

Masculinity and femininity in attractiveness of human face according to sex, brain dimorphism, and mating preferences

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Grant: KEGA 004TTU-4/2015 a FF UCM/Dem-2015

Název grantu: „Kognitívne aspekty estetickej skúsenosti“ a „2D:4D a jeho vzťah k vybraným psychickým charakteristikám“

Oborové zamčrenie: AN-Psychológia

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Abstract Commonly spread opinion that the attractiveness of the face is the „mater of the taste“, or that the “beauty is in the eye of the beholder” has been disrupted by the findings, that the consensus about the human face attractiveness is relatively high. Several researches revealed the most common tendencies influencing the human face assessment and its attractiveness. A special role in face attractiveness assessment plays the presence of sexual dimorphic traits of the observed object as well as the variables tight to sex/gender characteristics of the evaluator. Research was based on the attractiveness assessment of male and female face composites stressing the features of masculinity and femininity. Choices of the most attractive face has been compared in relation to the sex, gender (through digit ratio 2D:4D), and mating preferences of the observers. Subjects who assessed the face composites according to attractiveness were 413 participants from which 280 (67,8%) were female. The mean age of the sample was 21,41 years and all belonged to European race. Results show that there are no significant connections of sex, brain dimorphism, or mating preferences with the way how people evaluate the attractiveness of human face. The differences were found between the male and female face assessment. Males and females constantly assigned the feminine female face as the most attractive.

Key words Face attractiveness, masculinity, femininity, sex, digit ratio (2D:4D), mating preferences

1. INTRODUCTION

The attractiveness of human face is in the centre of the attention of various scientific disciplines. Although they track various aims, the need to discover what is attractive and consequently what makes the face attractive is their common interest.

Commonly spread opinion that the attractiveness of the face is the „mater of the taste“ (Dion, 2002; Luckier, Beane, & Guire, 1981) or that the “beauty is in the eye of the beholder” (Foster, 2008; Foos & Clark, 2011; McConnell et al., 2015) has been disrupted by the findings, that the consensus about the human face attractiveness is relatively high (Mealey, Bridgstock, & Townsend, 1999; Rhode et al., 2001; Etoff, 1999; Swami & Furnham, 2008 and many others). Within this consensus it is possible to state, that faces that are e.g. younger (Cunningham, 1986; Ebner, 2008), more symmetrical (Perrett et al., 1999; Demuthova, 2007; Zaidel & Hessamian, 2010),

happier (O'Doherty et al., 2003; Golle, Mast, & Lobmaier, 2014; Sun et al., 2015), average (Langlois, Roggman, & Musselman, 1994) or with healthy skin (Fink et al., 2012) are also perceived as more attractive.

A special role in face attractiveness plays the presence of sexual dimorphic traits. Masculinity in male faces and femininity in female ones is a very important factor of their attractiveness (Rhodes, Hickford, & Jeffrey, 2000; Little & Hancock, 2002). This importance is based on the evolutionary mechanism of preference for exaggerated secondary characteristics of opposite sex (Penton-Voak & Perrett, 2000) which are tight to hormone levels (Owens & Short, 1995). High testosterone levels are connected with forward growth of the brow ridges, increase the size of bones of the jaw, lower face and cheekbones in males (Thornhill & Gangestad 1999) and refer to masculine face prototype (Mitteroecker et al., 2015). On the other hand, oestrogen inhibits this growth leading to high eyebrows, gracile jaws and fuller lips, small lower face, relatively flat mid-face in females (Penton-Voak & Perrett, 2000).

