI)	Statements (16PF)
21. I often feel tense and jittery. 26. Sometimes I feel completely worthless N7. I rarely feel fearful or anxious. 41. Too often, when things go wrong, I get discouraged and feel like giving up. 56. At times I have been so ashamed I just wanted to hide. 7. I laugh easily. 42. I don't get much pleasure from chatting with people. 52. I am a very active person. 57. I would rather go my own way than be a leader of others. 8. I think it's interesting to learn and develop new hobbies. 13. I am intrigued by the patterns I find in art and nature. 28. I would have difficulty just letting my mind wander without control or guidance. 33. I seldom notice the moods or feelings that different environments produce. 38.I experience a wide range of emotions and feelings. 48. I have little interest in speculating on the nature of the universe or the human condition. 58. I often enjoy playing with theories or abstract ideas. 4. I try to be courteous to everyone I meet. 14. Some people think I am selfish and egotistical. 34. I tend to assume the best about people. 5. I keep my belongings neat and clean. 10. I'm pretty good about pacing myself so as to get things done on time. 35. I work hard to accomplish my goals.	86. When I am in a small group, I am content to sit back and let others do most of the talking. 130. I can work carefully on most things without being bothered by people 55. I have been let down by my friends: 117. If someone tells me something which I know is wrong, I am more likely to say to myself: 133. I enjoy doing "daring"," foolhardy things", "just for fun". 7. I make smart, sarcastic remarks to people if I think they deserve it. 38. When I have been put in charge of something, I insist that my instructions are followed or else I resign. 186. I am the energetic type who keeps busy. 47. As a teenager, I joined in school sports. 79. Some people seem to ignore or avoid me, although I don't know why. 84. People sometimes call me careless, even though they think I am a likable person. 15 . It would be good for everyone if vacations were longer and everyone had to take them. 58. I like to go out to a show or entertainment 41. I feel a need every now and then to engage in a tough physical activity. 26. With the same hours and pay, it would be more interesting to be: 122. In constructing something I would rather work: a. With a committee 150. If people shout suggestions when I'm playing a game, it doesn't upset me. 30. In my personal life I reach the goals I set, almost all the time. 5. I feel a bit nervous of wild animals even when they are in strong cages 57. When I get upset, I try hard to hide my feelings from others. 40. When I make a commitment, I can always be counted on to follow through. 4. I can find enough energy to face my difficulties 9. If I saw two neighbours' children fighting I would. 145. If a heated argument developed between other members taking part in a group discussion , I would:

When we refer to Table 1, there are 22 items from NEO-FFI and 26 items from 16PF which may be considered as significant predictors for preference of bearded faces over clean-shaved faces. This was done to reduce the number of predictors from both scales of NEO-FFI and 16PF. Considering NEO-FFI, it is seen that the maximum items are from the domain of Openness to Experience (7 items). This dimension is largely associated with willingness to new experiences, need for variety, easy adaptability and flexibility with better problem solving approaches (McCrae, 2004). This dimension is also linked with perceptions of trustworthiness in others, especially human-human trust. Initial studies have shown that facial

attractiveness often acts as a shortcut cue in inference for trustworthiness (Gutiérrez-García, Beltran & Calvo, 2018). Bearded faces are perceived as more trustworthy than clean -shaved faces (Bakmazian, 2014). This may be a reason as to why this dimension is significant in inferring preferences for bearded faces. With regard to 16PF, the maximum number of items was representative of Factor C which is associated with emotional stability, adaptability and maturity. Beardedness is associated with high masculinity and social maturity (Neave & Shields, 2008). This finding suggests that bearded faces are referred to as more mature and adaptable by both males and females in the existing Indian culture.

5. Conclusion and Implications

This study has highlighted the role of non-identity specific cues (beard and skin coloration) in the area of perceived facial attractiveness using real world static facial images. The findings from this study add on to the existing knowledge in this area with special reference to the Indian context. It suggests that both males and females in the present circumstances are more likely to find males faces with beard more attractive. This preference is most likely to influence their interpersonal-relationships in terms of partner-choices, job prospects and intimacy. This study adds to the Indian scenario wherein preferences towards lighter skin tone are still found to exist. Thus, the 'fair is beautiful' notion is still prevalent in present times. Though women prefer males with lighter skin-pigmentation, they may be considered to have lesser disregard for men with darker-skin pigmentation with regard to the existing Indian culture. To our knowledge, this study is the first of its kind to assess the role of personality traits behind selection of a particular face as attractive with respect to the South-Asian geography. Further investigations and explorations for personality traits of the observers of the faces would lead to better understanding of the causative role of personality traits of the perceiver behind choosing a particular face as attractive. The findings from this study may be utilized in the areas of mate-selection, face recognition, interpersonal relationships, and exploring cultural and contextual biases existing in the area of perceived facial attractiveness.

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