

# Biological Motives: Sex and Aggression

Drinking in land-dwelling animals, and feeding in all animals, are basic necessities if individuals are to survive. But reproduction is just as basic a necessity if the *species* is to stay around. And in some species, the same may be true of aggressive behavior, partly because it is closely linked with reproduction.

That is one reason we consider these two motives together in this chapter. Another is that they bear some resemblances to each other, and to hunger and thirst. But there also are some important differences.

First, the similarities: Like hunger and thirst, sex and aggression are affected by both internal and external factors. And internal and external factors interact: Internal state affects how the environment is reacted to, and environmental inputs affect the body's internal state.

Now, some differences: First, sex and aggression are *not* homeostatic motives. No internal commodity is *regulated* by sexual or aggressive behavior, and there is no threat to the animal's physical well-being if they do not occur. As a result, both are more variable and more sensitive to external circumstances than feeding and drinking are. Second, an animal may eat or drink all by itself, but sex or aggression takes two. Thus we must consider the interactions between *two* behaving organisms, and the factors influencing each.

Third, especially in humans, the role of *learning* adds formidable complexities to whatever biological mechanisms there may be. In fact, the culture in which one is raised has such profound effects on human sexuality, and human aggressiveness, that some scientists wonder whether they

are still controlled by biological mechanisms at all. In discussing human feeding, we referred only briefly to the role of culture. But with sex and aggression, we must look at it carefully. The old argument about inherited and learned mechanisms—the nature-nurture issue—has had these two motives as its principal battleground.

Therefore, let us begin by looking at the research that has given that ancient issue its modern form.

### **INSTINCT RE-EXAMINED: THE IMPACT OF ETHOLOGY**

Behaviorist researchers emphasized the study of behavior under controlled laboratory conditions. And the study of *learning* was a major part of their research program. However, while that movement was gaining ground in psychology, biologists and naturalists continued to investigate behavior in its natural setting. Watching what animals did in the world in which they made their living, scientists identified the patterns of action that characterized the members of a species, and the patterns of stimulation that triggered these actions.

These scientists, and the modern investigators who use their methods, are called **ethologists**. The findings of ethologists were brought to the attention of psychologists with the publication in 1951 of *The Study of Instinct*, by Niko Tinbergen.<sup>1</sup> The book aroused furious debate, for it challenged directly the dominant behaviorist view.

Behaviorists had thrown the concept of *instinct* out the window. This was partly because it had been abused (the thumb-twiddling instinct, the thumb-not-twiddling instinct; see p. 39); partly because *instinct* seemed to suggest a mystical, ghostly force, for which science had no place; and partly because it was believed that *learning* could account for all the complexity of behavior. Not so, said the ethologists. Behavior has complexities that are not put there by the environment—complexities that are *not learned*. William James had said the same thing, but he had only *argued* for that conclusion. The ethologists were *showing* it, by direct observation and experiment.

### **A CASE STUDY: SEX, AGGRESSION, AND THE STICKLEBACK**

An example that was worked out so early and so well as to be a classic of ethological analysis is the reproductive behavior of a river fish, the *three-spined stickleback*.

#### **Reproduction in the Stickleback**

In the spring, the male three-spined stickleback is brought into reproductive condition by hormonal changes. These have physical effects: They

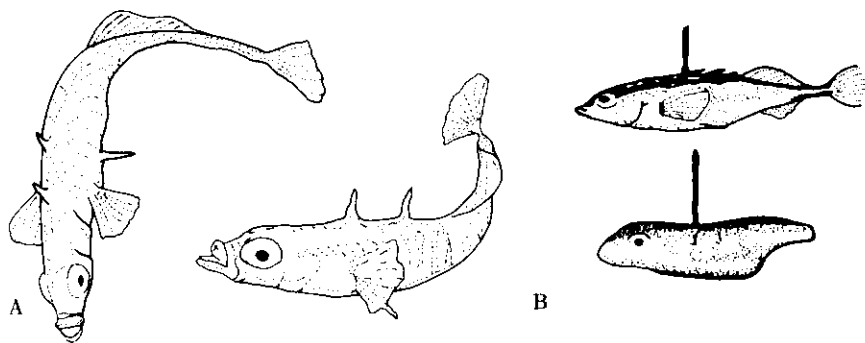
<sup>1</sup>Tinbergen, 1951.

give the male fish a characteristic red-colored underbelly, of which more in a minute. They also affect its behavior. The fish builds a tube-shaped nest, and then patrols the territory around the nest, as if waiting for the arrival of another fish.

What happens then depends on who comes around. If another fish with a red underbelly approaches, the male treats it as a rival male, and attacks. The attack begins with a characteristic *threat display*, an **action pattern** consisting of head-down posture and spread fins (Figure 4-1A). This threat posture is elicited, or released, by the intruder's red underbelly. That is the **releasing stimulus**. Even very crude models, if introduced near the male, will be threatened if their undersides are red—and only then.

If it is a female fish that comes along, then courtship rather than attack is released. Here the action pattern is a peculiar back-and-forth swimming pattern, a zigzag dance. Its releasing stimulus is the swollen underbelly of the female fish heavy with eggs. Crude models with swollen undersides will be courted; good models without it will not be (Figure 4-1B).

The affair is consummated by a meticulously choreographed series of releasing stimuli and action patterns. The male leads the female to his nest. If she follows, he points to the nest entrance with his nose. If she swims into the nest, he nuzzles her posterior, causing her to release her clutch of eggs. He then swims in after her, depositing sperm to fertilize the eggs; fertilization takes place outside the body in this species. Then the male takes over the job of caring for the developing eggs. Experiments with models have shown that every stage of the sequence is an instinctive pattern of responses—an *action pattern*—evoked by certain stimuli provided by the partner's appearance and/or behavior—the *releasing stimuli*.



**Figure 4-1.**

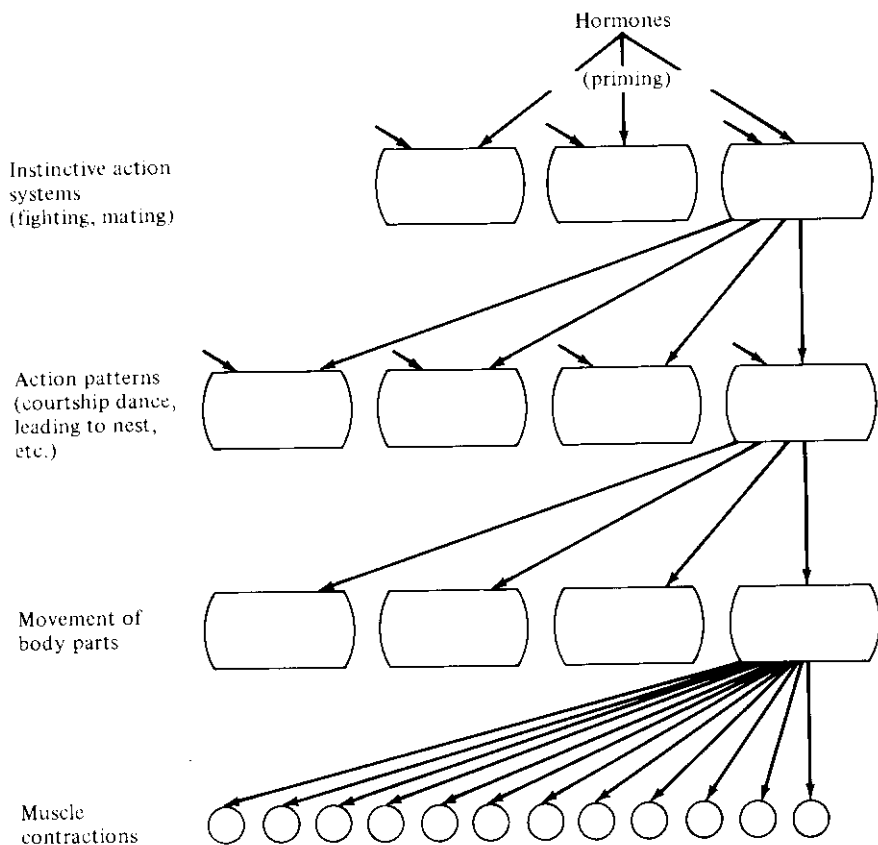
(A) A male stickleback fish (left) threatens his opponent. (B) Two model sticklebacks. The top one, a detailed female model without the swollen underside, does not release courtship in the male. The crude bottom one, with the swollen underside, does. (Both from Tinbergen, 1951.)

## Organization of Instinctive Behavior

In Figure 4-2, we see the structure of a stickleback male's reproductive behavior as Tinbergen described it. Here we find many parallels to what we learned about hunger and thirst in the previous chapter.

### HIERARCHICAL ORGANIZATION

First, there is the hierarchy, with components and sub-components like a military chain of command. A male fish in reproductive condition will fight a rival male, or court a female, or build a nest if he has no nest. But he will do *none of these* if his hormonal state is not appropriate. Therefore, hormones must act at the level of *reproductive motivation* to activate the whole system, with all of its components. Hormones awaken the general, not the foot soldiers directly.



**Figure 4-2.**

The hierarchical organization of reproductive behavior in sticklebacks. Each level, when activated, primes a collection of response patterns at the next level down. External stimuli, shown by the short arrows at the left, release one or more of those patterns.

