

The Neurobiology and Evolutionary Foundations of the Perception of Beauty

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ABSTRACT

The neurobiology and evolutionary foundations of the perception of beauty
Beauty in human beings can be defined as physical attractiveness to the opposite sex. Although the perception of attractiveness varies between cultures and individuals to a certain extent, it is established that most of the criteria for attractiveness are common among many cultures. According to evolutionary psychologists, facial and body-related features that people find attractive reflect the adaptations determined by sexual selection, which is one of the driving forces of evolution. These adaptations evolved to explore the mate value and reproductive success of a potential partner. Being attractive provides many social advantages to a person, and it is known that people make some positive attributions about other characteristics of such a person as well. Among humans, features such as facial beauty, youth, body shape, behaviors, voice tone, and ornamentation are important factors in the evaluation of attractiveness of the opposite sex.

Keywords: Attractiveness, evolutionary psychology, mate selection, neurobiology

ÖZET

Güzellik algılamasının nörobiyolojisi ve evrimsel temelleri

İnsanda güzellik kavramı karşı cins tarafından fiziksel olarak çekici bulunma niteliği olarak tanımlanabilir. Kültüre ve kişiye göre güzellik algılaması bir miktar değişken olsa da çoğu kültürde güzellik ölçütlerinin önemli bir bölümünün ortak olduğu ortaya konulmaktadır. Evrimci psikoloğlara göre insanların karşı cinsten güzel bulduğu yüz ve bedenle ilişkili özellikler daha çok evrimin itici güçlerinden birisi olan cinsel seçilimin şekillendirdiği adaptasyonları yansıtmaktadır. Bu adaptasyonlar potansiyel bir eşin eş olarak değerinin ve üreme başarısının araştırılmasına yönelik olarak gelişmişlerdir. Güzel olmanın sosyal yaşamda kişiye sağladığı birçok faydalar olduğu gibi, bu kişilere diğer insanlarca başka kişisel özellikler bakımından da olumlu atıflar yapıldığı bilinmektedir. İnsanlarda karşı cinsin güzelliğinin değerlendirilmesinde bakılan kişinin yüz güzelliği, genç görünümü, beden şekli, davranışları, ses tonu ve süslenmesi gibi etkenler önemli bulunmaktadır.

Anahtar kelimeler: Güzellik, evrimsel psikoloji, eş seçimi, nörobiyoloji

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INTRODUCTION

The questions of what people find beautiful and why have yet to be given a satisfying answer. Throughout history, the topic of how beauty should be defined has been a matter of debate among thinkers, and the notion of ideal beauty in various fields of art has changed and developed throughout the centuries. In this article, instead of examining the general notion of beauty, perceptions of beauty in the opposite sex, i.e. sexual attractiveness, will be examined, and the components and evolutionary and neurobiological foundations of this perception will be reviewed.

The notion of beauty in humankind can be defined as the attribute of being found attractive by the opposite sex; hence, beauty and sexual attractiveness are terms that can be used interchangeably (1). Sexual attractiveness is the product of the interplay between facial or bodily beauty of a person and the brain of the beholder (2). However, the definition and the determinants of sexual attractiveness are a matter of debate (3). Even though the perception of beauty may differ to a certain extent according to a person and culture, it is asserted that standards of beauty in different cultures, for the most part, share significant commonalities (1,3).

One important argument regarding the perception

of beauty claims that human beings internalize and slowly gain a notion of beauty based on the attributes that are considered ideal by the cultures they grew up in from their childhood onwards and thus, the notion of beauty will change according to culture (3). However, as a result of studies since the 1970s, a “universalist” view seems to have gained ascendancy over this “relativist” view that had argued that “beauty is in the eye of the beholder”. The universalist view asserts that beauty is similar in all cultures (3,4). According to the evolutionary scientists who hold this view, people’s interest in the facial or bodily features and in the social messages conveyed by these features are neither dependent on a specific culture nor arbitrary; rather, they reflect adaptations shaped by sexual selection, one of the driving forces of evolution (3). These adaptations have evolved to seek for the quality desired in a potential romantic partner (5).

While it is known that men place more emphasis on beauty in the opposite sex, it is reported that women also pay more attention to beauty than to abstract attributes such as personality traits in other women (5-7). It is reported that the leading topic of conversation among women is “appearance,” and women are more curious about the perception of their attractiveness by other women than by men (8,9). These findings give rise to the idea that the main impulse for women wanting to appear beautiful is to get the better of the competitors of their own sex rather than attracting men.

It has been reported that when people are evaluating their own level of attractiveness, they have a self-serving bias, and often find themselves more attractive than they are evaluated by others (10,11). Studies indicate that people find themselves, on average, 10% more attractive than they actually are (10).

The Advantages of Being Beautiful in Social Life

Studies reveal that physical attractiveness provides individuals with many advantages in social life (12). In addition to the fact that people who are found

beautiful attain an advantageous status when compared to their counterparts in many social arenas, it is known that the stereotype that “what is beautiful is good,” which has been around since Ancient Greece, is still maintained in many societies: That is to say, people who are found beautiful are also attributed with positive personal characteristics (12). For instance, being found beautiful and being beautiful are found to play an important role in the development of self-confidence and in shaping of the social life of every individual (13). It is claimed that people who are beautiful are more desired as friends and more successful in social relations, with these positive effects being more evident in the female sex (14). Other findings include that people who are beautiful are more preferred for sexual and life-long partners and those who marry more attractive people are happier with their lives (15,16).

