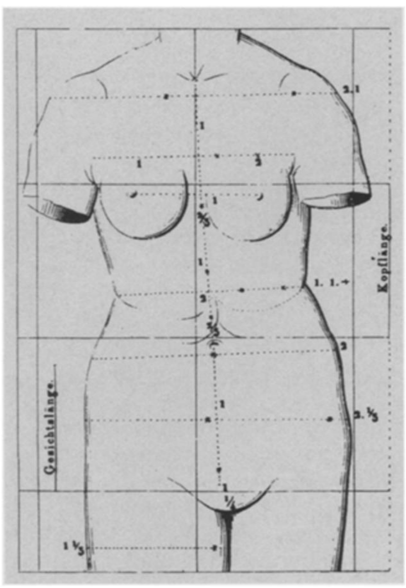
Imperfect Match

Do ideal mates come in symmetrical packages?

By ELIZABETH PENNISI

Second of two articles

The fuss about symmetry's link to human beauty began with the discovery of the Greek statue of Venus de Milo in 1820. The archaeologist who unearthed this famous sculpture wrote a research paper praising the pulchritude of his find. Shortly thereafter, however, a German physician asserted vehemently that this Venus was flawed because of her many distortions.



The dispute flared, prompting physicians throughout Germany to measure their patients. Their efforts made it clear that the human form possesses fluctuating asymmetries — slight, random deviations from true bilateral symmetry (SN: 1/21/95, p.46) — but did little to settle the debate.

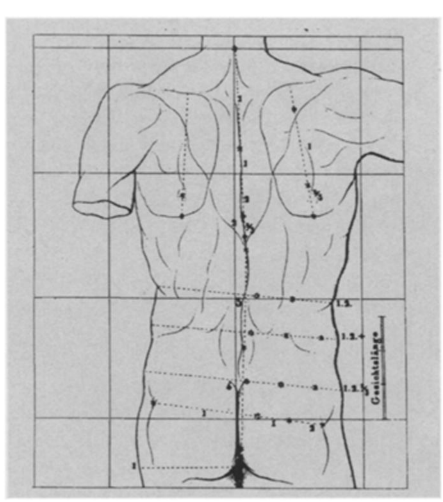
Today, results of genetic and psychological surveys suggest that people, like animals, have evolved a preference for symmetry. That preference could have stemmed from the way the nervous system works (see sidebar). Or it could have arisen because symmetry signals fitness.

What a frightening thought! Already, a pretty face (that is, a largely symmetrical one) tends to elicit more gracious treatment than a homely one. Just imagine the boom in plastic surgery if health insurance companies could classify people as high risks on the basis of lopsided features.

Some previous studies have verified the appeal of faces with average-size or well-proportioned features, while certain other features — a wide jaw in men, for example — make one sex irresistible to the other. Randy Thornhill and Steven W. Gangestad, of the University of New Mexico in Albuquerque, and their colleagues have examined these preferences further.

For men, successful mating parameters, such as number of sexual partners or age of first sexual experience, correlate with low fluctuating asymmetry, Thornhill and Gangestad reported in the September 1994 PSYCHOLOGICAL SCIENCE. In other work, they found that symmetrical female faces generated as composites of individual photographs by a computer generally appeared more attractive and sexier to men than actual faces of individual women. In contrast, individual male faces seemed sexier, healthier, more dominant, and more attractive to women than composite faces. Symmetrical men are more attractive and tend to have a larger number of sexual partners and extramarital affairs than asymmetrical men, Thornhill adds. They flirt more frequently and generally invest less time in their primary relationships. In many ways, they are a lot like desirable male birds or scorpion flies, says Thornhill.

Gangestad, Thornhill, and New Mexico colleague Randall Comer then examined female orgasm. Scientists have long speculated that female orgasm evolved because it serves a purpose in mating. It may help bond a couple, for example. Or it may help a woman "choose" whose sperm will most likely result in conception.



The New Mexico researchers think that simultaneous female-male orgasm aids the sperm's journey to the egg. Thus, if symmetrical men truly have a mating advantage, as earlier studies suggest, then their sexual partners should be more likely to reach orgasm in synchrony with them than with other men. Otherwise there would be little benefit for those men in flirting more or having more sexual partners.

A survey of 86 University of New Mexico couples bears that prediction out. Symmetrical men not only have an easier time finding willing partners, they are also more likely to have partners whose orgasms occur in synchrony with their own, Thornhill reports.

He and his colleagues have begun to delve more deeply into perceptions stimulated by symmetry. They are asking male and female romantic partners about each other's vigor, muscularity, and coordination — all traits that early in human history would aid survival, Thornhill explains. Their analysis to date indicates that both men and their partners rate the symmetrical man high in those traits. The analysis for women is not finished.

This research, like most studies of symmetry, spurs dissent. An individual's fluctuating asymmetry can be fairly challenging to assess, cautions John T. Manning, who studies the phenomenon at the University of Liverpool in England. Researchers use multiple raters to ensure reliable results, but they still must deal with slight inconsistencies. Also, because most individuals randomly exhibit symmetry for one trait but not another, the determination of one's overall asymmetry requires the assessment of at least 10 characteristics.