Lots of studies proved, that female faces with feminine features mentioned above are considered as attractive (Grammer & Thornhill, 1994; Cornwell et al., 2004; Little et al., 2014). Studies measuring facial features from photographs of women (Cunningham, 1986; Jones & Hill, 1993) and studies manipulating facial composites (Perrett et al., 1998) indicate that feminine features increase the attractiveness of female faces (Little, Jones & DeBruine, 2011). Similar, but not so evident (Scott et al., 2010; Morrison et al. 2010) outcomes provide the studies on male face attractiveness and masculinity. Masculinity is not always the feature women prefer when assessing the male face attractiveness (Swami & Furnham, 2008; Little & Hancock, 2002; Swaddle & Reiersen, 2003). There are several possible explanations referring to combined mating strategies (Smith, Jones, & Allan, 2013), supportive presence of social status (Cunningham, Barbee, & Pike, 1990), hormonal activity etc. It is therefore possible, that mechanisms that lead into the preference of attractive face in males are different from those in females.

The role of gender and sexual orientation of the observer in the human face attractiveness assessment has been also examined, although the studies considering this area are rather rare. E. g. Bailey et al. (1997) found that homosexual men preferred men who were described to be masculine more than they preferred men who

were described to be feminine. Homosexual women, on the other hand, showed no preference for masculine versus feminine women.

Another studies pointed to the tendency of homosexual men to prefer masculine men more than heterosexual women, and homosexual women prefer feminine women more than do heterosexual men (Child et al., 1996; Lippa, 2007). The tendency of homosexual men to prefer masculinity in male faces proved also Glassenberg et al. (2010) together with the finding that homosexual women demonstrated stronger preferences for masculinity in female faces than did heterosexual women. Gender studies focusing on the attractiveness of the face taking into account not just the sex but gender as a set of roles and behavior usually concentrate on the gender of the object. E. g. Zucker et al. (1993) found that young boys with gender identity disorder were judged by normals to be more attractive than were the clinical controls boys. In contrary, analogical research on girls showed that girls with gender identity disorder were judged less attractive than the clinical controls (Fridell & Zucker, 1996). Within these means, gender of the observer and its influence on the face attractiveness preference has not been deeply studied, yet.

2. PROBLEM

It seems that masculinity (in male face) and femininity (in female face) increase the attractiveness of the face for the observer. On the other hand, there are differences in how the female and male face is perceived and how strong the influence of sexual dimorphism on the attractiveness is. We assume that analysis of the sex, gender, and mating preferences of the observer can bring the explanations for the similarities/ differences in human face attractiveness perception.

3. PROCEDURE AND METHODS

Participants enrolled the research on a voluntary basis. Before the data collection they were informed on the area of research and they continued only after the oral consent. All participants were adults. They filled out a battery of questionnaires, tests and sets of questions and tasks among which they rated the attractiveness of human faces and answered various questions. From 425 batteries, twelve were excluded from further analysis due to incomplete answers. During the filling in of questionnaires the measures of fingers on hands were taken. All relevant data were statistically evaluated by the Statistical Package for the Social Sciences (SPSS) Software, version 16.

3.1 Sex

One of the tasks within the battery was to choose the sex of the participant. Subjects were asked to choose from two categories – a man or a woman.

3.2 Brain dimorphism

2D:4D represents the length of the index (second) finger divided by the length of the ring (fourth) finger. This ratio is used as a substitution for the measurement of the amount of prenatal androgens exposure (Manning et al., 2014). The high prenatal levels of androgens refer to low values (male type) of 2D:4D and high values refer to female type of development. Contemporary anthropological, medical, and psychological (Manning, 2002) studies have found connections between 2D:4D and various somatic (Muller et al., 2011; Zhao et al., 2013; Garcia-Cruz, et al., 2012) and psychological characteristics (Kilduff et al., 2013; Burton, Guterma, & Baum, 2013; Garbarino, Slonim, & Sydnor, 2011), too. Basically, the 2D:4D ratio represents the amount of masculinisation of the brain, however, instead of rough division into

binominal categories man-woman it measures the amount of masculinity/femininity on a scale. Lower values of the 2D:4D variable refer to more masculine brain development while bigger values of 2D:4D point to a feminine brain development. Although extreme low 2D:4D values are usually present in males and high 2D:4D in females (Manning, 2002), measurement of subtle differences mainly in mid values enables to assign the subject into the right value of brain masculinisation regardless the visible biological sex (male vs. female). In these means we use 2D:4D as an expression of the “sex of the brain”.

