CHAPTER 7.

TRUTH IN ADVERTISING, The Evolution of Body Signals.

Section 1.

Two friends of mine, a husband and wife whom I shall rename Art and Judy Smith to preserve anonymity, had gone through a difficult time in their marriage. After both had a series of extramarital affairs, they had separated. Recently, they had come back together, in part because the separation had been hard on their children. Now Art and Judy were working to repair their damaged relationship, and both had promised not to resume their infidelities, but the legacy of suspicion and bitterness remained.

It was in that frame of mind that Art phoned home one morning while he was out of town on a business trip of a few days. A man's deep voice answered the phone. Art's throat choked instantly as his mind groped for an explanation. (Did I dial the wrong number? What is a man doing there?) Not knowing what to say, Art blurted out, "Is Mrs. Smith there?" The man answered matter-of-factly, "She's upstairs in the bedroom, getting dressed."

In a flash, rage swept over Art. He screamed inwardly to himself, "She's back to her affairs! Now she's having some bastard stay overnight in my bed! He even answers the phone!" Art had rapid visions of rushing home, killing his wife's lover, and smashing Judy's head into the wall. Still hardly able to believe his ears, he stammered into the telephone, "Who ... is ... this?"

The voice at the other end cracked, rose from the baritone range to a soprano, and answered, "Daddy, don't you recognize me?" It was Art and Judy's fourteen-year-old son, whose voice was changing. Art gasped again, in a mixture of relief, hysterical laughter, and sobbing.

Art's account of that phone call drove home for me how even we humans, the only rational animal species, are still held in the irrational thrall of animal-like behavioral programs. A mere one-octave change in the pitch of a voice uttering half a dozen banal syllables caused the image conjured up by the speaker to flip from threatening rival to unthreatening child, and Art's mood to flip from murderous rage to paternal love. Other equally trivial cues spell the difference between our images of young and old, ugly and attractive, intimidating and weak. Art's story illustrates the power of what zoologists term a signal: a cue that can be recognized very quickly and that may be insignificant in itself, but which has come to denote a significant and complex set of biological attributes, such as sex, age, aggression, or relationship. Signals are essential to animal communication—that is, the process by which one animal alters the probability of another animal behaving in a way that may be adaptive to one or both individuals. Small signals, which in themselves require little energy (such as uttering a few syllables at a low pitch), may release behaviors that require a lot of energy (such as risking one's life in an attempt to kill another individual).

Signals of humans and other animals have evolved through natural selection. For example, consider two individual animals of the same species, differing slightly in size and strength, facing each other over some resource that would benefit either individual. It would be advantageous to both individuals to exchange signals that accurately indicate their relative strength, and hence the likely outcome of a fight. By avoiding a fight, the weaker individual is spared the likelihood of injury or death, while the stronger individual saves energy and risk.

How do animal signals evolve? What do they actually convey? That is, are they wholly arbitrary, or do they possess any deeper meaning? What serves to ensure reliability and to minimize cheating? We shall now explore these questions about the body signals of humans, especially our signals related to sex. However, it is useful to begin with an overview of signals in other animal species, for which we can gain clearer insights through doing controlled experiments impossible to do on humans. As we shall see, zoologists have been able to gain insights into animal signals by means of standardized surgical modifications of animals' bodies. Some humans do ask plastic surgeons to modify their bodies, but the result does not constitute a well-controlled experiment.

Animals signal each other through many channels of communication. Among the most familiar to us are auditory signals, such as the territorial songs by which birds attract mates and announce possession to rivals, or the alarm calls by which birds warn each other of dangerous predators in the vicinity. Equally familiar to us are behavioral signals: dog lovers know that a dog with its ears, tail, and hair on the neck raised is aggressive, but a dog with its ears and tail lowered and neck hair flat is submissive or conciliatory. Olfactory signals are used by many mammals to mark a territory (as when a dog marks a fire hydrant with the odors in its urine) and by ants to mark a trail to a food source. Still other modalities, such as the electrical signals exchanged by electric fishes, are unfamiliar and imperceptible to us.

While these signals that I have just mentioned can be rapidly turned on and off, other signals are wired either permanently or for extended times into an animal's anatomy to convey various types of messages. An animal's sex is indicated by the male/female differences in plumage of many bird species or by the differences in head shape between male and female gorillas or orangutans. As discussed in chapter 4, females of many primate species advertise their time of ovulation by swollen, brightly colored skin on the buttocks or around the vagina. Sexually immature juveniles of most bird species differ in plumage from adults; sexually mature male gorillas acquire a saddle of silvery hairs on the back. Age is signaled more finely in Herring Gulls, which have distinct plumages as juveniles and at one, two, three, and four or more years of age.