It is very telling for the advantages that beauty provides in life that beautiful people receive better treatment from others throughout their lives, are at an advantage in job promotions, have a greater chance of success at imaginary or actual job interviews, and beautiful people may even have an advantage regarding the punishment received in court (17-22). It is also believed that beautiful children receive more care from their parents and the photos of children who are not beautiful arouse more negative feelings and more physiological changes related to these feelings in adults. These findings lead us to believe that the advantages of being beautiful begin at birth (22,24).

Another reality is that attractive people are also perceived positively in terms of non-esthetic personal attributes (Halo Effect). For example, people who have more attractive faces are perceived by others as being happier (25). Similarly, studies and meta-analyses assert that there is widely-held judgment that people who are beautiful are also more morally upright (26). When subjects were shown a photograph of a person and asked questions about the pictured individual, it was revealed that those who are attractive were assumed to be “more giving, helpful, intelligent, friendly” and these stereotypes exist even in children as young as 7-9 years (27).

The Evolutionary Foundation of the Perception of Beauty

For researchers who look at human behavior from an evolutionary perspective, attractiveness in a human being needs to be evaluated as a concept being directly related to their mate value and their reproductive success (28,29). Thus, “attractiveness” research, while on the one hand examining which physical attributes are found attractive in human beings, on the other hand needs to investigate the evolutionary adaptive value of features that are found attractive.

Selecting a partner based on elements that are found “beautiful” constitutes one of the basic mechanism of “sexual selection,” which has been known since Charles Darwin. In sexual selection, the individual to be chosen (generally the male) can attract the attention of the choosing partner (generally the female) and thus gain a selective advantage in two ways (30):

1. Develop weapons such as horns, teeth, etc. that will increase the likelihood of being the winner in a contest with their competitors of their own
2. Equip themselves with various extensions (peacock tail, lion’s mane), beautiful colors, or attractive songs, as in the case of birds, to display high genetic quality.

Beauty and the perception of beauty must have developed as a product of this second mechanism in sexual selection, considering that the members of a species give three messages to the opposite sex with the attributes that make up their attractiveness (31):

1. “I am healthy,” in other words “I have good genes.”
2. “I have an abundance of estrogen (or testosterone),” that is to say, “I have great reproductive potential.”
3. “I would be a good mother or father.”

Thus, individuals from the opposite sex who correctly evaluate this type of information, demonstrating the carrier’s genetic quality, reproductive power, partnership capacity, and social

value, will have a great evolutionary advantage and leave behind more genes (3). Therefore, signs indicating partnership quality will be perceived positively (thus attractive) by the other sex (13). High-quality individuals will also increase the success of their partners in reproduction and survival, which will give them a higher preference. As a result of this mechanism, in the evolutionary process members of both sexes have been carefully attuned to signs that demonstrate “high spousal quality” (13). In sum, the current human standards of beauty are a product of our past and people select their partners so as to maximize their reproductive powers.

Attributes Found “Beautiful” in Humans

Which features are more important than others for humans to find someone attractive or not is a research topic that has gained momentum in recent years. It appears that in finding someone from the opposite sex attractive, some of the physical and behavioral attributes of the person being viewed (facial beauty, appearance of youth, body shape and weight, tone of voice, adornments and attire, behavior, etc.) as well as certain features of the viewer (such as their culture, values, personal attributes, in the case of women: the time of their menstrual cycle) are of importance. Due to lack of space, in this article only the attributes relevant to the perception of beauty of the person being viewed will be examined.

Facial Beauty

In human beings, facial perception occurs much faster than the perception of other objects (32). The evaluation of facial characteristics gives us information not only about a person’s sex, age, race, etc., but also finer details of relevance in social life such as their emotions, reliability, attractiveness, and intentions (33). In humans and monkeys, the facial processing area is essentially in the lateral fusiform gyrus (the fusiform face area), which is part of the occipitotemporal cortex (34,35). This fusiform facial area has an effective connection to the orbitofrontal

cortex (OFC) that also plays an important role in facial processing (36).

The perception and processing of whether or not a face is beautiful in the human mind is incredibly efficient. It is reported that it takes 100 milliseconds to understand whether a face is attractive or not (37). This shows that the perception of the attractiveness of the face is based on strong biological foundations. The beauty detectors which fulfill this cognitive function are believed to exist in every human being from the moment of birth. Studies have found that even three-month-old babies look more at faces that adults find attractive (38,39).

Whether or not a face is considered attractive is very important in human mate selection behavior, which is determined by neural pathways that have been shaped as a result of thousands of years of natural selection in the human brain: A beautiful face provides the beholder valuable information about the other person's being healthy, having a high level of the right gonadal steroids, and being resistant to parasites, as well as, particularly in women, being fertile (40,41).