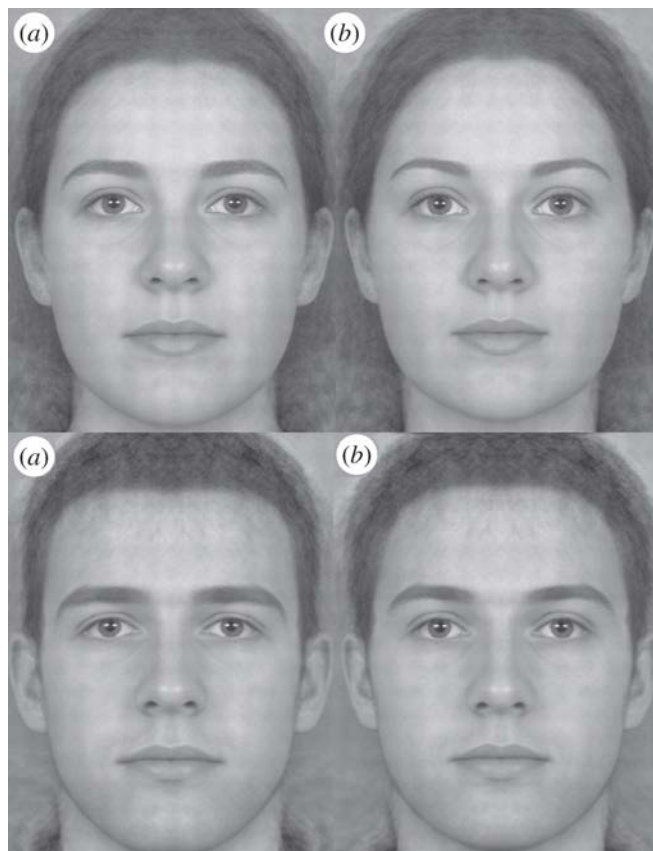
2D:4D is commonly measured as the length from the midpoint of bottom crease (where the finger joins the hand) to the tip of the fingers (Demuthova, 2016). As there are not clear outcomes from researches whether to prefer right hand or left hand for the measurement (Hönekopp, 2010; Stoyanov, Marinov, & Pashalieva, 2009) or both (van der Meij et al., 2012) and that basically both of them refer to the amount of prenatal androgen exposure (Manning, 2002), we took a measure individually from both – the right and the left hand and used their average value. Also, there are several ways of taking the measure – by the x-ray of hands (Xi et al., 2014), by the photocopies (Burriss, Little, & Nelson, 2005), or by the ruler/vernier calliper. We preferred the direct measurement by the vernier calliper with the resolution of 0,05 millimetre.

3.3 Mating preferences

On other place of the test battery, subjects were presented the statement: “From my experience I know, that I like: *males/females/members of both sexes/I am not sure* as my partners. From their answers we gained four possible types of mating preferences and labelled participants as heterosexuals (preference of the subjects of the opposite sex), homosexuals (preference of the subjects of the same sex), bisexuals (preference of the subjects of both sexes), and uncertain (from answers “I am not sure”).

3.4 Attractiveness of masculinity/femininity of faces

For the face attractiveness assessment based on masculinity/femininity perception we used face composites from the study of Little, Jones, & DeBruine (2011). Two male and two female composites showed faces manipulated in facial masculinity and femininity according to findings which face features correspond with high masculinity and femininity in faces. Subject, that evaluated the faces according to their attractiveness were blind to the fact faces represent two different levels of masculinity/femininity. Also, the face composites alter in the order at which the face with low and face with the high masculinity/femininity was presented for the evaluation of attractiveness. Face composites are shown at the Picture 1.



