APORIA MAGAZINE

Beauty as a biological construct

It's not simply in the eye of the beholder.

MAR 20, 2024

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What are we attracted to? The question has long fascinated both researchers and laypeople. One perspective, captured by the saying "beauty is in the eye of the beholder", contends that there is no objective standard of attractiveness. It all depends on who's looking, their unique point of view determined by some intangible mix of personal and cultural factors.

From an evolutionary perspective, this seems odd. An individual's background and experiences unquestioningly play a role. Yet if life is based on the survival and propagation of genes, one would expect there to be some universal markers of beauty – markers related to what matters for reproductive success. Research and experience bear this out.

Signs of immunity and health

Darwin was perplexed by the colorful plumage of the peacock. He couldn't understand how something so extravagant could have evolved. The "aha" moment came in the form of sexual selection theory: the bright feathers serve as signals of genetic quality, indicating health and strength. A huge display shows the male can afford to put on a show. Costs to its own mobility and survival are outweighed by advantage in the intense competition for mates.

Peacock displaying his tail.

As one of nature's creations, we're not exempt from the unforgiving pressure to stand out in the crowd. Like the peacock, we desire to be noticed and liked. And like the peahen observing him, we gauge the characteristics of potential mates. Females tend to be more selective, particularly with respect to short-term mating, as they are the ones who bear the major costs of reproduction. Males work to get them swooning with songs, bright displays and feats of daring. Maverick and Goose performing "You've Lost That Lovin' Feelin'" in the original *Top Gun* movie is an obvious example.

One thing men and women alike look for in both mates and associates is absence of infection and disease.

In an interesting experiment, researchers found that injecting individuals with an inflammatory compound made them less attractive to others. The effect, which has been replicated, was almost immediate: after just 2 hours, photo evaluations yielded lower likability scores. A slightly grim and off-putting look had taken hold of the participants' faces. The researchers theorized that the ability to gauge others' immune activity is an adaptation for dealing with the threat of pathogens.

There is a strong connection between inflammation and melancholy. Depressed people tend to have higher circulating cytokine levels, which contribute to the stereotypical symptoms of malaise: tiredness, discomfort and angst. Isolation and rest, in turn, help the body recover. This link between the immune system and emotional well-being can help explain why we are drawn to happy people. Their faces and body language demonstrate that they are healthy. Not only are they unlikely to carry a lot of pathogens, but some of their beneficial microbes could be transferred to us – for example through kissing.

The importance of immune health shows up in one of the most cited measures of physical beauty: facial symmetry. Asymmetry often results from parasitic infections and developmental instability, which helps explain why we find it unattractive. We prefer symmetrical faces over asymmetrical ones because the former indicate pathogen resistance and good health.

It may seem harsh that we evaluate people like this, but that is the nature of a Darwinian world. And such harshness is tempered by the empowerment we get from having multiple ways to enhance our appearance.

This is clearly true when it comes to our skin. Some flimsy research conducted more than 50 years ago led the dermatology community to the faulty conclusion that diet has nothing to do with acne – that the skin lesions so many teenagers face in the mirror are an inevitable part of growing up. More recent studies have found that acne is virtually absent among horticulturalists and hunter-gatherers. What's more, diet has been strongly implicated in the condition, which has reached endemic proportions in western society.

A high intake of fruits and vegetables (which are rich in antioxidants) and exposure to sunlight (which promotes vitamin D synthesis) both affect skin complexion in a way we find attractive. Again, this plausibly has to do with the role antioxidants and vitamin D play in bodily defenses. The former help counter free radicals – compounds created during metabolism that must be inactivated to avoid cellular damage. The latter plays an important role in the body's immune defenses, partly through the production of the antimicrobial peptide cathelicidin.

Moving from the skin to the mouth, bacteria that grow rapidly in the presence of sugar generate teeth-damaging acids. Gingivitis and tooth decay can result. If one's diet and oral hygiene are poor, the teeth may rot if they are not removed. Caries-causing agents multiplied with the starch and sugar infusions of the agricultural and industrial revolutions. These changes also softened our diets, so that our jaws and dental arches no longer develop optimally.

Just like clear skin, nice teeth – a classic beauty feature – signals good health.

Signs of fecundity and strength

Women with relatively wide hips and round bottoms are not only reported to be healthier; they are also more fertile. Their broad pelvis allows for natural childbirth, and the omega-3 rich fat of the buttocks provides the baby with essential nutrients. It's therefore not surprising that big butts are a thing, or that waist-to-hip ratio predicts women's attractiveness to men. Fat stored around the hips is generally considered desirable in terms of both beauty and vitality, as long as it's not excessive. Fat stored in the stomach area is not.