In addition, it can be said that facial beauty is a sign indicating that the whole body is healthier/more attractive. When male subjects were shown cropped photographs of women which showed either only their faces or their bathing suit-clad bodies and asked "which one is more attractive?", they gave scores similar to those they would give when the complete women – face and body – were visible (42). In other words, it appears that the messages carried by each of the different parts of the body that create attractiveness are consistent with one another to a significant degree, and that each by itself presents cues associated with general attractiveness and health.

A study which supporting the thought that the facial attractiveness of a person is related to his being healthy found that women assessed the facial photographs of men whose handshakes were considered "strong" according to a handshake measurement as being more handsome and attractive (43). Based on this, it has been asserted that for a man, having an attractive face carries information about his being particularly strong and

healthy, in addition to giving information about his testosterone level. Also, the finding that individuals who have an attractive face live longer and have more children supports the positive correlation between facial attractiveness, health, and reproductivity (44,45). Furthermore, the findings that people with attractive faces were found to have lower levels of cortisol under stressful circumstances, while women with beautiful faces were found to have higher estrogen levels (therefore have a higher potential of becoming pregnant), support this belief (46,47).

Factors that are Important in the Evaluation of Facial Beauty:

1. Facial Beauty: Symmetry

What is symmetrical is considered more beautiful in many animal species and in human beings. The brains of animals are programmed to perceive symmetry quickly (48). In the animal world, symmetry is found to be related to gene quality; asymmetry may reflect factors such as inbreeding (which causes poor quality genes), mutations, homozygosity, or environmental factors such as an unhealthy development in the first few months or years of life, inadequate nutrition, or parasitic infection, which may give very valuable information to the one who is evaluating the individual as a potential mate (3,12). On this basis, from an evolutionary perspective it can be assumed that facial symmetry in human beings indicates similar attributes and humans unwittingly prefer symmetrical faces for this reason.

As expected, studies show that humans, too, find symmetrical faces to be more attractive (1,49,50). In many studies where the levels of symmetry of faces were altered on a computer, facial symmetry was found to increase attractiveness (51).

In studies conducted on humans, it is demonstrated that symmetry of the face is somehow associated with good health. For example, the perception in human beings that those with symmetrical faces are healthier is supported by the examination of actual medical sources where a

correlation is found between facial symmetry in men and women and their being healthy. These findings demonstrate that there may be a real relationship between facial symmetry and being healthy, or that at the very least, this relationship is perceived as such (52-54). Similarly, findings that facial symmetry in humans and level of intelligence are directly related as well as facial attractiveness, even when controlled for symmetry, is proportional to the person's socio-economic status may make us think that symmetry is an indicator that a person is generally healthy and "has good genes" (55,56).

2. Facial Beauty: Being Average

It is established that there is a relationship between a human face (and generally speaking forms and objects) being close to average and being perceived as attractive. Up to a certain point, men and women tend to find faces that are close to average more attractive; however, particularly for certain personality traits and periods, in both sexes the accentuation of masculine or feminine characteristics is found more attractive than being average (3).

The fact that human beings find average faces more attractive can be explained as follows: The human mind forms "an average for the face" (prototype) based on the faces it has been exposed to from the moment of birth. In fact, our visual system creates an internal prototype for every stimulus, and this prototype is the average of all of the stimuli that one has been exposed to so far. Thus, when our mind is faced with a new stimulus, it compares it with the prototype and builds a feeling of familiarity with the prototype. Hence, the reason for average faces seeming more attractive to us is that we find them more familiar (57).

In support of this view, in studies where facial photographs are shown — some of them twice — individuals on photographs that had been seen before were perceived as more attractive by both sexes (58). However, this effect (finding what is familiar more attractive) was more evident in women and less apparent in men. Similarly, it was found that women find faces resembling that of their partner more

attractive, while this effect does not exist in men (58). In summary, the phenomenon of finding what is familiar more attractive is more evident in women, while men are more prone to new relationships and thus also find what is new attractive. This finding can be interpreted as information that confirms men's tendencies towards multiple and short-term relations (59,60).

The phenomenon of average faces being found more attractive has been demonstrated in studies conducted in different cultures (11,54,61). In addition it has been demonstrated that children of the ages of five and nine years, just like adults, find average faces more attractive than others (62).

3. Facial Beauty: Masculine-Feminine Features

In non-human species, exaggerated gender-specific features (e.g., the large antlers of a deer, the tail of a peacock) have the function of attracting the opposite sex and intimidating rivals of the same sex (63,64). Based on this knowledge, the effect of gender-specific morphological attributes (the dimorphism of facial and bodily features) on the perception of beauty is increasingly becoming a research topic in human beings, too.

In the male face, features that are perceived as masculine are a broad chin, thick eyebrows, a nose that is broader than a woman's, deep eyes that are close together, and ears that are close to the head. In women, feminine features are listed as a narrow chin, full lips, slender eyebrows, large eyes, small nose and a short distance between mouth and tip of the chin.

In many studies, it is shown that men find feminine features more attractive in female faces and women find masculine features more attractive in male faces; however, there is a limit to this perception (65,66). On the contrary, there are studies which do not find a relationship between facial femininity or masculinity and attractiveness (67).

The leading biological factors related to a human face being feminine or masculine can be listed as: healthy genes, the effect of hormones in the intrauterine period, the effect of surging hormones during puberty and the level of hormones in adult life (3).