Picture 1. Face composites manipulated in facial masculinity and femininity. Faces marked a) refer to masculinized faces, b) to feminized faces (source: Little, Jones, & DeBruine, 2011).

4. SUBJECTS

Subjects were 413 participants, from which 280 (67,8%) were female. The mean age of the sample was 21,41 years (St.dev.=6,111; median=20 with minimum 18 and maximum 67 years of age) and the sample was not distributed normally within this category (sig. in Kolmogorov-Smirnov test=0,000, skewness=4,588; kurtosis=25,588). All participants declared their belonging to European race. Values of 2D:4D ratio were distributed close to normal distribution within the sample (sig. in Kolmogorov-Smirnov test=0,190; skewness=0,144; kurtosis= 1,016) with the mean value=0,99337 (minimum=0,863; maximum=1,149). 93,2% of the sample (N=385) declared to be heterosexuals, 3,9% (N=16) homosexuals, 1,7% (N=7) bisexuals and 1,2% (N=5) were not sure about their sexual orientation.

5. RESULTS

5.1 Sex

First part of analysis concentrated on sex differences in the preference of masculine/feminine features in the attractiveness of the female face. Table 1 shows, that there are no significant differences (sig.=0,349) in the preference between males and females.

This result is supported by the outcomes of Chi-Square test showing the existence of significant differences (Asymp. Sig.=0,000; chi-square value=122,579) between the preference of feminine female faces and preference of masculine female faces in whole sample in the task of assigning the most attractive face.

Table 1. Independent Chi-Square for sex and attractiveness of female face

| Sex | Face assigned as the most attractive | | |
|--------------|--------------------------------------|----------|-------|
| | Masculine | Feminine | Total |
| Men | 34 | 99 | 133 |
| Women | 60 | 220 | 280 |
| Total | 94 | 319 | 413 |
| Cramer's V | 0,05 | | |
| Approx. Sig. | 0,35 | | |

Similar results have been gained from the assessment of attractiveness of the male face – there are no significant differences (sig.=0,627) in the preference between males and females (Table 2). However, from the frequencies of the choices it is obvious, that there is no significant preference for the choice of feminine of masculine male face when subject rated the face according to attractiveness. It therefore seems, that men and women do not consider masculine male face as more attractive than the feminine one. This result is statistically significant; the value of chi-square for the equality of distributions of choices for masculine and for feminine faces was 0,061 with the value of sig.=0,806.

Table 2. Independent Chi-Square for sex and attractiveness of male face

| Sex | Face assigned as the most attractive | | |
|--------------|--------------------------------------|----------|-------|
| | Masculine | Feminine | Total |
| Men | 65 | 68 | 133 |
| Women | 144 | 136 | 280 |
| Total | 209 | 204 | 413 |
| Cramer's V | -0,24 | | |
| Approx. Sig. | 0,63 | | |

5.2 Brain dimorphism

This variable represents the amount of the masculinisation of the subject's brain. Low values of 2D:4D point to masculine development while higher values to more feminine structure and functioning of the brain. Because a simple dichotomous variable "sex" does not always correspond with gender and other characteristics based on the dimorphic development of the individual, 2D:4D can be possibly more distinctive.

Subjects who consider feminine female faces as more attractive do not differ in 2D:4D from the subjects who consider masculine female face as prettier (Table 3). Those who preferred masculine face had slighter lower values of 2D:4D (more masculine), but Student's t-test for two independent samples proved, that these differences are not significant.

Table 3. Differences in 2D:4D between subjects preferring masculine and preferring feminine female faces

| Face assigned as the most attractive | N | Mean | St. Dev. | SE Mean |
|--------------------------------------|--------|---------|----------|---------|
| Masculine | 94 | 0,99202 | 0,03198 | 0,00329 |
| Feminine | 319 | 0,99376 | 0,03625 | 0,00203 |
| t | -0,421 | | | |
| Sig. (2-tailed) | 0,674 | | | |

In male face attractiveness assessment there are no differences in 2D:4D between subjects who assigned masculine and feminine male face as the prettiest (see Table 4). It seems that the brain dimorphism does not have as strong connection with the face attractiveness assessment when its masculinity of femininity is taken into account.