## RESPONSIVENESS TO STIMULI

Second, the higher levels prime, or facilitate, *responsiveness to stimuli*. Once aroused, the reproduction general activates the officers in charge of fighting, courting, and so on. Each is made ready for action *if a specific releasing stimulus occurs*. The fighting officer is told, "Be ready to fight if you see a red underbelly." The courting officer is told, "Be ready to court if you see a swollen underbelly." When the releasing stimulus is encountered, the officer alerts the sergeants, who order coordinated patterns of movement by the body's parts. Finally, the foot-soldier muscle cells, which actually produce the movements, are ordered into action.

## INSTINCTIVE BEHAVIOR AND MOTIVATIONAL STATES

We see that the stickleback's sex/aggression system has much in common with hunger and thirst. There is the hierarchical organization; the multiple-alternative, multiple-output system; and the priming of specific responses to specific stimuli.

But are these motivational states, like hunger in rats or humans? In the rat, we saw that the feeding hierarchy includes *multiple paths to a goal*—and some of these are arbitrary learned responses, like pressing a lever or running a maze. The rat will make *whatever response is available* to attain its goal—food. The stickleback does have alternative responses—to court, or to mate—but the response is not goal-directed. Rather, it is *stimulus-bound*: It depends on the releasing stimulus that precedes it, not on the goal that follows it. And it is not learned (see below).

To say that a motivational state exists, we must show that the animal will make an arbitrary learned response to attain a goal. This defining characteristic of motivational states—arbitrary goal-directed responses—is absent from the sexual behavior of many species, and for good reason. In many insects, for instance, mating occurs only once in a lifetime. The animal must identify a mate and make all the right movements the first and only time; it has no need and no opportunity to learn anything about it. In such species, mating is stimulus-bound and inflexible; there is no evidence for a motivational state.

The stickleback is an intermediate case. In this species, as in hungry rats, arbitrary responses may be learned, and these may be directed toward a goal rather than triggered by a releasing stimulus.<sup>2</sup> But this flexibility is there during the period *before* the releasing stimulus comes along. For example, a male fish will learn an arbitrary response to obtain access to a female, but then it courts the female in its unlearned, instinctive way. Or it will learn a response that gives it access to a rival male, but then it will threaten the rival in its unlearned, instinctive way.

In sticklebacks, therefore, there are two phases to sexual/aggressive behavior. During the first, arbitrary learned responses can expand the

<sup>2</sup>Sevenster, 1972.

sexual or aggressive repertoire, and therefore we can speak of a state of sexual, or aggressive, motivation. But once the mate or the rival is at hand, behavior funnels down into inflexible, stimulus-bound instinctive reactions.

Actually, feeding and drinking in the rat are organized in a similar way; we just haven't discussed it until now. The various responses the animal can make—approaching, running a maze, pressing a lever—are alternative ways of *getting to* food or water. But once the commodity is there, it releases stimulus-bound, instinctive action patterns: Dry food triggers seizing and chewing, liquid triggers lapping.\* The rat does not have to learn these.<sup>3</sup>

Humans are different. In adults, feeding movements, as well as food-seeking ones, are variable and learned: Some of us eat with forks, others with chopsticks. That species difference has its parallel in sexual behavior, as we will see.

In summary, we can distinguish two classes of behavior. Some are flexible and goal-directed, leading us to speak of *motivational states*. Others are stimulus-bound, depending on the stimuli that precede them rather than on the goals that follow them; and when these are unlearned, we speak of them as *instinctive*. † Various mixtures are possible, however. In some insects, mating appears to be all instinctive, as noted above. In sticklebacks, a motivational state can be shown early in the mating sequence, but the later behavior is instinctive. And in humans, the question is whether anything instinctive remains—a question to which we will return.

## INSTINCT AND LEARNING: THE INNATE AND THE UNTAUGHT

Even in the stickleback, we have seen, learning can play a role in sex and aggression, at least early in the sequence. What impressed ethologists, however, was how much complexity there was in the fish's behavior even without specific learning experiences that might have put it there. Nest building, fighting, and mating happen in an essentially normal way on the fish's first breeding season, even in fish reared in isolation. They are unlearned; in the ethologists' language, they are **innate**.

The word *innate* is an unfortunate one. It seems to imply something forever fixed and unmodifiable, something that must inevitably occur. In

\*One can teach rats to feed and drink with arbitrary responses; for example, by pressing a lever to inject fluid into their stomachs. The experiment is difficult, however, and there are questions about its interpretation (see Epstein, 1960; Teitelbaum, 1966; Holman, 1969).

<sup>3</sup>Hall, 1975.

†This distinction looks backward to Descartes' division between reflex and voluntary behavior (pp. 29–31). And it looks forward to Skinner's distinction between respondent and operant behavior (p. 265).

fact, that is not at all what the ethologists showed. Let us look again at the data.

By the use of models, Tinbergen showed that a red underbelly, all by itself, is enough to release attack behavior in the male stickleback. That is what he meant by calling the red belly a releasing stimulus. That does *not* mean that nothing else affects attack behavior. Other conflicting motives, for instance, might suppress it altogether.

He also showed that the attack response occurred even with no opportunity for learning. That does *not* mean that learning cannot affect it.\* It is entirely possible, for instance, that one might suppress courting in such a fish by punishing courting behavior, though I know of no data on this point.

In short, what terms like *innate* refer to is behavior, or some influence on behavior, that *is not acquired through specific learning experiences*. How modifiable it is, if specific learning experiences *are* brought to bear, is a different question altogether.

Because this confusion crops up so frequently, I offer a modest suggestion here. Let us drop the term *innate* altogether and substitute the term **untaught**. Then we can speak about action that was not taught to the animal by any specific learning experience. But *untaught* doesn't mean *unteachable*, and we are leaving open the possibility that learning might modify the behavior later. I will use the term *untaught*, for that purpose, throughout the rest of this book.

### **A Look Backward: The Concept of Instinct**

Ethologists have offered us concepts that are highly useful in describing animal behavior in the wild. Much of it is instinctive. That is, it consists of action patterns, complex actions that (1) are characteristic of the species, (2) are triggered by certain stimulus inputs, or releasing stimuli, and (3) are untaught; that is, learning did not produce them, though it may modify them later.

The question then arises: How far will these concepts take us in explaining the behavior of more complex creatures? How much of the stickleback do we see in our mammalian cousins—or in ourselves?

### **SEX IN MAMMALS: INTERNAL FACTORS**

The rat, like the stickleback, has a characteristic courtship routine. A male rat's initial reaction to a female is a thorough investigation, with particular attention to the female's genital region. If receptive, the female

\*This takes us back to a point we saw in Chapter 1 (pp. 18–19). It is one thing to show that something is *an* important influence on behavior. That doesn't mean that it is *the* important influence. The red underbelly is *an* important influence on the stickleback's attack, and learning did not make it so. But other influences, including learning, may be just as important or more.

often responds with a swift, darting run for a short distance, then an abrupt halt with wiggling of the ears. If the male does not follow, the female then approaches and investigates the male's genital area, shifting back to the darting run if the male shows interest.

The dart-pursuit-dart sequence is repeated with mounting excitement. Mating itself begins when the male mounts the female from the rear, eliciting the *lordosis reflex*—the female's rump is elevated and the tail is moved to one side, exposing the vaginal opening. Copulation follows.

What produces this sequence of courtship and copulation? As in Chapter 3, we will look at internal and external influences, and then at how they interact.

### Endocrine Glands and Hormones

We have referred to *hormones* several times in this discussion. These are the body's chemical messengers. They are manufactured by the *endocrine glands*, which release hormones into the blood. They are then carried by the blood to all the cells in the body.

The sex hormones produce their effects at a number of places in the body that react to their presence. At puberty, for instance, there is an outpouring of hormones from the male *testes*. These hormones are referred to collectively as *androgens*; among these, the hormone *testosterone* is the most important. The increased androgen level produces, in boys, the growth of facial and body hair; deepening of the voice; and growth of skeletal muscles. In girls, the development of breasts and the widening of hips is caused, and the growth of facial hair is inhibited, by the outpouring of hormones, especially *estrogen*, from the *ovaries*.

And in both sexes, these hormones may act on the brain to promote sexual interest and motivation. In animals at least, it is clear that they do.

### Hormones and Sexual Motivation

We need to consider males and females separately, for the hormonal systems are quite different in the two. We will also need to be careful which species we consider, for there are very great species differences.

#### MALES

In the male rat, sexual behavior slowly declines and finally disappears altogether after castration. Injections of testosterone can restore it. Therefore, in the rat, the presence of the male hormone testosterone is an important condition for sexual motivation. Moreover, when the hormone is present it produces a motivational state. A rat will learn an arbitrary response if rewarded with opportunity to copulate.<sup>4</sup>

In higher species, too, hormones play some role. The following, how-

<sup>4</sup>Kagan, 1955.

ever, is a safe rule of thumb: *As we move to higher animals, even within the mammals, hormones become less important; experience and stimulus factors become more so.*

In men, castration can produce a loss of sexual interest or failure of such interest to develop, especially if it occurs before puberty. On the other hand, sexual motivation—and potency as well—*can* persist for many years, especially in sexually experienced men. In short, absence of the male hormone does not *necessarily* lead to loss of sex drive or sexual behavior in human males; whereas in the rat, it does.