3.1. The Effect of Genes

From an evolutionary perspective, it can be said that extreme secondary sexual characteristics (in other words, more feminine in women, more masculine in men) point to the person having good genes, which makes them more desired (3). Since in animals, a gross exaggeration of gender-specific attributes leads to the consumption of resources, the individual's capacity to cope with this burden indicates its being healthy. Even though there are some findings in humans suggesting that features differentiating men and women demonstrate gene quality, this correlation is not very clear and certain (3).

Support for the positive relationship between masculine attributes in men and gene quality comes from studies which assert that there is a correlation between masculine features and the strength of the immune system (18). The "immunocompetence hypothesis" makes the following claim: as is known, testosterone is a steroid that suppresses immunity (68). Thus, only men with a very strong immune system can remain healthy despite their high levels of testosterone. Men who have masculine attributes in their faces have been able to remain healthy despite their high levels of testosterone, which means that they must be men with very strong immune systems (69). Thus it is asserted that exaggerated gender-specific features are indicative of a hereditary immunity and thus "good genes." It needs to be pointed out that this subject is still at the level of a hypothesis and there are very few findings to confirm it (69).

3.2. The Effect of Intrauterine Hormones

It is maintained that the level of pre-natal testosterone the fetus has been subjected to is important in the development of masculine or feminine features. In other words, prenatal testosterone has an effect not only on the body and brain developing as a male, but also may play an organizational role in the masculine or feminine development of the face. A finding supporting this view comes from research that examines the index

finger to ring finger ratio in men and women (2D:4D). According to most of these studies, the 2D:4D level in men is lower than in women. The digit ratio drops as the prenatal testosterone level increases (70). There are studies that indicate that as the 2D:4D level decreases (in other words, as the exposure to pre-natal testosterone increases), men's attractiveness, physical/athletic capacity, and the number of spouses and children increases (71,72). However, we must add that a newly conducted meta-analysis did not confirm this argument and found that there was no relationship between 2D:4D ratios and male attractiveness (73).

3.3. The Effect of Rising Hormones in Puberty

Many of the gender-specific facial features of men and women form during puberty based on the masculinization or feminization of secondary sexual characteristics. Hormones such as testosterone and estrogen which rise during puberty lead to this differentiation. The masculinization of the face in men as well as the increase in testosterone occur concurrently during puberty (74). The features of the female face that men find attractive point to rising levels of estrogen and decreased androgen that women are exposed to during puberty. The increasing levels of estrogen inhibiting the effect of testosterone in women during puberty lead to the formation of feminine features such as wide eyes and full lips (2,75).

3.4. The Effect of Circulating Hormones

There are studies which indicate a positive correlation in adulthood between the levels of circulating testosterone and facial masculinity in men, and estrogen levels and facial femininity in women (47,76,77). For example, there are studies to indicate that the attractiveness of the female face is positively correlated to the level of estrogen in the blood (47). Therefore, faces of ovulating women are found to be more feminine and attractive.

As the sexually dimorphic features in human face are partly hormone-controlled signs, they may be indicators of their reproductive quality or their ability to

compete with same-sex competitors (78). Even though it has been demonstrated many times in animals that masculine traits increase procreative power and success, this remains a matter of debate where human beings are concerned (79-81). Some studies have found a positive correlation between masculine features of the face and attractiveness and the quality of sperm in humans, but others have not (82-84). It has been reported that there is a positive correlation between the attractiveness of the face and its masculinity and physical strength as measured by the strength of the handshake (43). The finding that men who have a high level of testosterone have a greater number of sexual partners throughout their lives and more children indirectly supports this idea (85,86).

3.5. Male Preference of Feminine Faces

All studies carried out using either real women's faces or modifying female faces on the computer demonstrated that a feminine female face is found more attractive by men (87-89).

It is said that the feminine attributes of the female face are also an indication of youth; thus the preference for femininity in women by men might partially be due to the preference for young women (88). Indeed, many of the features which men find attractive and feminine are features resembling those of babies (small chin, small nose, large eyes, bright and smooth skin, etc.). Make-up applied by women, which is a universal phenomenon, is used to emphasize these attributes (making the eyes appear larger and deeper, smoothing the skin, concealing lesions, and making the lips to appear fuller) (90).

Another finding is that men are most strongly attracted by feminine faces when in their 30s, while with increasing age, their level of finding feminine faces attractive decreases (91). Consequently, it is thought that the preference for feminine faces in men may be related to testosterone levels and the decrease in the preference for femininity may be a reflection of decreasing levels of testosterone. This may have an evolutionary adaptive advantage as well: the decrease in the preference for femininity as they get older may

protect men from the risky behavior such as fighting with younger and stronger competitors for highly fertile women (91).

3.6. Female Preference of Masculine Faces

The subject of masculine faces appearing attractive to women is highly debated (3). While there are some studies that indicate an increasing female attraction to male faces with increased masculine features, there are also studies suggesting that exaggerated masculine features in male faces are perceived for indicators of dominance and not found attractive (50,65,92). While the female attraction towards certain male features such as a wide chin is a more consistent finding (93, 94), this is not the case for all masculine features (13). An increase in masculine facial and vocal features in men, while consistently being perceived as an indicator of dominance, is not always evaluated as a phenomenon to increase attractiveness (96,97).