Animal signals can be studied experimentally by creating a modified animal or dummy with altered signals. For instance, among individuals of the same sex, appeal to the opposite sex may depend on specific parts of the body, as is well known for humans. In an experiment demonstrating this point, the tails of male Long-Tailed Widowbirds, an African species in which the male's sixteen-inch tail was suspected of playing a role in attracting females, were lengthened or shortened. It turns out that a male whose tail is experimentally cut down to six inches attracts few mates, while a male with a tail extended to twenty-six inches by attaching an extra piece with glue attracts extra mates. A newly hatched Herring Gull chick pecks at the red spot on its parent's lower bill, thereby inducing the parent to vomit up half-digested stomach contents to feed the chick. Being pecked on the bill stimulates the parent to vomit, but seeing a red spot against a pale background on an elongated object stimulates the chick to peck. An artificial bill with a red dot receives four times as many pecks as a bill lacking the dot, while an artificial bill of any other color receives only half as many pecks as a red bill. As a final example, a European bird species called the Great Tit has a black stripe on the breast that serves as a signal of social status. Experiments with radio-controlled, motor-operated tit models placed at bird feeders show that live tits flying into the feeder retreat if and only if the model's stripe is wider than the intruder's stripe.

One has to wonder how on Earth animals evolved so that something seemingly so arbitrary as the length of a tail, the color of a spot on a bill, or the width of a black stripe produces such big behavioral responses. Why should a perfectly good Great Tit retreat from food just because it sees another bird with a slightly wider black stripe? What is it about a wide black stripe that implies intimidating strength? One would think that an otherwise inferior Great Tit with a gene for a wide stripe could thereby gain undeserved social status. Why doesn't such cheating become rampant and destroy the meaning of the signal?

These questions are still unresolved and much debated by zoologists, in part because the answers vary for different signals and different animal species. Let's consider these questions for body sexual signals—that is, structures on the body of one sex but not the opposite sex of the same species, and that are used as a signal to attract potential mates of the opposite sex or to impress rivals of the same sex. Three competing theories attempt to account for such sexual signals.

The first theory, put forward by the British geneticist Sir Ronald Fisher, is termed Fisher's runaway selection model. Human females, and females of all other animal species, face the dilemma of selecting a male with which to mate, preferably one bearing good genes that will be passed on to the female's offspring. That's a difficult task because, as every woman knows all too well, females have no direct way to assess the quality of a male's genes. Suppose that a female somehow became genetically programmed to bo sexually attracted to males bearing a certain structure that gives the males some slight advantage at surviving compared to other males. Those males with the preferred structure would thereby gain an additional advantage: they would attract more females as mates and hence transmit their genes to more offspring. Females who preferred males with the structure would also gain an advantage: they would transmit the gene for the structure to their sons, who would in turn be preferred by other females.

A runaway process of selection would then ensue, favoring those males with genes for the structure in an exaggerated size and favoring those females with genes for an exaggerated preference for the structure. From generation to generation the structure would grow in size or conspicuousness until it lost its original slight beneficial effect on survival. For instance, a slightly longer tail might be useful for flying, but a peacock's gigantic tail is surely no use in flying. The evolutionary runaway process would halt only when further exaggeration of the trait would become detrimental for survival.

A second theory, proposed by the Israeli zoologist Amotz Zahavi, notes that many structures functioning as body sexual signals are so big or conspicuous that they must indeed be detrimental to their owner's survival. For instance, a peacock's or widowbird's tail not only doesn't help the bird survive but actually makes life more difficult. Having a heavy, long, broad tail makes it hard to slip through dense vegetation, take flight, keep flying, and thereby escape predators. Many sexual signals, like a bowerbird's golden crest, are big, bright, conspicuous structures that tend to attract a predator's attention. In addition, growing a big tail or crest is costly in that it uses up a lot of an animal's biosynthetic energy. As a result, argues Zahavi, any male that manages to survive despite such a costly handicap is in effect advertising to females that he must have terrific genes in other respects. When a female sees a male with that handicap, she is guaranteed that he is not cheating by carrying the gene for a big tail and being otherwise inferior. He would not have been able to afford to make the structure, and would not still be alive, unless he were truly superior.