On the other hand, while male hormones are not *necessary* for male sexual motivation, they can enhance it if present. Sexual activity tends to be highest in late adolescence, when testosterone levels are highest. Men with low testosterone levels may have low frequencies of erection and of sexual activity, but testosterone injections increase the frequency of both.<sup>5</sup>

## FEMALES

In female mammals, secretion of hormones is a cyclic process; the ovaries secrete a combination of hormones that changes over time, and repeats itself again and again. In female rats, this *estrous cycle* lasts four to five days; in women, the corresponding *menstrual cycle* lasts about a month.

In female rats and carnivores, sexual behavior is strictly limited to a brief period during the cycle, known as **estrus** or "heat." This is also the period during which impregnation can take place. It is characterized by high levels of certain ovarian hormones, especially the hormone **estrogen**.

If you have ever been owned by a female cat, you have seen the characteristic behaviors that signal the arrival of heat. There is the weird, contralto meow. Stroke the cat's back, and you see the reverse arching of the back that elevates the rump—the lordosis reflex—and the unmistakable treading with the paws. Let a male come around at that time, and we know just what to expect.

In female cats and rats, that state, and sexual behavior too, are totally dependent upon the sex hormones. Remove the ovaries, and sexual behavior and the other signs of heat are totally and permanently abolished. Injection of estrogen can restore them. We can state it much more categorically for sub-primate females than for males: No sex hormones, no sex.\*

And, once again, what the hormones promote is a motivational state, not just responses to releasers. Female rats during estrus, or spayed rats

<sup>5</sup>Davidson, Camargo, and Smith, 1979.

\*Note that we say "sub-primate" rather than "sub-human." Apes and monkeys are an intermediate case, with some females displaying sex behavior when they are not in estrus and even after spaying.

treated with estrogen, will work at an arbitrary response to gain access to a male.<sup>6</sup>

In adult human females, as with males, hormones play a less central role. Unlike female rats or carnivores, human females may mate at any time, not just during the fertile period. Moreover, neither removal of the ovaries, nor menopause when ovarian function ceases, has any dependable effect on sex drive in women. And attempts to correlate sexual activity with the menstrual cycle have led to inconsistent results.\*

Interestingly, however, removal of the adrenal glands, which secrete appreciable amounts of the *male* sex hormones even in females, does depress sexual interest, both in female monkeys and in women.<sup>7</sup> And in both species, treatment with male hormones can restore it. Thus, the "male" sex hormone may play a greater role than "female" hormones in sexual arousal for women.

## SEXUAL BEHAVIOR: STIMULUS FACTORS

We saw in Chapter 3 that external as well as internal influences can trigger ingestion and food-seeking. We also saw that internal factors can exert their effects by priming responses to external stimuli. These phenomena occur in sexual behavior, too. In sticklebacks, courtship reactions to releasing stimuli are primed by sex hormones. The sexual action patterns require appropriate hormonal condition *and* the releasing stimulus.

### Pheromones and Other Sexual Signals

In some mammals, chemical messengers, or **pheromones**—odorous substances released by the animal—are powerful sexual attractants. Male rats or guinea pigs, for instance, are strongly attracted to the smell of the urine of a female in estrus. The urine of a non-estrous female evokes no such interest.<sup>8</sup> Pheromones are also the reason that all the male cats in the neighborhood seem to know when a female cat is in heat. They do know it, and it is pheromones released by the female that tell them.

Furthermore, these smelly signals do not just release action patterns; they can evoke motivational states of the kind we considered earlier. Male rats may press a lever to gain access to a hormone-treated female—but not if they are unable to smell.<sup>9</sup>

In some primates such as chimpanzees, the signal is visual. The tissue around the genitals becomes swollen, and sometimes brightly colored, during the female's fertilizable period (Figure 4-3). This change in appearance, known as *sex skin*, brings a great deal of sexual attention from males in the vicinity.

\*See for example Meyerson and Lindstrom, 1973.

<sup>6</sup>For discussion of the problems in this research see Matteo and Rissman (1984).

<sup>7</sup>Everitt and Herbert, 1975.

<sup>8</sup>Pfaff and Pfaffmann, 1969.

<sup>9</sup>Michael and Keverne, 1968.



**Figure 4-3.**  
Estrus in the female chimpanzee is indicated by swelling of the vaginal lips, or "sex skin."

### Stimulus Arousal in Humans

In the human case, too, external stimuli can evoke signs of sexual arousal. The sight of an attractive person of the opposite sex, or pictures, can elicit penile erection in men, and vaginal lubrication and swelling of the vaginal walls in women. In homosexual men, pictures of same-sex individuals can have similar effects.<sup>10</sup>

It is tempting to think of these persons or pictures as releasing stimuli—or perhaps simply as stimuli that inherently evoke motivational states, as tasty foods do. It is true that physical attractiveness plays a powerful role in how sexually interesting we find a person.<sup>11</sup> On the other hand, conceptions of sexual attractiveness vary a great deal between one group of humans and another, so we must be careful here. In American society, slimness is considered attractive in women, but in many societies it is plump women who are considered attractive. Among the Hottentots of Africa, the condition known as *steatopygia*—enlargement of the buttocks—is considered a mark of great beauty, and the bigger the bottom the

<sup>10</sup>See for example Barlow et al., 1972.

<sup>11</sup>Walster and Walster, 1978.



**Figure 4-4.**

Among the people of the New Guinea highlands, feathers in the nose enhance sexual attractiveness.

better. In certain groups in New Guinea, feathers in the nose are considered sexually provocative dress in males (Figure 4-4).

Thus these characteristics are not releasing stimuli. Our response to them is *not* untaught; we are taught by our society to consider them attractive or arousing.

Because of this diversity, many writers have argued that standards of sexual attractiveness are wholly learned; one is taught them by the culture one grows up in.<sup>12</sup> Other writers are not so sure. Maybe we have been so struck by the differences among cultures that we have neglected the similarities. It has been argued that certain standards of sexual attractiveness *are* universal among humans.<sup>13</sup> One is the set of stimuli correlated with *health*; for example, a clear skin. Another, in women but not in men—and whether we like it or not—is the set of stimuli correlated with *youth*.

Perhaps such stimulus patterns do evoke sexual motivation directly, apart from learning. If so, however, they still don't qualify as releasing

<sup>12</sup>E.g., Mahoney, 1983.

<sup>13</sup>Symons, 1979.

stimuli, for it is another question how such motivation is expressed. In humans, it certainly is not expressed by untaught action patterns (see below).

### Touch and Sexual Arousal

Smells and sights are long-range signals. Especially as behavior progresses from courtship toward mating, close-up stimuli take over. The role of touching and caressing in sexual arousal may be almost too obvious to require comment. And it is tactile stimulation of the genitals during intercourse that builds up excitement in the spinal-cord centers that control the reflex patterns of orgasm and ejaculation.

Once again, however, the matter is not simple. The so-called **erogenous zones**—the genitals, breasts, and lips—are densely supplied with nerve endings, rendering them highly sensitive to touch. But the touch they are sensitive to is apparently just that—touch. There are no special sexual receptors in these places, and no special sexual touch (Figure 4-5).

What makes touches sexual, then? As one writer points out, the lips are erogenous zones all right, but when was the last time you were turned on by eating a slice of pizza?<sup>14</sup> And anyone who has ever fended off an unwanted sexual advance knows that the touching of one's erogenous zones is not *automatically* arousing or even pleasant. The context of the



Figure 4-5.

Even a tickle on the nose can be erotic, from the right person at the right time.

touch has a great deal to do with our response to it: our relations with the toucher, the sexual attitudes and values our society and our upbringing have given us, the external situation, and what we expect will follow. In a word, culture and cognition can powerfully affect our response to sexual stimuli.

### Internal Modulation of Responses to Stimuli

Let us look again at sexual signals, such as pheromones and sex skin, in animals.

#### SEXUAL SIGNALS AND RECEIVER'S STATE

In all such cases, one animal sends out signals to another, and these signals are produced by the sender's hormonal state. However, responsiveness to the signals depends on the *receiver's* hormonal state. A castrated male guinea pig, for example, will show no interest in the smell of a female's urine. Testosterone injections restore that interest. In short, the male's hormones make him responsive to the female's signals.

We notice a complication here that we did not see with feeding—for feeding, unlike sex, does not take two. The sequence of events goes from one partner's endocrine state—the fertile period—to the other partner's behavior. The one partner's endocrine state produces the signals, pheromones or sex skin, that arouse the other's sexual motivation.

This link between one actor's hormones and the other's behavior may be an important way of synchronizing mating behavior with the fertile period, so that it occurs when offspring are most likely. When a female rat comes into estrus and is fertile, she produces urine with its characteristic odor, evoking the male's sexual interest. Thus, if copulation occurs, it will occur right about when it should, to maximize the likelihood of producing little rats with minimal risk and wasted energy.

#### THE RANGE OF EFFECTIVE STIMULI

In discussing ingestion, we saw effects of deprivation and satiation on the responsiveness to stimuli. We saw, for example, that food deprivation can extend the range of objects treated as edible.

In sexual behavior, analogous effects can be seen in some species. If a stickleback fish has been deprived of a mate for some time, very crude models of the female may release the courtship pattern. The same models would be rejected with contempt by the same male if it had recently mated.