When we assess the studies in their entirety, it can be said that masculine attributes demonstrating dominance in men increase their attractiveness up to a certain point, beyond which it decreases. Another finding on this matter indicates that women close to ovulation or looking for a short-term relationship find masculine faces attractive, while during a large part of their menstrual cycles and particularly when looking for a long-term relationship, they prefer men with faces that show low dominance (98,99). Thus the level of masculine face preference in women was found to be associated with their blood estrogen levels (99). It is also reported that married women (particularly during ovulation) find extremely masculine-faced men more attractive than single women and that in both sexes the level of preference for exaggerated masculine or feminine features in the opposite sex is directly correlated to the intensity of their sexual desire (65,89,100).

The preference of women towards masculine faces is also found to be associated with oxytocin levels. It is reported that when women are administered oxytocin through their noses, their preferences shift towards masculine faces (101). The reason for this is stated to be that oxytocin, as a hormone that "supports

socializing and spousal relationships” covers (makes invisible) the negative personality traits that masculine faces are normally associated with.

The decrease in women’s preference for masculine facial features, when they are in search of long-term partners is a consistent finding. This is said to be due to the fact that extreme masculinity has a disadvantage in long-term relationships (in other words, parenthood). Extremely masculine characteristics are associated with certain negative attributes such as aggressiveness, controlling and forceful behavior. It has been shown that women perceive men with increased masculine features in their faces as being more dominant, more aloof, less emotional, less honest, less cooperative and being worse parents (88). Indeed, some findings demonstrate that men’s parenting quality decreases with increasing masculinity. For example, men who have more masculine attributes are reported to be less loyal to their families and spouses, taking less time to care for their children (18). Similarly, observations such as men with high levels of testosterone being less likely to be married, with a higher rate of divorce, and if married spending less time with their partners and children are supporting this suggestion (102-104).

In conclusion, it can be said that from a female perspective, there are both advantages (good genes) and disadvantages (bad parenthood) of being “very male” of a man. Thus, some authors suggest that women are solving this dilemma (masculine and dominant or feminine and soft, good spouse and parent) by choosing a spouse whose face combines both attributes, reflecting “multiple instincts”(98). In other words, the facial selection in women is based on a balance between good genes and a desire for a cooperative spouse. Therefore, masculine male faces will be found attractive under certain circumstances such as when the women are in certain periods. The evolutionary explanation of this balancing strategy can be done in the following way: From the perspective of evolution, it is appropriate for the woman to select a mate who has the potential to be a “good father” in the long run; however, if during her fertile period she is to

encounter a male with better genes, i.e. someone more masculine than her spouse, she will engage in a sexual escapade (105).

4. Facial Beauty: Smooth Skin

As well as skin color distribution and its homogeneity affect the attractiveness perception of the face, they also give us information about the person’s age and healthiness (106-108). A smooth face and homogeneous skin color increase female beauty in particular. In women, a skin that is free of lesions, acne, tumors, and facial hair, in short, good skin, is a feature that is universally desired by men (106).

One of the most important reasons for smooth skin increasing attractiveness is that it gives the individual a “youthful” appearance (109). Decreasing homogeneity in facial skin coloration in both sexes leads to the perception of being older, less healthy, and less attractive (10). An important reason for the use of cosmetics in women is to appear to have spotless, flawless skin and an overall young and healthy appearance (90).

Smooth skin in a woman, in addition to being an indicator of youth, may also carry the messages of healthiness and productiveness. For example, illnesses that destroy the homogeneity of the skin such as acne and hirsutism may point to a hormonal abnormality (109,111). In women, a smooth skin tone may give information about the power of her fertility, because smooth skin is found to be associated with low levels of androgen and high levels of estrogen (112). Another message which smooth appearance of the skin may relay is that the person has a good immune system, because it is known that the skin of persons with a weak immune systems has a high chance of being attacked by micro- and macroparasites (112).

Another factor that is associated with an increased attractiveness and healthy appearance is a rosy color of the cheeks. In both sexes, rosy cheeks point to adequate oxygenation and thus good health (108,113). In addition, a high level of gonadal hormones in women is known to increase the vascularity of the skin and

thus the redness of the cheeks (114). Some associate the beautifying effect that small doses of alcohol has on a person to this as well. Studies show that the face of a person who has consumed a small dosage of alcohol (such as 250 cc of wine) is evaluated as being more attractive by members of the opposite sex (115).

Contrasting colors on facial skin are also known to increase the attractiveness of women. Contrasting colors on the skin normally occur more in women than men and thus are found attractive by men. Increased contrast in the face (an increased color difference between the skin and organs such as the lips and eyes) increases the attractiveness of a woman while decreases the attractiveness of a man (116), because the skin color of women is on average lighter than that of men and this is what is preferred (109). It has been demonstrated in many cultures that men prefer women who have skin colors that are lighter than the average (117,118). The two most important substances that generate the color of the skin are melanin and hemoglobin, and both are found in smaller quantities in women. In sum, the fact that the woman has more contrast in her face is found attractive by men because it is an attribute that demonstrates sexual dimorphism (being a feminine attribute) (109).