One can immediately think of many human behaviors that surely conform to Zahavi's handicap theory of honest signals. While any man can boast to a woman that he is rich and therefore she should go to bed with him in the hopes of enticing him into marriage, he might be lying, Only when she sees him throwing away money on useless expensive jewelry and sports cars can she believe him. Again, some college students make a show of partying on the night before a big examination. In effect, they are saying: "Any jerk can get an A by studying, but I'm so smart that I can get an A despite the handicap of not studying."

The remaining theory of sexual signals, as formulated by the American zoologists Astrid Kodric-Brown and James Brown, is termed "truth in advertising." Like Zahavi and unlike Fisher, the Browns emphasize that costly body structures necessarily represent honest advertisements of quality, because an inferior animal could not afford the cost. In contrast to Zahavi, who views the costly structures as a handicap to survival, the Browns view them as either favoring survival or being closely linked to traits favoring survival. The costly structure is thus a doubly honest ad: only a superior animal can afford its cost, and it makes the animal even more superior.

For instance, the antlers of male deer represent a big investment of calcium, phosphate, and calories, yet they are grown and discarded each year. Only the most well-nourished males—ones that are mature, socially dominant, and free of parasites—can afford that investment. Hence a female deer can regard big antlers as an honest ad for male quality, just as a woman whose boyfriend buys and discards a Porsche sports car each year can believe his claim of being wealthy. But antlers carry a second message not shared with Porsches. Whereas a Porsche does not generate more wealth, big antlers do bring their owner access to the best pastures by enabling him to defeat rival males and fight off predators.

Let us now examine whether any of these three theories, devised to explain the evolution of animal signals, can also explain features of human bodies. But we first need to ask whether our bodies possess any such features requiring explanation. Our first inclination might be to assume that only stupid animals require genetically coded badges, like a red dot here and a black stripe there, in order to figure out each other's age, status, sex, genetic quality, and value as a potential mate. We, in contrast, have much bigger brains and far more reasoning ability than any other animal. Moreover, we are uniquely capable of speech and can thereby store and transmit far more detailed information than any other animal can. What need have we of red dots and black stripes when we routinely and accurately determine the age and status of other humans just by talking to them? What animal can tell another animal that it is twenty-seven years old, receives an annual salary of $125,000, and is second assistant vice president at the country's third largest bank? In selecting our mates and sex partners, don't we go through a dating phase that is in effect a long series of tests by which we accurately assess a prospective partner's parenting skills, relationship skills, and genes?

The answer is simple: nonsense! We too rely on signals as arbitrary as a widowbird's tail and a bowerbird's crest. Our signals include faces, smells, hair color, men's beards, and women's breasts. What makes those structures less ludicrous than a long tail as grounds for selecting a spouse— the most important person in our adult life, our economic and social partner, and the coparent of our children? If we think that we have a signaling system immune to cheating, why do so many people resort to makeup, hair dyes, and breast augmentation? As for our supposedly wise and care-ful selection process, all of us know that when we walk into a room full of unfamiliar people, we quickly sense who attracts us physically and who doesn't. That quick sense is based on "sex appeal," which just means the sum of the body signals to which we respond, largely unconsciously. Our divorce rate, now around 50 percent in the United States, shows that we ourselves acknowledge the failure of half of our efforts to select mates. Albatrosses and many other pair-bonded animal species have much lower "divorce" rates. So much for our wisdom and their stupidity!

In fact, like other animal species, we have evolved many body traits that signal age, sex, reproductive status, and individual quality, as well as programmed responses to those and other traits. Attainment of reproductive maturity is signaled in both human sexes by the growth of pubic and auxiliary hair. In human males it is further signaled by the growth of a beard and body hair and by a drop in the pitch of the voice. The episode with which I began this chapter illustrates that our responses to those signals can be as specific and dramatic as a gull chick's response to the red spot on its parent's bill. Human females additionally signal reproductive maturity by expansion of the breasts. Later in life, we signal our waning fertility and (in traditional societies) attainment of wise elder status by the whitening of our hair. We tend to respond to the sight of body muscles (in appropriate amounts and places) as a signal of male physical condition, and to the sight of body fat (also in appropriate amounts and places) as a signal of female physical condition. As for the body signals by which we select our mates and sex partners, they include all those same signals of reproductive maturity and physical condition, with variation among human populations in the signals that one sex possesses and that the other sex prefers. For instance, men vary around the world in the luxuriance of their beard and body hair, while women vary geographically in the size and shape of their breasts and nipples and in their nipple color. All of these structures serve us humans as signals analogous to the red dots and black stripes of birds. In addition, just as women's breasts simultaneously perform a physiological function and serve as a signal, I shall consider later in this chapter whether the same might be true for men's penises.