In humans, the picture is less clear. The studies of Alfred Kinsey and his colleagues<sup>15</sup> included men who were confined in prison for long periods of time. Some of these men, whose previous orientation was heterosexual, did engage in homosexual activities, suggesting that a less-

<sup>15</sup>Kinsey, Pomeroy, and Martin, 1948.

preferred partner will sometimes be accepted if preferred ones are unavailable. These men were a minority, however. Most heterosexual men simply remained celibate, and reported no particular discomfort as a result of doing so. Kinsey et al. suggest that in the absence of arousing *stimuli*, sexual motivation is simply not often aroused even in deprived humans.\*

However, another effect on the range of effective stimuli does occur over longer time periods. Aging men—men in their fifties or sixties, say—find that sexual fantasies, or the sight of attractive people at a distance, are no longer sufficient to produce erections. More immediate stimulation is required to have this effect. Many men worry needlessly about this, believing it to show the onset of impotence. Actually, it is just a shrinkage of the *range of effective stimuli*: Remote stimulation no longer works, but close-up stimulation does.<sup>16</sup>

This shrinkage probably reflects the gradual decline in sex hormone levels with aging. If so, it fits well with the idea of internal priming of responsiveness to the environment. If there is less priming from within, more powerful stimulation from outside is required (compare p. 91).

#### ALLIESTHESIA

In feeding, we saw some evidence that hunger can make food taste good, whereas satiety can make it taste less good. What about sexual behavior? Does sexual motivation affect the pleasantness or attractiveness of sexual stimuli? Perhaps.

In female rats, stroking of the flanks, even by a human experimenter, can evoke the lordosis reflex—the elevated rump that characterizes the female mating position—if the female is sexually receptive. Lacking the hormones that prime sexual readiness, the female reacts with escape or attack instead, as if touches on the flank were strongly unpleasant. And she may react much more violently to a second approach by a male than to the first one, as if the first one had left a painful memory. Donald Pfaff<sup>17</sup> points out that many things which reduce the painfulness of stimulation also promote lordosis, and conversely. He speculates that sex hormones may shift the effects of touch away from unpleasantness and toward pleasantness.

In human sexual behavior, a kind of alliesthesia seems to affect the *visual* stimuli that people provide. Sexually aroused people, of both sexes, perceive attractive members of the opposite sex as even more attractive. Aroused males in this society see females as having better figures than non-aroused males do. Aroused females see males as having more attractive hips and genitals.<sup>18</sup>

\*This picture is further complicated by the fact that humans can generate their own arousing stimuli; they can *fantasize*. Fantasies too can produce erection and other signs of sexual arousal. The effects of deprivation may depend a great deal on how often one thinks or fantasizes about sexual activity.

<sup>16</sup>Butler and Lewis, 1976.

<sup>17</sup>Pfaff, 1982.

<sup>18</sup>Kaiser and Griffitt, 1981; Stephan, Berscheid, and Walster, 1971.

However, there is a distinct difference between this case and the rat case. In rats, internal factors—hormones—make certain stimuli more positive. In these human studies, it is sexual arousal produced by *external* means—for example, looking at erotic pictures—that does so. There is no evidence, and it is most unlikely, that looking at such material changes anybody's hormone levels. Rather, we have a sequence that goes from stimulus to motivational arousal to stimulus again. External stimuli produce sexual arousal which in turn enhances the response to other external stimulation. In that way, sexual arousal may feed on itself; the initial arousal intensifies further sexual cues, which in turn increase arousal further still.

### Stimulus Effects on Internal Factors

The next topic extends the parallel between sex and feeding. Earlier, we saw that external stimuli can affect internal controlling systems; food can trigger insulin release which in turn leads to hunger. This kind of thing happens in sexual behavior, too, at least in some species. Stimulation can affect the release of hormones that in turn affect subsequent behavior.

#### LOVE IN THE DOVE

An especially clear case occurs in the female ring dove. The courtship process in ring doves normally takes several days. When a male and female have been properly introduced in the laboratory, the male begins to bow to the female repeatedly, making characteristic cooing sounds. After about two days of this, the female is ready for copulation. And it can be shown that this readiness occurs because of a gradual increase in estrogen level in the female.

But this buildup of estrogen occurs as a *response to the sight of the male's behavior*. To show this, a team of experimenters removed the gonads from the *male* dove—not the female.<sup>19</sup> This operation abolishes bowing and cooing in the male.

It also abolished estrogen buildup in the female. A perfectly normal female ring dove, placed with a castrated male, showed no trace of the hormonal changes that would otherwise have occurred in a male's presence. Appropriate controls ruled out sounds and smells as the missing signals; it was the *sight of the male's bow-and-coo display* that was necessary to start the female's estrogen flowing.

What this shows is that it is not enough, for the female, to be in the presence of a male bird. The bird may look like a normal male and feed like a normal male, but if it does not bow and coo like a normal male, the surge of estrogen that primes the female for mating does not occur. Thus this very complex input—the sight of the male's display—acts on the female's brain to effect the release of hormones that in turn control her sexual responsiveness.

<sup>19</sup>Erickson and Lehrman, 1964.

## STIMULUS EFFECTS ON HORMONE SECRETION IN HUMANS

There are similar effects in human women, but their behavioral effects, if any, are unclear. A classic study showed that women who lived together—as dormitory roommates, for example—tended to synchronize their menstrual cycles.<sup>20</sup> Some signal transmitted from woman to woman, probably a pheromone, must have produced this synchrony. More recently, it was found that over a 40-day period, women who simply slept in the same bed with a man were more likely to ovulate than ones who did not. This effect was independent of the frequency of intercourse, suggesting that the mere *presence* of the male was enough to produce the effect.<sup>21</sup> How this works we do not know, but some pheromonal signal is a likely possibility.

These phenomena may be important in preparing the body for fertilization and implantation of the egg. But, to my knowledge, no corresponding effects on sexual *behavior* have been reported. That makes good sense, for women's sexuality, we recall, is not much affected by ovarian hormones anyway.

On the male side, there is the fascinating experience, published anonymously, of a man who worked in isolation for considerable periods of time. On occasion he would return to civilization, with its opportunities for sexual contact; and as the times to do so grew nearer, he found that he had to shave more often! Actual measurement—weighing beard clippings to the nearest milligram—confirmed the fact: As sexual contact grew nearer, his beard grew faster.<sup>22</sup> The rate of beard growth is sensitive to androgen level, suggesting that the mere *prospect* of sex was enough to increase sex hormone secretion.

**Variety: The Coolidge Effect**

We saw earlier how simple *variety* in the diet can keep feeding going when otherwise it would end. Variety can also maintain sexual behavior, and the effect can be very large. In some species, sexual activity may persist much longer if the partner is varied than if the partner stays the same. This is known as the Coolidge Effect.\*

<sup>20</sup>McClintock, 1971.

<sup>21</sup>Veith et al., 1983.

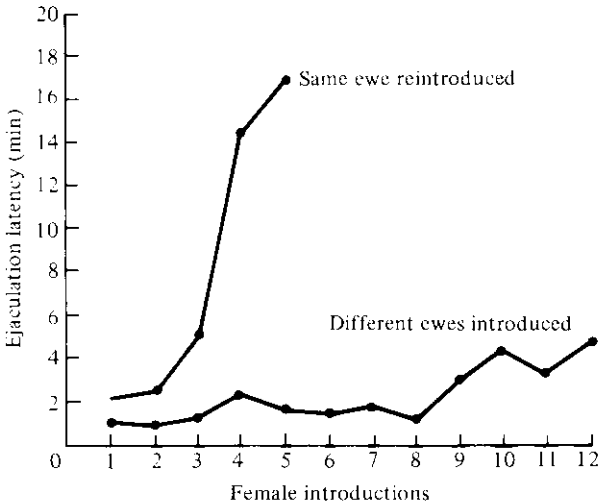
<sup>22</sup>Anonymous, 1970.

\*The name comes from the following story (almost certainly untrue): One day, President Calvin Coolidge and his wife were visiting a chicken farm. The two went separate ways, the President with the farmer and Mrs. Coolidge with the farmer's wife. As Mrs. Coolidge walked past a particularly assertive-looking rooster, she wondered aloud how many times a day roosters copulated. "Dozens of times!" she was told. "Please tell the President that," she said. So the farmer's wife did so. Coolidge listened quietly and then asked, "Same hen every time?" "Oh no, Mr. President; different hen every time." The President nodded and said, "Tell Mrs. Coolidge that."

## EXPERIMENTAL DEMONSTRATIONS

In male rats, one investigator<sup>23</sup> found that sexual exhaustion and cessation of mating required an average of seven ejaculations if the rat was left with the same female throughout. But if the female was changed at every 15-minute mark, an average of thirteen ejaculations—almost twice as many—was required to produce exhaustion. In rams, the effect is even more striking, as shown in Figure 4-6. When the same ewe was offered the male throughout, the ram was slower and slower to resume mating. With a different female every time, the ram mated promptly again and again, until the *experimenters* were exhausted.

There are few if any experiments dealing with the Coolidge Effect in *females*. Actually, it would make good biological sense if the Coolidge Effect were specifically a male phenomenon (see below). The matter needs direct study, however.