Another finding related to this topic is that red lips increase the attractiveness of a woman in almost every culture (119). As most likely reasons for this has been asserted that red lips are considered an imitation of the vasodilation that takes place during sexual arousal, pointing to blood with high levels of oxygen and thus good health, and to high estrogen levels (119).

5. Facial Beauty: Youthful Appearance

Even though youthful-appearing faces are found more attractive compared to older-looking faces in both sexes, it is known that a young appearance of women is more important for men (107,120,121). In many cultures, men prefer women who are younger than them while women prefer men who are slightly older as partners (120). From an evolutionary perspective, this is expected, because youth means strength and health, and furthermore, a person who is young has more time

to have children and be a parent. Because the period of fertility in women is shorter, the advantages of being young are more evident. In other words, due to the effects of aging on fertility and health the decrease in mate value is more evident in women (122).

In men, given that aging goes along with an increase in status and material resources, the effects of decreasing attractiveness due to age are not as evident as in women (121). In other words, the decreased attractiveness of the male face after middle age is partially redeemed by status and resource-related increases, because the wealth and status value of men is important for women with regard to raising children and giving them a good upbringing. Supportingly, it is found that attractiveness evaluation of post-menopausal women is lower than their male counterparts' who are in the same age range (121).

6. Facial Beauty: Eyes

The eyes are the body part that reveals most about a person's intention. Generally speaking, people evaluate faces that look directly at them as being "well intentioned" or "more attractive" (123). Deep and big eyes stand out as a factor that increases attractiveness, particularly in women. It is reported that among the sexually dimorphic attributes of the face, the most important area is that surrounding the eyes (124). One study found that even children younger than five years of age look longer at faces that have big eyes (125).

Furthermore, it has been demonstrated that men find women on photos where their pupils have been made larger than normal (without the men noticing) more attractive and feminine (126). As a reason for this, it has been proposed that dilated pupils are a sign of sexual arousal in women, which men may realize through the unconscious-automatic portion of their minds.

Additionally, a pronounced medial canthus of the eyes makes them appear to be tilted inward and slanted downward, increasing attractiveness particularly in women (124). This is because inward- and downward-tilted eyes are a prominent feature in babies, also demonstrating sexual dimorphism (more pronounced in women). Thus, women with

pronounced medial canthus are considered more attractive by men because they create the illusion that their eyes are slanted inwardly-downwardly (124).

7. Facial Beauty: Facial Expression of Feelings

One of the most important elements that affect the attractiveness of the face is the “expression of emotions” (25). Generally, the abundant use of facial movements (facial mimics) when expressing feelings is found more attractive by men (127). The finding that woman who are not in a romantic relationship use more facial expressions when engaging with men compared to women who are may be revealing that they too are aware of the attractiveness of using facial mimics (128). An increase in facial expression during ovulation also confirms this idea (127).

The smile, which indicates happiness, holds an important place in the relationship between attractiveness and the expression of feelings. When individuals were shown pictures of humans, a smiling face was found more attractive than a neutral face in both sexes (25,129,130). Furthermore, there is a positive correlation between attractiveness score and the width and intensity of the smile (94). Pictures of smiling and attractive faces are reported to cause a higher activity increase in the brain reward system and the medial prefrontal cortex (mPFC) (130). It is held that the attractiveness-increasing phenomenon of the smile is more valid in women than men (131).

Brain Activity of a Person Looking at a Beautiful Face

In brain activity studies conducted with fMRI, it was found that when humans are shown the picture of an attractive face from the opposite sex, the brain – in comparison to looking at faces that are not attractive – shows an increase in activity in the regions of OFC, mPFC, nucleus accumbens, and anterior and posterior cingulate regions (33,130,132-135). These areas are generally associated with the brain’s reward system and thus it is believed that looking at the attractive face of the opposite sex has a rewarding effect on a person. It is asserted that

the mOFC in particular is the part of the human brain that determines and appreciates beauty in all modalities (136). As the attractiveness of the face being viewed increases, OFC activity increases in a linear fashion (132). When male participants were shown beautiful female and male faces, those of both sexes were correctly evaluated as attractive; however, probands only showed increased activity in the right orbitofrontal and bilateral nucleus accumbens when looking at pictures of women (133,137). In summary, it can be asserted that the OFC in particular is the area automatically evaluating whether a face is beautiful or not, and thus it is likely the essential area for choosing a potential partner (133).

Bodily Features that are Found Attractive

When people are evaluating whether the opposite sex is attractive or not, they reach a decision after processing information coming from many different sources. Thus, in addition to the face, the shape of the body, physical attributes and movements, too, are important in determining attractiveness and thus the quality of a potential mate (138).

As variables that are important in determining whether a body is beautiful or attractive, its symmetry, height, weight, in women the waist-to-hip ratio, the size of breasts, and the hips, and in men broad shoulders can be considered relevant. It can be argued that all of these physical attributes may increase a person’s attractiveness because they are related to being healthy or more reproductive.

1. Bodily Beauty: Symmetry

Symmetry is an important element in bodily shape and beauty, just as it is for the face. Humans who have a symmetrical skeletal structure are found more attractive, and those who have a body structure that is symmetrical are reported to have more sexual partners (139). The finding that there is a positive correlation between bodily symmetry and sperm count in ejaculation and the speed of sperm (140) demonstrates that there may be a positive relationship between symmetry and reproductive power in men.