Table 4. Differences in 2D:4D between subjects preferring masculine and preferring feminine female faces

| Face assigned as the most attractive | N | Mean | St. Dev. | SE Mean |
|--------------------------------------|-------|---------|----------|---------|
| Masculine | 209 | 0,99436 | 0,03286 | 0,00227 |
| Feminine | 204 | 0,99235 | 0,03768 | 0,00264 |
| t | 0,580 | | | |
| Sig. (2-tailed) | 0,562 | | | |

5.3 Mating preferences

Mating preferences turn the attention of an individual towards sexual partners. Therefore it is possible that people who see e.g. males as possible sexual partners will judge the male face attractiveness differently as those who's potential sexual partners are females. Results from the comparison of the frequencies have limited consequences due to very small number of participants in categories of homo/bisexuals and uncertain vs. heterosexuals.

From previous researches as well as from our partial results it is obvious, that the analysis of the human face attractiveness needs to be executed separately for the sex of the observed face as well as of the observer. Table 5 presents the variance of the choices for the female face composite in males and females separately.

Table 5 shows the tendencies of how people tend to evaluate the attractiveness of the female face due to their sexual orientation. Results show clear and significant preference for feminine female face in heterosexual males and females.

Table 5. Chi-Square for the variances of the preference of masculine and feminine female face in females and in males

| Mating preferences in females | Female face assigned as the most attractive | | | Chi-Sq. | Sig. |
|-------------------------------|---|----------|-------|---------|-------|
| | Masculine | Feminine | Total | | |
| Heterosexual | 56 | 204 | 260 | 84,25 | 0,000 |
| Homosexual | 2 | 9 | 11 | 4,455 | 0,035 |
| Bisexual | 1 | 4 | 5 | 1,800 | 0,180 |
| Uncertain | 1 | 3 | 4 | 1,000 | 0,317 |
| Total | 60 | 220 | 280 | | |
| Mating preferences in males | Female face assigned as the most attractive | | | Chi-Sq. | Sig. |
| | Masculine | Feminine | Total | | |
| Heterosexual | 32 | 93 | 125 | 29,770 | 0,000 |
| Homosexual | 2 | 3 | 5 | 0,200 | 0,655 |
| Bisexual | 0 | 2 | 2 | * | * |
| Uncertain | 0 | 1 | 1 | * | * |
| Total | 34 | 99 | 133 | | |

Note: * Not enough cases. No statistics are computed.

Results considering other sexual orientations cannot be taken into serious account as very small number of participants claimed to be homosexuals, bisexuals, or uncertain in their sexual orientation. Numbers in these cases point to a tendency to prefer feminine female face regardless of sexual orientation in both sexes.

Table 6. Chi-Square for the variances of the preference of masculine and feminine male face in females and in males

| Mating preferences in females | Male face assigned as the most attractive | | | Chi-Sq. | Sig. |
|-------------------------------|---|----------|-------|---------|-------|
| | Masculine | Feminine | Total | | |
| Heterosexual | 136 | 124 | 260 | 0,554 | 0,457 |
| Homosexual | 4 | 7 | 11 | 0,818 | 0,366 |
| Bisexual | 2 | 3 | 5 | 0,200 | 0,655 |
| Uncertain | 2 | 2 | 4 | 0,000 | 1,000 |

| Total | 144 | 136 | 280 | | |
|-----------------------------|---|----------|-------|---------|-------|
| Mating preferences in males | Female face assigned as the most attractive | | | Chi-Sq. | Sig. |
| | Masculine | Feminine | Total | | |
| Heterosexual | 61 | 64 | 125 | 0,072 | 0,788 |
| Homosexual | 3 | 2 | 5 | 0,200 | 0,655 |
| Bisexual | 1 | 1 | 2 | 0,000 | 1,000 |
| Uncertain | 0 | 1 | 1 | * | * |
| Total | 65 | 68 | 133 | | |

Note: * Not enough cases. No statistics are computed.