**Figure 4-6.**

In rams, ejaculation latency gets longer and longer—that is, the rams take longer and longer to resume and finish mating—if the same ewe is offered every time. With different ewes, the rams mated promptly time after time. (From Bermant, 1976.)

## VARIETY AND HUMAN SEXUALITY

In humans, we have evidence that is mostly anecdotal, and one must remember how easily anecdotes or case studies can be selected to support a point. But consider the complaints of the men in a Pacific island society:

<sup>23</sup>Fisher, 1962.

When colonial authorities took their concubines away, they found it difficult to maintain sexual interest in their wives.<sup>24</sup> That variety may be arousing is also suggested by the frequency with which American adults—of both sexes, by the way—report the use of *fantasy* during intercourse to increase arousal. Very often, the fantasy centers around someone other than the partner—a former lover, or an imaginary one.<sup>25</sup>

#### SOCIOBIOLOGY AND THE COOLIDGE EFFECT

We noted a minute ago that the Coolidge Effect, or a search for variety in sexual partners, might make particularly good sense in males. Let us see why.

Once a female has mated and been impregnated, she cannot be impregnated again for some time—let us say, nine months. Then the total number of offspring she could possibly bear in her lifetime is strictly limited by the number of childbearing years, times 12/9. If her period of childbearing capability is, say, thirty years long, this means that she could have an absolute maximum of forty children.

Now look at it from the male view. If he remains faithful to one mate all her fertile lifetime, then his limit on offspring is the same as hers. He could leave forty children, at the very maximum. But a male, having fertilized one female, can soon be ready to fertilize another. A male *could* father literally thousands of children—but not if he remains monogamous.

Now, suppose that the tendency to seek sexual variety has some genetic basis. That is a big assumption, especially if we try to apply the theory to humans (see below). But there is nothing mysterious or absurd about the possibility. It sounds strange to speak of something like “genes for male philandering,” but it really is not. It would mean something like: “An inherited characteristic of the masculine brain which makes novel sexual partners effective stimuli for courtship and mating, where familiar or just-mated-with sexual partners would not be effective.” That takes a long time to say, so let us speak of a *Coolidge gene complex* or CGC, for short.

And, in at least some species—rams for instance—we know that there is a CGC. No one *taught* those rams to renew their sexual enthusiasm when offered new partners. It must be a characteristic of a system within the ram brain, the development of which was programmed by the genes.

Now, if some species members have a CGC and others do not, then the males who have it will leave more offspring than those who lack it. That is because, by seeking variety, they will fertilize more females. Therefore, the CGC will spread through the population. In Darwinian language, the CGC will be *selected for* because of the advantage in reproductive success—number of descendants—it confers. For females, this is not true. A female, in our example, can have just forty children, no more—whether

<sup>24</sup>Davenport, 1965.

<sup>25</sup>Tavris and Sadd, 1977.

she mates with many men or only one. She cannot increase her number of offspring by seeking variety. So a tendency to seek variety should evolve—but only in males.

In theory, then, there might be a biologically based tendency for males to seek sexual variety. It could have evolved simply because ancestral forms that had that mechanism left more descendants than those that did not have it. And the life-forms of today *are* the descendants.

So goes the argument. It is the kind of argument characteristic of the area of research and thought known as **sociobiology**—the application of evolutionary theory to social behavior.

Does this argument apply to humans? Human sexuality is subject to so many influences that it is hard to tell, though Alfred Kinsey did conclude: "Among all people everywhere in the world, the male is more likely than the female to desire sex with a variety of partners."<sup>26</sup> For us, the important thing to see is how the responsiveness to subtle stimuli, such as those that signal novelty or variety, might have evolved, and how its evolution would depend on its effect on reproductive success.

#### REPRISE: WHAT INNATE DOES NOT IMPLY

Before leaving the topic for now, we must stop to avert confusion. Whether a mechanism for the Coolidge Effect evolved in humans is an interesting *theoretical* question about human prehistory. It has no social implications whatever. In particular, let us be clear: If there is an untaught tendency for males to seek variety, this does not mean that they will necessarily do so, or that they must do so, or that they can't help doing so. This takes us back to the point I made earlier: Untaught means *untaught*. It doesn't mean *unteachable*.

If the Coolidge Effect applies in humans, it can only be one influence among very many others, including (1) the constraints imposed by culture and (2) the complexities of *personal* as opposed to purely sexual relations. As to the first, a sociobiologist writes: "Most human societies are indeed monogamous. . . . On the other hand, some human societies are promiscuous, and some are harem-based. What this astonishing variety suggests is that man's way of life is largely determined by culture rather than by genes."<sup>27</sup>

As to the second, a psychologist cautions: "Perhaps it is true that for many married couples, the quality and quantity of sexual experiences . . . would be enhanced by participation in sexual behavior outside the marriage. *But this does not mean, necessarily, that the marriage would be strengthened.*"<sup>28</sup> Human relationships, even sexual ones, involve much more than sex.

Thus the importance of this kind of theorizing is not its social implications, but that it invites us to look at human and animal behavior with

<sup>26</sup>Quoted by Barash, 1979, p. 49.

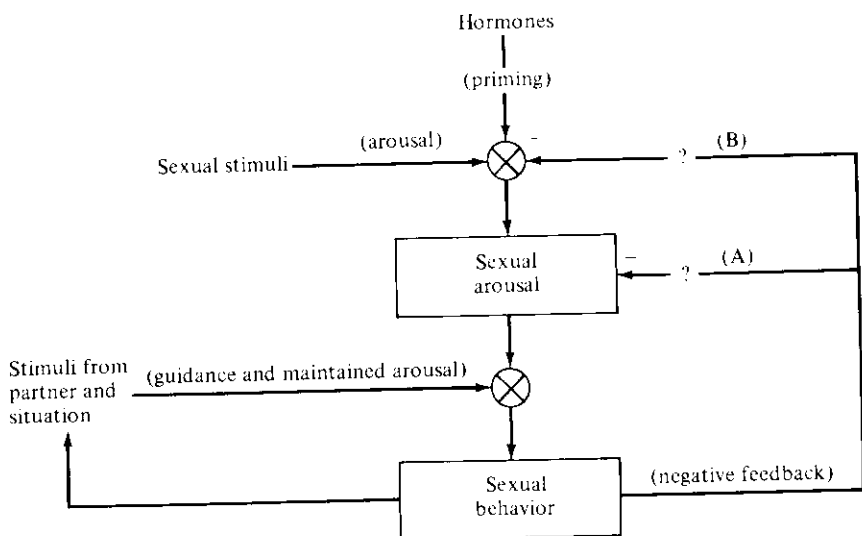
<sup>27</sup>Dawkins, 1976, p. 177.

<sup>28</sup>Bermant, 1976, p. 101; italics in original.

some new ideas in mind. It could help us understand how behavior came to be the way it is.

### Sexual Motivation—A Look Backward

What sort of system is sexual motivation, as we have developed it so far? Figure 4-7 puts some of the pieces together.



**Figure 4-7.**

Sexual motivation as a negative-feedback loop. Mating depresses sexual arousal (A), or the arousing properties of the stimuli from that particular partner (B). It does not, however, feed back to affect hormone levels.

#### INTERNAL AND EXTERNAL CONTROLS

In at least some species, internal hormonal factors are necessary for sexual arousal. Even in humans, if hormone levels are low, hormone treatments can enhance arousability. However, hormones exert their effects by promoting responsiveness to *external* stimuli—a partner or potential partner, or the signals the partner generates—just as internal factors may affect the response to food. In sex, as in feeding, this effect *may* be exerted by way of the attractiveness of the stimuli—alliesthesia.

But whereas hormones may provide a background priming or encouragement of sexual motivation, sexual arousal is produced over the short term by *external* means. In humans, even a picture of an attractive person can produce sexual arousal that was absent before. And sexual arousal is primarily a response to those stimuli, not to the hormones themselves.

The Coolidge Effect shows dramatically the importance of external influences on mating. The effectiveness of a just-mated-with partner is reduced, while responsiveness to other partners remains strong.

We are reminded of taste-evoked feeding or dietary obesity (see pp. 85–87). In affluent societies, even eating is more often pulled from without than pushed from within. The same is true of sexual behavior, especially in complex creatures.

#### NEGATIVE FEEDBACK AND HOMEOSTASIS

Is sex a negative-feedback loop? Is it a homeostatic system? The answer to the first is yes; to the second, no.

As to the first question, we know that sexual activity is self-limited, producing a kind of satiety that brings arousal to an end. That qualifies the system as a negative-feedback loop: Sexual arousal leads to mating, and some consequence of mating decreases sexual arousal—at least as directed toward that partner. In that sense the behavior acts to reduce the motive that aroused it.

However, it is not a homeostatic system. In Figure 4-7, the negative feedback depresses *sexual arousal*. Or it *might* decrease the arousing properties of the specific partner, leaving arousability by other partners high. That is one way of interpreting the Coolidge Effect. Either way, it does *not* control internal hormone level.

Therefore, sex hormone level is not *regulated*, in a homeostatic sense, by sexual behavior. In thirst, the body loses water, the animal drinks, and water is restored. But mating does *not* depress the male rat's androgen level from too high to normal. Indeed, androgen level may even *rise* after mating.