2. Bodily Beauty: Slimness

It is shown that being overweight decreases attractiveness for both sexes. The two most commonly used measures in studies on this topic are Body Mass Index (BMI) and Waist-to-Hip Ratio (WHR). It appears that lower figures for both measures are preferred by males and females alike (141,142).

In the current century, particularly for women the relation between slimness and beauty is increasingly exaggerated; thus the assumption that a slimmer person is found more attractive is gaining force. The media have been pointed out as the most effective institution creating the stereotypical notion that “slim is good” regarding the ideal weight (143,144). We see that today, women who are presented by the media as being ideal tend to be below normal weight (145). A study examining the bodies of 559 playboy beauties from the years 1950-2000 found that over time, ever taller and thinner models were featured on the pages of the magazine (146). Consequently, women who follow fashion magazines have more deeply internalized the idea that “being slim is ideal,” and therefore, they more often suffer from eating disorders (147,148). Some studies have found that women subjects who are exposed to the photographs of slim-bodied women for a short period of time change their own body image and ideal body notions, increasing their dissatisfaction with their own physiques (149,150). It is established that the subject of thinness is deemed more important by women who view themselves as more attractive and beautiful, and thus young girls who have this type of a hang-up regarding beauty are at an increased risk of suffering from anorexia nervosa (151).

Studies indicate that men find women who are found beautiful by other women to be too thin, while in reality finding women who carry slightly more weight to be more beautiful (152). In women, BMI and general degree of health are to a certain extent proportionally related. It is established that a rise in BMI increases fertility and that women with greater weight have more children (153). Extreme thinness or

obesity decrease attractiveness and may directly cause amenorrhea, thus preventing genes from being passed on to the next generation (154). This subject appears to be significantly influenced by cultural perspectives. For example, we know that rural men prefer women that are heavier compared to those chosen by men living in industrialized cities (155).

One of the variables related to slimness is the BMI. Studies indicate that women with a BMI of 20 or thereabout are found more attractive by men (141). Another of the variables in this matter is the WHR. It is reported that there is an inverse relationship between WHR and attractiveness in women (6,156). Women generally have a smaller WHR compared to men, and this difference is preferred by men. A preference for the hour-glass figure is seen in all cultures (157,158). Generally speaking, women with a WHR of 0.7 are found ideal by men (159). When the silhouettes of women are placed before men in a very speedy fashion, men are still able to find women with the ideal waist-to-hip ratio (159). Furthermore, it has been established in studies by fMRI that when men are looking at images of ideal women with a 0.7 WHR, the parts of their brain that deal with perceiving beauty and reward processing, such as the OFC, are more active (160).

The WHR is an indicator of fat storage and is controlled by sex hormones (6). While estrogen triggers fat storage in the hips and thighs, it represses fat storage in the internal organs. Therefore, the female body shape found attractive by men (an hourglass figure: big breasts, low waist/hip ratio) is actually displaying attributes which are the effects of estrogen (161). A low WHR is known to correlate with a high level of reproductive hormones (estrogen), being healthy, and high conception and reproduction levels (162). Furthermore, findings that women who have low levels of WHR experience an earlier menarche, with more regular menstrual and ovular cycles during adulthood, confirm the idea that this attribute is directly related to the sexual competence and health of a women (163,164). In line with these findings, it can be ascertained that there is an adaptive quality to the male preference of a low WHR.

3. Bodily Beauty: Height

Tallness affects the qualities attributed to a person by others in both sexes. Particularly in man, having a tall stature is reported to increase attractiveness (165). Tall men are found to have an advantage in being chosen as a flirt partner (166,167). It appears that being tall affects perceptions other than attractiveness as well. For example, men who are taller are attributed more positive personality traits by women, while tall women are perceived by men as being smarter, wealthier, having more initiative and ambitions (168,169). These perceptions may partly express a reality: Some studies have found a positive correlation between height and professional success and annual income (170). Furthermore, taller men are known to have more children (171).

Behaviors and Attitudes

While masculine behavior in men and feminine behavior in women increase their attractiveness, the reverse decreases their allure to the other sex. It is noted that women are particularly attracted to men who have a high level of self-confidence, but at the same time are compassionate and protective. Furthermore, it is suggested that the way of walking, too, is important for attractiveness: a coordinated and symmetrical gait increases attractiveness. It has been found that women move in a more coordinated and symmetrical fashion when they are in their mid-luteal phase (the period of optimal estrogen levels) compared to their menstrual period (172).

A number of studies indicate that courting or flirting women more frequently engage in behaviors such as head-nodding, leaning forward and towards their potential partner, touching the person before them and themselves, playing with their hair and tossing their hair back (173). Narcissistic behaviors, too, are reported to increase attractiveness, especially as a short-term romantic or sexual partner (174).

In recent years, an increasing number of studies has assessed the attractiveness of individuals who dance. Men who were found attractive by women

while dancing reportedly have a greater level of physical power measured by the strength of their handshake (175). In other words, it can be said that dance movements in particular give information about the physical strength of men and women admire the dancing of strong men.