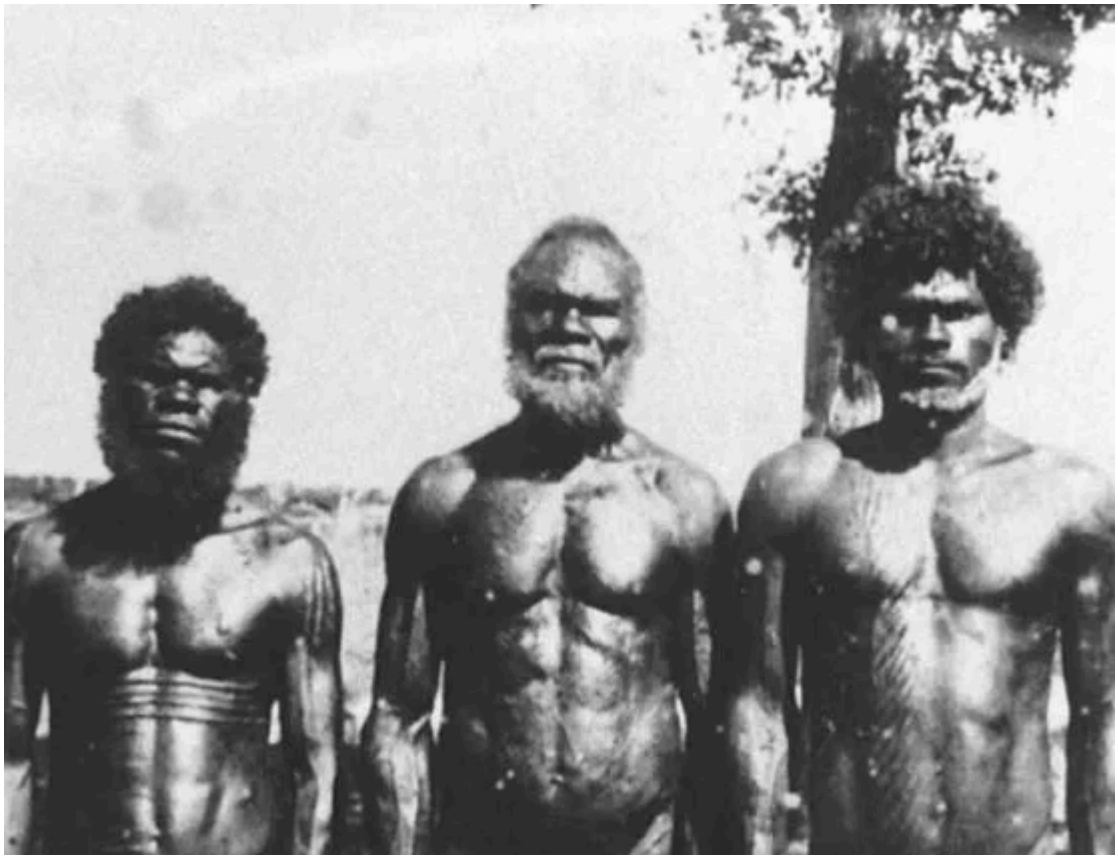
Like the peacock, humans are equipped with secondary sexual characteristics that serve to entice the other sex, such as large breasts in women and rugged beards in men. When it comes to the less fair sex, muscularity and height are particularly valued – not just for show, but for the physical benefits conferred. A formidable man is better able to protect

his mate and may have an easier time acquiring food. Muscle and robusticity signal power and virility.

There is an inverse relation between immune activity and testosterone secretion. During infection and other inflammatory insults, the body directs resources towards the immune system, rather than towards muscle growth or reproduction. If the situation is critical or becomes chronic, the body taps into muscle protein, causing atrophy. Muscle loss is striking in very ill patients, who appear stricken.

In both sexes, excessive body fat is associated with infertility. Menstrual irregularities and miscarriages are more common in obese women, while lower libido and sperm counts have been reported in obese men. This would suggest there is some selection against genes predisposing to fatness – though the picture is complicated by reproductive and contraceptive technology, as well as socioeconomic factors. Individuals with higher socioeconomic status tend to be slimmer and often have fewer children.

Obesity is a novel condition. Venus figurines portraying voluptuous women indicate that some of our remote ancestors may have been quite plump. Yet most of the time, it would have been difficult or impossible for humans to acquire enough food to become overweight. In the absence of modern convenience products, leanness is the norm. This is most clearly seen in hunter-gatherer communities, where body mass index scores are far below those seen in Western countries. The natural state of man resembles that of Bathurst islanders more than overweight westerners.



Bathurst Island men.

In both sexes, gait has been repeatedly documented as a facet of attractiveness. In men, a strong and balanced walking style signals absence of musculoskeletal issues that could impair food acquisition and fighting ability.

Our ability to discern meaningful features in others is so refined that what we pick up on isn't always clearly definable. A powerful example was found in a study of lap dancers. Tracking the cycles and earnings of a group of dancers, researchers found that they made significantly more money in the ovulatory phase of their menstrual cycle. The earnings per 5-hour shift during estrus amounted to $335, compared to $185 during menstruation. The pattern was not observed among dancers using hormonal contraceptives, who had significantly lower total earnings.

This raises the question of whether the pill, which inhibits ovulation, makes women less attractive to men. There is evidence that it alters women's mate preferences. It's conceivable that it also affects how appealing they are to members of the opposite sex. Note that while many studies have reported

ovulatory cycle effects, there are some contradictory findings. The mechanisms also remain to be fully elucidated, but probably involve a combination of olfactory, physical and behavioral cues.

The bottom line

Like all species, we are designed by natural selection to preserve and propagate our genes. By choosing a partner with nice skin, hair and teeth, symmetrical features, good posture and movement patterns, and a lean physique, we are inadvertently selecting for microbial, hormonal, musculoskeletal, nutritional and immunological health. This, in turn, enhances our reproductive success by enriching our life and endowing our offspring with beneficial characteristics.

Physical beauty isn't just something we find pleasing; it's a matter of survival and reproduction.

Eirik Garnås is a Norwegian assistant professor teaching in the area of health and nutrition. He's particularly interested in the evolutionary origins of function and behavior, a subject he has written extensively about in magazines, newspapers, blogs, and science articles.