Rather than acting as regulated variables, then, the sex hormones act to *support*, or *permit*, sexual motivation when the appropriate stimuli arise. As one writer puts it:

The individual deprived of sexual outlet does not perish, regardless of the length of time involved. No genuine tissue or biological needs are generated by sexual abstinence. . . . To a much greater extent than is true of hunger or thirst, the sexual tendencies depend for their arousal upon external stimuli.<sup>29</sup>

We are reminded of Kinsey et al.'s similar conclusion about imprisoned men.

Finally, before moving on we should remind ourselves just how oversimplified this is. In Figure 4-7, the box innocently marked *sexual behavior* includes the whole complex hierarchy of Figure 4-2—and that figure just shows the stickleback's hierarchy. In more complex animals we find learning and, in humans, culture, modulating the system at every step and at every level. We turn to that topic now.

<sup>29</sup>Beach, 1956, pp. 4–5.

## THE ROLE OF LEARNING

The stickleback's mating pattern can be elaborated by learning. Its basics, however, are untaught, and a quite uneducated stickleback can mate successfully the first time it sees another stickleback.

But we also recall our rule of thumb in sexual behavior. As we go to more complex animals, there is progressive emancipation from hormonal control, and other factors become more important. Among these other factors, learning is prominent and powerful.

### Animal Investigations

Even in rats, experience plays a role. A male rat may mate normally on its first opportunity. In that sense, its sexual behavior, like the stickleback's, is untaught. However, castration in male rats has much more prompt and severe effects in sexually naive males than in experienced ones. And certain handicaps—inability to smell, for instance—are serious sexual stumbling blocks for an inexperienced male, but are readily overcome by experienced ones.<sup>30</sup> In short, sexual experience is not necessary for mating in male rats, but it helps.

In female rats, learning is even less important. Handicaps to mating seem to have about the same effect in experienced as in naive females. This sex difference, too, diminishes as we go to more complex creatures.

When we look at *primates*, learning may change from a luxury to a necessity, at least for some species. The psychologist Harry Harlow<sup>31</sup> has observed sexual behavior—what there was of it—in male monkeys reared in isolation, and then given access to hormonally receptive females. He describes it thus:

When these infant monkeys reached sexual maturity, we attempted to set up a breeding colony. . . . [But] of those lab-reared males who made any attempt at amorous advances, some created bizarre sexual scenes by mounting the head of the female, while others grasped the midbody of the female and thrust laterally, leaving them totally at cross purposes with reality. It was not surprising that the morale of our lab-reared monkeys was not very high . . .

It appears at first glance that, deprived of learning opportunities, the monkeys were deprived of sexual behavior too. But when we look again, we see that some fragments survived. It is as if the monkeys knew they wanted *something*, and that it involved the females, and even which organs of their own were crucial. What they lacked, it seems, was not sexual motivation but the skills necessary to express it. As Harlow comments mournfully, "Their hearts were in the right place even if nothing

<sup>30</sup>Beach, 1956.

<sup>31</sup>Harlow, 1976.

else was." They seemed to be confused about the means, and not, so to speak, the end.

If this is so, then we might suggest that the *top* levels of the Tinbergen hierarchy were functioning in these monkeys. Hormones, together with the stimuli from the female, promoted sexual arousal and directed it toward the female. But it was expressed ineffectively because the monkeys lacked specific skills at lower levels of the hierarchy. The motivational state was like a general with incompetent field officers: The aim was there, but not the tactics for achieving it.

We may see something like that in the human case, too. Let us look.

### Children without Cultures

In most human beings, sexuality is subject to intensive teaching by the society in which one lives, so much so that it is hard to tell what, if anything, is instinctive. However, there are a few rare cases in which such cultural conditioning is absent. What does sexuality look like then?

#### THE WILD BOY

On January 9, 1800, a boy about twelve years old wandered out of the woods into a village in France. His behavior was animal in almost every respect. He was naked except for the tatters of a shirt, and showed no sign of relating himself to the people who captured him. He had no speech, and was, as a commentator delicately put it, "unhousebroken." No one knows where he came from or how he had lived to that time. No parents claimed him.

Most of what we know about the Wild Boy comes from the reports of Jean-Marc Itard, who worked with the boy, named him Victor, and tried to teach him to speak. These reports were concerned primarily with Victor's cognitive and linguistic development, but some notes on his sexual development are revealing.

When Victor was about seventeen, his training program hit a snag: puberty. Itard wrote:

I saw this long-awaited puberty arrive, or rather explode. Our young Savage has been consumed by continuous and violent desires without the faintest idea of their object and without the slightest preference for any woman. . . . I have seen in him only a kind of groping and feeble instinct making him prefer the company of women to that of men. . . . Several times I have watched him in a group of women seek to calm his tenseness by sitting down next to one and squeezing her hand, her arms, her knees. Continuing these bizarre caresses, he would feel his unruly desires grow stronger instead of disappear. Then, seeing no way out of his uncomfortable emotions, he would change mood completely. He would push away the woman he had first sought out and go through the same process with another.<sup>32</sup>

<sup>32</sup>Quoted by Shattuck, 1980, p. 152.

As with all such case studies, it is always possible that Itard, or we ourselves, are reading too much into what happened. Yet the behavior does sound familiar. We mean no disrespect to Victor when we say that his behavior is reminiscent of Harlow's unsocialized monkeys. He seemed to want *something*, and to want it from women—but did not know how to seek it or even what it was. In any case, some fragments of apparently sexual urges were directed toward women, without, as far as we know, any explicit cultural conditioning that might have taught such actions to him.\*

#### GENIE

The case of Genie is one of the most dramatic episodes known of growing up without a society. It is also one of the most tragic.

Genie was discovered in 1970. Her father disliked children and wanted none; when his first child was born, her father put the child in a garage so that he would not have to hear her cries. She died of pneumonia and exposure. Later, Genie was born into this family.

The details of Genie's first 20 months of life are unclear. We do know that after that, Genie was confined to her bedroom, harnessed, with a harness the father had sewn himself, to a baby's potty seat. She seldom heard speech; and, beaten for making noise, she made none. She was fed baby foods and cereals, hurriedly. She spent her days alone in that harness, her nights sewn into a sleeping bag, until she was *fourteen years old*.

Genie's mother, "too blind to even dial the phone and forbidden under threat of death to contact her own parents, felt helpless to do anything" over these years.<sup>33</sup> She finally did leave her husband, taking Genie with her. Genie was at once hospitalized for extreme malnutrition. The father committed suicide.

Susan Curtiss, a psychologist, worked with Genie as Itard had worked with Victor, trying, successfully this time, to teach her to speak. Like Itard, Curtiss focused on cognitive and linguistic development. But, as Itard had, Curtiss also saw puberty explode<sup>34</sup>:

Today Genie revealed an adolescent crush on Mr. B., her school bus driver. When I mentioned his name to her, she blushed and held her hands over her face. She also talks about him incessantly, mentioning him over and over. Today I asked her, *Who is Mr. B.?* Genie answered *Mr. B.* She was overcome—blushing, she was unable to verbalize.

Elsewhere, Genie talked as specifically as she was able about her sexual feelings involving Mr. B. She said in her fragments of English:

\*After Itard gave up his training, Victor lived on for twenty-two years with a Madame Guerin. He never did learn to speak, or to form any but the most rudimentary social attachments. A state pension kept him alive, and when he died, no one noticed.

<sup>33</sup>Curtiss, 1977, p. 7.

<sup>34</sup>Ibid., p. 42.

Mr. B. hand.  
 Mr. B. have hand.  
 Mr. B. tickle vulva.  
 Finger tickle vulva.  
 Genie vulva.

Now it seems clear that nothing like that had ever happened. These were fantasies, to which Genie clearly attached some desire. There are two dramatic implications here. One is that her adolescent body chemistry triggered her desire for that kind of touching. The other is that it targeted these desires on a specific person, from whom she wanted the touching. And the wish was not targeted on Susan Curtiss, whom Genie knew much better, but on a male.\*

To summarize: In the actions of both Victor and Genie, there was evidence of vague sexual desires, but also evidence that they were *directed* in each case toward a member or members of the opposite sex. If so, then the stimuli that identify conspecifics as male (for Genie) or female (for Victor) must have become more powerful stimuli for approach, or simply for desire, than the converse set of stimuli. And it must have been hormonal state that made them so. We cannot see what else it could have been.

Quite possibly, then, certain hormonal conditions can produce *untaught* urges and orientations, in humans as in sticklebacks. But humans, unlike sticklebacks, must learn the means of implementing those urges. And, as we will see in the next section, such hints from the hormones can be modulated or even overruled by the learning experiences a culture provides.

### Culture and Human Sexuality

Among the Mangaia of Polynesia, males and females become active in sexual relations at early adolescence. Sex is a highly and frequently enjoyed aspect of living. It is not unusual for couples to engage in intercourse three or four times a night, five or six nights a week, and to keep to that schedule for years on end.

In contrast, the Dani of New Guinea show little interest in sexual activity. Intercourse does not occur before marriage and, after marriage, may not occur for the first 2 years while the couple are establishing their residence. After childbirth, there is no sex within the marriage or, apparently, outside it, for 4 to 6 years.

One is led to wonder what rigid social controls, or what feats of self-control, permit the Dani to starve themselves sexually in this way. But the

\*One might argue that if Genie was going to direct her urges toward anyone, the odds were about even that the target would be male. But Genie developed several other crushes, all on men, and Victor made repeated overtures to different women.