The evaluation of male face attractiveness differs from the female face. From the tables 5 and 6 it is obvious, that while the feminine female face was the most attractive regardless sex, brain dimorphism, and mating preferences for the vast majority of participants, male face doesn't show such preferences.

Heterosexual women slightly prefer masculine male faces in contrast to homosexual and bisexual women who chose the feminine male face more often. Heterosexual males see the feminine male face as slightly more attractive as homosexuals who assigned masculine male faces as the most attractive more frequently. Again, the number of cases in non-heterosexual sample is too small for any representative and reliable results. However, it can turn attention towards possible directions for future research. Overall tendency shows that there are no differences in attractiveness between masculine and feminine male face in men, neither in women.

6. DISCUSSION

Results from 413 subject show, that there are no significant connections of sex, brain dimorphism, or mating preferences with the way how people evaluate the attractiveness of human face. Most of these results (except variables of homosexual, bisexual, and uncertain sexual orientation) are statistically significant. Therefore we can assume, that the attractiveness of human face is not strongly affected by the sex, sexual orientation, nor the fact how strongly has been masculinised the brain of the observer.

Except this general finding, the study revealed interesting partial results. In spite of the fact, that the preference of masculinity/femininity of human face has not been different in male and female observers, it differed between the male and female face assessment. Males and females constantly assigned the feminine female face as the prettiest. This result is in the concordance with the theories that present the femininity as a sign of fertility (Thornhill & Grammer, 1999) and "good genes" (Gangestad, 1993; Scheib, Gangestad, & Thornhill, 1999), therefore the consideration of female femininity face as pretty one is evolutionary effective strategy. The connection of femininity and attractiveness of female face has been proved also by many other studies (Cornwell et al, 2004; Little et al., 2014; O'Connor et al., 2013; etc.).

However, universal attitude towards female face femininity and attractiveness is not applicable on the male face. If the same explanation would be applied, we should expect the preference of masculinity in the masculine male face. Except the physical fitness and health (Rhodes et al., 2003), male masculinity is connected with the dominance (Ahmetoglu and Swami, 2012) which brings higher social status or with the aggressiveness (Little et al., 2015) enabling better success in gaining resources. Therefore, preference of masculinity in males and assessing it as attractive feature should be an evolutionary advantageous strategy. Our results show, that men as well as women do not prefer masculine male faces significantly more than the feminine ones. The fact that males might not favour masculine male face over the feminine is not surprising. There is no

evolutionary reason why men should find masculine male face more attractive. However, according to connection of masculinity with male "good genes", women should strongly prefer these features, which they did not. A possible explanation lies in the findings that individuals use diverse reproductive strategies, rather than using a single "best" strategy (Gross, 1996). Within this perspective, women on one hand search for "good-looking" donors of dominant and healthy genes (preference of masculine features), but on the other hand, they also look for "good fathers" (Perrett et al., 1998) who are faithful, caring, warmer, more agreeable and honest (feminine features - Fink & Penton-Voak, 2002). In the light of these conflicting findings, it appears that „good genes“ theories of male attractiveness preferences cannot completely account for female judgments of male facial attractiveness (Penton-Voak et al., 2003). Our results of non-existing preference of masculine male face in the assessment of the attractiveness correspond with the findings of Swami & Furnham (2008) and Little & Hancock (2002).

Few interesting tendencies have been revealed within the factors of sexual orientation. Results are not reliable due to a small number of participants, however it is possible that all non-heterosexual females and males prefer feminine face composites (males and females, too) except the homosexual males who consider masculine male face as more attractive. This slight tendency is in concordance with the findings of Child et al. (1996), Lippa (2007) and Glassenberg et al. (2010). However, in this case the further researches with larger samples has to be carried out.

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