In one study, facial photographs were shared with participants along with a number of sentences evoking moral judgments (this person is a human rights defender, works as a volunteer nurse in Africa, or a drug-dealer, this person was proven to have stolen their dissertation from someone else, etc.), in order to see if these individuals' moral attitudes influence their "attractiveness" scores (176). This study determined that while in both sexes the perception of attractiveness was influenced by moral evaluations, this effect was more pronounced in women and less so in men. In the end, men were found to place less significance on the moral status of their potential partners in the assessment of their attractiveness. This finding matches the classical evolutionary view that men are less selective in choosing a partner as they have to invest less in the process of gene transmission (176).

Tone of Voice

Voice frequency in men is inversely proportional to their level of testosterone during puberty (177). A deep voice of men is found more attractive by women (178-180). In addition, it is known that a deep voice is considered an indication of dominance in both men and women (181).

The voice of a man may carry clues about the size of his body and his hormonal state. In a study where the voice of male participants was recorded and played to female participants, male voices with a lower frequency were rated as more masculine; and these men were actually taller than the others and their spit testosterone was higher than their counterparts' (182). Thus, it can be asserted that women can recognize the signs of male dominance through hearing their voice alone.

Furthermore, some studies find that men who have a more attractive voice have a higher rate of reproductive success (183). There is a negative

correlation between the frequency of voice (its high pitch) and the body size and shoulder width (179). It has been found that women find men with deep voices more attractive when they are in their fertile period (late follicular phase); it has been found that the level of finding a deep voice attractive and being affected by this voice is positively related to estrogen in the saliva or the level of estrogen metabolites in urine (180,184). In other words, there is an increase in the preference of masculine attributes (face, behavior, etc.) in men as the level of estrogen increases in women during their fertile period (99), and it appears that the preference for a deep voice also increases (180).

Adornments and Attire

The main effect of adornment in animals is to show the gene quality and good health of the owner, consequently conveying to the other sex the message that they are “a superior partner” (185). In animals, the sex that adorns itself more and thus becomes increasingly beautiful in order to be chosen by the female is the male. However, females are seen to be adorned in many animal species as well, a fact that is more related to genes from male ancestors who increasingly adorned themselves in the evolutionary process (shared genetic architecture) (185,186). Because intra-sex competition is less forceful in monogamous animals, both the males and females resemble one another, while male ornamentation is more emphasized in polygamous animals. It is reported that ornamentation in males is an honest indication of quality (the more the ornamentation the better the gene) (185).

In many animal species, males adorn themselves under selection pressure; at the same time, males also have energy to spend on ornamentation as they do not invest in offspring. Because the female is focused on the offspring, she cannot set aside energy for adorning herself; furthermore, after securing pregnancy, she no longer has the need to adorn herself (187). In the species of animals where females are more adorned, it has been found that they invest

less in their children (188). In the end, there appears to be an inverse relationship between investing in offspring and ornamentation in animals.

Contrary to most animal species, in human beings it is the female who adorns herself. The application of makeup by women is an almost universal phenomenon that is known to have existed throughout history (189). Cosmetic products produced for use by women, as well as cosmetic surgery procedures, aim to exaggerate features which are normally found to be beautiful (1). It has been proven over and over again that make-up increases the attractiveness of women (190,191). Moreover, when participants were shown photographs of women with and without make-up, it was the faces with cosmetics that triggered a higher level of activity in the left OFC and the right hippocampus (with made-up faces being perceived as more attractive and found more rewarding) (191).

Some studies in humans have proven that a red background or a red outfit increase the allure of a woman (192). In restaurants, men were found to pay female waitresses wearing a red outfit a more generous tip (193). It has also been found that men will more often perceive a woman dressing red as being more “sexually eager” (194). Interestingly, red creates the same perception of women with other women as well: Other women will evaluate a female in red as having “high sexual receptivity and low sexual fidelity” (195). The same study found that women will exhibit the tendency to protect their partners from “women wearing red” in particular.

It is reported that women’s preference of formal attire in men, such as a suit, over “casual” (sporty) wear may be due to an estimation that a man who wears a suit is “of a higher status” (196).

CONCLUSION

People are perceptive to what is beautiful, and beauty is an important factor in mate selection. While being found beautiful has many psychological advantages such as boosting an individual’s self-confidence and self-satisfaction, it also provides many

social advantages. Even though the perception of beauty differs depending on culture and person, many studies prove that there are common standards of beauty in different cultures. Studies even assert that these common beauty criteria have existed in the human mind since birth: In other words, people may have a tendency to differentiate what is beautiful and what is not based on a biological skill that has been, to a large extent, embedded in their genes. It is observed that traits that are found automatically attractive in the human mind by the opposite sex are of the those relating to fertility, health, youth; in short: gene quality and being a good partner or parent in particular, as human beings subconsciously choose

partners in a way that maximizes their chances of reproduction/gene transfer. Thus, when thinking of the assessment of beauty and the evolutionary advantages of choosing the right partner, it becomes better understood why the perception of beauty has developed as a strong and automatic action of the human mind and why this subject is given so much importance in virtually every society. Researching the evolutionary and biological foundations of beauty and sexual attractiveness serves a highly insightful and informative function in understanding how the human mind works, in addition to comprehending the strong skills that have developed through the evolutionary process.

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