Dani reply: None. They do not report feeling any stress, tension, or deprivation. Sex just is not that big a part of life for the Dani.<sup>35</sup>

### Multiple Levels of Cultural Influence

In human sexuality, cultural learning takes hold at every level of the already complex system.

#### SEXUAL AROUSAL

First, consider the *stimuli* provided by the partner and the situation. We have already noted the wide cultural variation in standards of sexual attractiveness; beyond that, there is the matter of who is, or is not, even *considered* as a possible sexual partner. In our society, many people find the idea of homosexual relations disgusting, just as they are disgusted at the notion of eating toasted ants! But in one important cross-cultural survey, fully two-thirds of the societies studied regarded homosexuality as normal and permissible, at least for some age groups. Some societies even encourage it.<sup>36</sup>

Finally, the differences between three societies—the Dani, the Mangaia, and our own—suggest that the frequency of sexual arousal or interest, high in the hierarchy, varies greatly with culture and circumstances. If sexual arousal is a response to a set of sexual stimuli, then frequency of arousal will depend upon what is *defined* by the actor as a sexual situation, and how many such situations there are. If there are few such situations, sexual interest will rarely be aroused. Perhaps that is the case with the Dani.

In short, hormones may provide a necessary underpinning for *potential* sexual arousal. But actual arousal depends on what situations we encounter, *and* how we have learned to interpret them. Our cultural training selects those stimuli that define permissible sexual partners and courtship situations. One culture filters out same-sex persons as sexual partners; another does not. One culture teaches its members to be aroused by large buttocks or feathers in the nose; another does not.

#### COURTSHIP

Once a sexual situation arises, culture selects those responses that are permissible, and that are effective—in that society—as ways of attaining the goal of sexual contact. The social skills that Victor lacked are taught to those who do grow up within a society.

Consider the preliminary courtship or approach phase. In some cultures, courtship may begin with a request for a date during a casual conversation. In others—for example, in traditional Japanese families—it begins with a conversation between the respective parents.

<sup>35</sup>Mahoney, 1983.

<sup>36</sup>Ford and Beach, 1951.

Conversely, we may be taught what *not* to do, and when not to do it. In an especially clear demonstration of this process,<sup>37</sup> a group of young American men and women watched an erotic film, and then worked together for a while. After the film, there were *fragments* of sexual advance; the subjects stood somewhat closer to members of the opposite sex, and gave them more sidelong glances. But there were no overt sexual overtures, much less mating behavior. Of the many behaviors that the film may have primed or aroused, the ones expressed were strictly limited to those permitted in social situations in this society.

### MATING

After the male stickleback encounters a female—the releasing stimulus—its behavior becomes stimulus-bound and untaught. Human sexual behavior does not; it remains goal-directed and largely taught.

First, culture defines permissible mating situations. In this society, we seldom make love in public. Some other societies find nothing objectionable in doing so.<sup>38</sup>

Then there are the actual movements involved in mating. Sexual intercourse can be performed with a wide variety of movements in a wide variety of positions. But within a culture, only certain positions and movements may be permitted, whereas others are prohibited, labeled “not nice,” or punished by law. In American society today, for example, oral-genital sex is a crime in some states, even between consenting adults.

Conversely, varied techniques of love-making can be *taught* by the culture one lives in. In this society, sources of such education range from peers, to more experienced people, to how-to books.

### SEXUAL GOALS

Even the goal is not fixed. At first glance we might suppose that orgasm is the goal. But consider that, for many people in this society, the *partner's* sexual pleasure is an important goal, and ways of achieving that goal may have to be discovered (Figure 4-8). In fact, in this society, some people of both sexes pretend to have orgasms, so that the partner may feel that he or she has pleased the person!

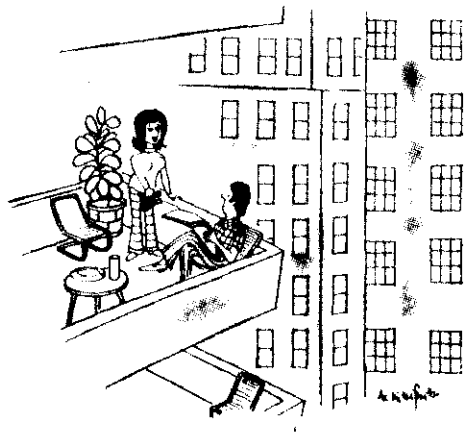
All this is a fairly recent development, too. In the 1930s, a gynecologist wrote:

Both men and women know that the woman has no animating desire. She submits without welcome to the embrace, it may occur without [her sexual] excitement and she expects it to terminate without [her] orgasm.<sup>39</sup>

<sup>37</sup>Griffitt, May, and Veitch, 1974.

<sup>38</sup>Barash, 1979.

<sup>39</sup>Cited by Francoeur, 1982, p. 26.



**Figure 4-8.**

"Look at the corner apartment on the 12th floor. That's what I want you to do to me."

For those who believed that, we might say that the goal for the male was orgasm; for the female, enduring the experience. The point is that cultural beliefs and values set even the goal of intercourse—and they can change.

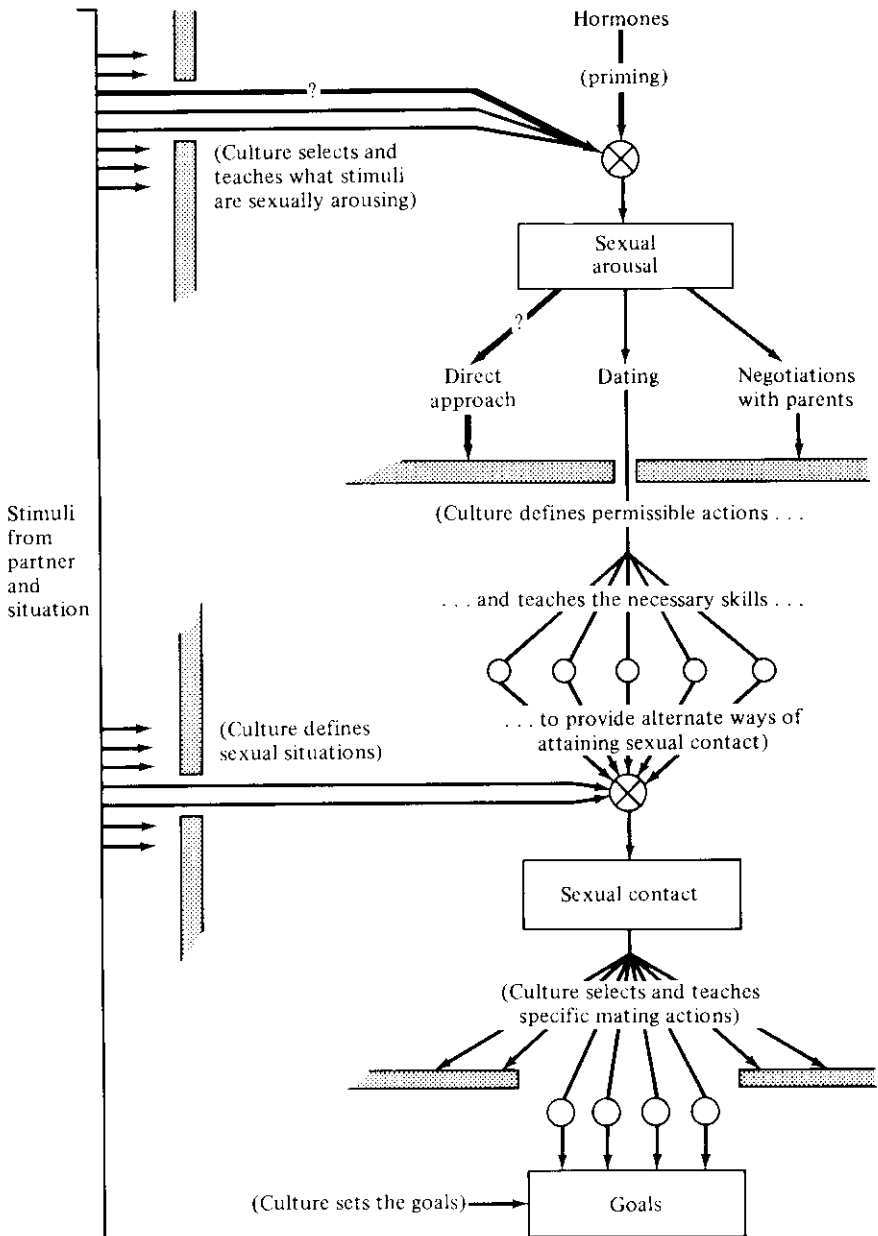
### **A Look Backward: Of Sex and Sticklebacks**

What can we say about all this? How much of the stickleback do we see in human sexuality? A bit, perhaps, but very little (Figure 4-9).

We might expect that the instinctive component of human sexuality, if any, would be seen at the low levels of the hierarchy—the level of movements. What evidence we have, however, suggests the opposite. There may be untaught influences that promote diffuse sexual arousal at the top of the hierarchy, as suggested by Genie, Victor, and Harlow's monkeys. These may include untaught stimulus influences, including, perhaps, novelty or variety itself. But the *expression* of that arousal, at every level, is a matter of goal-directed learned responses, not of stimulus-bound, untaught ones. The latter seem limited to unskilled, diffuse approach and touching, as in Victor's case.