What's more, "it's very difficult to find a good measure of asymmetry that the environment since birth hasn't modified," says Therese A. Markow of Arizona State University in Tempe. So Markow depends on fingerprint data in her work. Those ridges and whorls appear during gestation and stay the same for the rest of an individual's life. Therefore, the difference between right and left hands truly reflects stresses incurred in the womb, she notes.

Markow began seeking good markers for fluctuating asymmetry in people after she demonstrated links between low asymmetry and fitness or mating preferences in some fruit flies. She decided to investigate whether asymmetry could help her make sense of the unusual patterns of inheritance in conditions, such as schizophrenia, that have complicated genetic bases. Her results indicate that people with schizophrenia indeed have high degrees of fluctuating asymmetry in their fingerprints. Their unaffected relatives display more symmetry but not as much as unrelated healthy individuals.

Markow and other researchers believe that variation in the severity of some diseases with complex genetic bases may hinge on the diversity of an individual's genetic makeup. Each person possesses two versions of each gene. If the two versions are the same, or homozygous, for too many traits, that individual may be less able to withstand the vagaries of the environment. When homozygosity exceeds some threshold, then disease, including schizophrenia, may result, she and others think.

This idea also intrigues Gregory Livshits, a population geneticist at Tel Aviv University in Israel. A decade ago, he assessed the symmetry of 250 preterm and 150 full-term babies. The babies born early tended to be more asymmetrical. Moreover, the more asymmetrical the infant, the greater the likelihood of inborn heart or circulatory problems. Livshits suspects that those babies were more homozygous and consequently less able to cope with the developmental stresses that led to their early births.

Now, he is taking X rays of adults' hands and assessing both the density and symmetry of the bones. He wants to know whether fluctuating asymmetry can predict an individual's risk of developing osteoporosis, a condition in which bones become brittle, sometimes to the point of fracturing. Could osteoporosis result from excess homozygosity? he wonders.

Livshits readily admits that no one has pinned down a consistent tie between health and symmetry. Sometimes the tie seems real; other times it does not.

Indeed, some worry that a few proponents of this idea are pushing its significance too far. "I think there are some people who would see [fluctuating asymmetry] in a glass of milk," says Markow. "It has the potential to explain a lot of things, and people are jumping on a bandwagon.

"But I would be really careful. It's not a general rule, and I don't think we're close to understanding why we see it when we see it." □

Symmetry's significance: Much ado about nothing?

If symmetry signals a suitable sexual partner, then why do people often find symmetry attractive in nonhuman objects, plants, and organisms?

This question nagged Magnus Enquist, an animal behaviorist from the University of Stockholm in Sweden, for years. Then in 1992, he and Anthony Arak of Archway Engineering in Elland, England, started using computers to test ideas about the evolution of various mate-attracting traits in animals. He first demonstrated that a female's preference for flashy males evolves more from a need to recognize mates of the right species than from a desire to identify the fittest mating partner (SN: 2/6/93, p.84). Likewise, symmetry arises not because it signals strengths, but because it facilitates recognition, the two report in the Nov. 10, 1994 Nature.

As in their earlier work, Enquist and Arak used neural networks, computer models that mimic the information processing done by groups of nerve cells, to stand in for a female bird's visual system. Patterns of colored squares acted as surrogates for the male's sexually attractive trait. Initially, the patterns were not symmetrical.

Like cells in the retina of the eye, the network's 147 light-sensitive units "see" the patterns and relay information to processing units. The 15 processing units then send messages to a single output device. The strength of that device's signal indicates the degree of recognition.

Each time around, the researchers presented two patterns to the neural network, retaining that which stimulated it most strongly. They also selected the network connections best suited to this recognition. After 500 such cycles, involving 100 changes in the connections and in the pattern, both the network and the pattern stabilized. The pattern had evolved into a brightly colored one with rotational symmetry, which means it looked the same from any direction.

In a different test, the two scientists presented patterns in different places but in the same orientation. The network evolved its bias for symmetry much more quickly, but the pattern needed only to be bilaterally symmetrical. "[The symmetry] depends on what orientation the receiver normally approaches the signal [from]," Enquist says.

Symmetry evolved because it aids recognition, not mate choice, they conclude. "It's an explanation of why symmetry can appear in the first place," Enquist adds.

At the University of Cambridge in England, Rufus A. Johnstone performed a similar simulation. This one examined what happens when symmetry exists but goes slightly awry. He trained his neural networks using sets of five bilaterally symmetrical tail patterns. In each set, he modified some patterns to show varying amounts of lopsidedness. In one set, all five "tails" ended up asymmetrical. After the networks learned to recognize the tails, Johnstone examined the networks' preferences. Both those that had seen the symmetrical tail and those that had not selected the symmetrical pattern over all others more often, he reports in the Nov. 10, 1994 Nature.

When he varied the lengths as well as the symmetry of the tails, the networks evolved a preference for longer — but not too long — tails, as well as for symmetrical ones. The network could care less about the fitness of the tail's owner, had there been one. Rather, because all the patterns were somewhat symmetrical, the truly symmetrical one looked most like each of the others and elicited the strongest recognition, Johnstone explains.

Nonetheless, he thinks symmetry may also persist because it signals an organism's well-being. "You need the sensory biases to get [a signal] going, but you need it to also tell information about quality to maintain [a bias]," Johnstone explains. "[The bias] turns out to be a good idea. That's why it lasts."

— E. Pennisi