### **A Look Forward: The Problem of Internalization**

One final point. As we have discussed it here, it is easy to think of culture as a set of commands, a set of dos and don'ts. The fact is, however, that the dos and don'ts of a society become *internalized* as our own values,



**Figure 4-9.**

There may be some untaught stimuli for human sexual arousal, and some untaught classes of response to these, shown by the heavy lines. But at every stage in a courtship-and-mating sequence, culture defines the situations that permit sexual expression, and the stimuli that promote and maintain sexual arousal. It also selects and teaches appropriate actions. It even sets the goal(s) of sexual activity itself.

preferences, and customs. We do not just *obey* them, we *share* them. We do not just do what society says, we also feel what it feels. Thus, for example, many heterosexual people in this society do not just refrain from homosexual activity, or oral-genital sex, because it is forbidden. Some find such ideas genuinely disgusting.

Why? How do we internalize a society's values so that they become our own? We do not know; indeed, that is one of the great mysteries of human motivation. What is clear is that it occurs, and with powerful effect.

It happens with respect to aggressive behavior, too. Let us turn to that.

## AGGRESSION: INTERNAL INFLUENCES

In some species, aggression is so closely linked with sex that the two might be considered a single motive. For example, let us return to the stickleback. In the male, both mating behavior and aggressive behavior are primed by male hormones. Whether the male fights or courts depends upon what releasing stimuli are presented, but the fish is prepared to do either one. And for good reason: The male must stake out its territory, defend it against intruders, and build a nest in it. No nest, no mate.<sup>40</sup>

### Hormones and Aggression

This link between mating and aggression occurs in many species. Deer, for instance, are seasonal maters and seasonal aggressors. In the spring rutting season, the testes pour out androgens, and both sexual and aggressive motives appear: Males will court females, and fight each other vigorously.

All this suggests that fighting, like sexual behavior, might be responsive to male hormones, the androgens. It is. In many species, little or no serious fighting occurs before puberty, and after that it is mostly males who engage in it. A male rat castrated in adulthood is likely to show diminished aggression, which hormone treatment can reverse.<sup>41</sup>

There is some evidence for hormonal involvement in human aggression, too. Throughout the world, men commit more violent crimes than women do.<sup>42</sup> This in itself means little—it might be a matter of sex roles rather than sex hormones—but even among males in this society, history of violence and self-reports of irritability and hostility correlate with testosterone levels to a surprisingly high degree.<sup>43</sup> Finally, in one study, reduction in testosterone level by drug treatment did reduce violent behavior in six of eleven men with histories of repeated violent crime.<sup>44</sup> Four of those six returned to violent behavior when the drug was discon-

<sup>40</sup>Morris, 1952.

<sup>41</sup>Brain, 1979.

<sup>42</sup>Moyer, 1976.

<sup>43</sup>Persky, Smith, and Basu, 1971; Kreuz and Rose, 1972.

<sup>44</sup>Money et al., 1975.

tinued, suggesting that it really was the internal change, and not the effects of counseling and the like, that had helped the men remain in control.

### Lorenz's Hydraulic Theory

An influential theory of aggression also posits an internal factor that promotes aggressive action. This theory comes from the ethologist Konrad Lorenz.

#### VACUUM REACTIONS AND ACTION-SPECIFIC ENERGY

In birds and fish of several species, Lorenz noticed that if an action pattern has not been released for some time, it may be triggered at the slightest provocation. Most important, in animals who had not attacked or captured prey for a long time, the complete behavioral sequence of attack or prey capture might occur without *any* external releasing stimulus. Lorenz called such episodes **vacuum activities**.

To explain such actions, Lorenz proposed an internal pressure building up behind an action pattern, making it more and more likely to occur. Occurrence of the action releases the pressure, so that the response does not have much strength for a while. But then pressure builds up again, so that it takes a less and less powerful releaser to permit the response to occur. If the built-up excitation is very great, then the response can go off without any input from the environment. That, Lorenz thought, is why vacuum reactions occur.

The theory implies that if aggressive urges are denied expression, they will build up so that less and less provocation, or none at all, is required to evoke them. Earlier, Freud had taken a similar view: Unexpressed aggressive urges continue to press for expression, direct or symbolic (pp. 42-43).

All this is not so pessimistic as it sounds. Lorenz argued that in humans, aggressive energy can be drawn off in non-destructive symbolic ways (again compare Freud). Indeed, part of his argument in his influential book *On Aggression*<sup>45</sup> is that we ought to seek more and better ways of accomplishing this, so that truly damaging human aggression, as in warfare, can be made less likely. Aggression must have *some* outlet, though, and if it is denied one outlet it will seek another. So the argument goes.

#### THE CATHARSIS HYPOTHESIS

We have presented Lorenz's theory because it introduced influential concepts and has received a great deal of attention. As a general theory of motivation and of aggression in particular, however, it has not fared very well. There are various reasons, but we will consider only one: the catharsis hypothesis.

<sup>45</sup>Lorenz, 1966.

A clear prediction from the theory is that an opportunity to fight should release the pent-up action-specific energy, and therefore reduce aggressiveness for a while. This is the **catharsis hypothesis**—that venting anger, or “letting off steam,” allows aggressive urges to dissipate.

But this is not always true even in animals. In one experiment,<sup>46</sup> a model male fish was presented repeatedly to a real male fish, who attacked it. Repeated presentations of the model led to an *increase* in the rate of attack reactions—not a decrease, as Lorenz would predict.

Among humans *in this society*, something like the catharsis hypothesis has become part of the folklore. We speak of “ventilating” anger, or “getting it off our chests,” or “letting off steam,” as if these would drain off aggressive urges. The theory is often taken for granted. And yet there is a great deal of evidence that it is simply not true.

The fact is that expression of anger, either verbally or in action, is at least as likely to *increase* anger and further aggression as to dissipate it.<sup>47</sup> In one study, a group of boys was encouraged to play with violent toys, kick the furniture, and otherwise blow off aggressive steam. On later occasions, these boys were not *less* hostile and destructive, but *more* so.

What about verbal catharsis? In one study,<sup>48</sup> a team of researchers interviewed 100 engineers who had been laid off by the local aerospace industry. Some of these subjects, but not others, were encouraged to express their anger at the company during the interview. Did this catharsis drain the anger out of their systems? Quite the contrary; the men who expressed anger at the company or their supervisors were *more* angry at the end of the interview than those who did not.

Then there is the notion that watching violent games, or violent television shows, provides symbolic catharsis for our aggressive urges. This theory is argued vigorously by followers of Lorenz, followers of Freud, and television producers; but there is now a great deal of evidence on this point, and it says just the opposite. Watching violent television, for example, is much more likely to increase violent behavior than to reduce it.<sup>49</sup>

We sometimes do experience a feeling of relief and well-being after telling someone we are angry, and why. It seems, though, that this happens when our action is likely to have some useful effect on the cause of our anger.<sup>50</sup> In other words, it may be the positive feeling that comes with progress toward solution of a problem. Perhaps it is the anger-arousing circumstances, not the anger itself, that we get off our chests in such cases.

In summary, physical or verbal expression of anger is at least as likely to feed on itself, increasing anger further, as it is to drain anger off. As one commentator says, “Letting off steam can make the atmosphere very

<sup>46</sup>Heiligenberg and Kramer, 1972.

<sup>47</sup>See Hokanson, 1970; Baron, 1977; Tavris, 1982.

<sup>48</sup>Ebbeson et al., 1975.

<sup>49</sup>Liebert et al., 1973.

<sup>50</sup>Hokanson, 1970.

hot and humid."<sup>51</sup> And: "For most of the small indignities of life, the best remedy is a Charlie Chaplin movie. For the large indignities, fight back. And learn the difference."<sup>52</sup>

### **A Look Backward: Is Aggression Inevitable?**

Lorenz's hydraulic theory of aggression, and Freud's closely related one, do not stand up to the evidence. Aggressive tendencies do not necessarily build up as opportunity to express aggression is denied; nor are they necessarily drained off when aggression is expressed.

Lorenz's observations still need explaining, especially the vacuum reactions. We know little about them. But Lorenz's explanation, that they represent the escape of pent-up energy, is unlikely to be correct. There probably is no buildup of aggressive energy over time, and certainly none that makes aggression inevitable.

The same could be said of other internal influences on aggressiveness: They do not make it inevitable. Male hormones may enhance aggressive tendencies perhaps; but "[i]t is perfectly possible for . . . 17-year-old men with very high levels of androgen to be perfectly peaceful."<sup>53</sup> They might be even *more* peaceful without all that androgen, but if so, it would make little difference.

Then again, if such a man is peaceful, it may be because he is not provoked. This takes us to the topic of *external* factors in aggression.

## **STIMULUS EVOCATION OF AGGRESSION**

If aggressive action is not an escape of pent-up internal energy, our next thought is to look to the *external situation* for its causes. What sorts of situations or stimuli call forth aggressive actions?

Kenneth Moyer<sup>54</sup> has listed a number of stimulus situations that frequently cause aggression. He distinguishes among different systems of aggressive behavior on the basis of their arousing stimuli. Let's consider a few of them.

### **Predatory Aggression**

*Predatory aggression* refers to an attack by an animal on its prey, which it kills and eats. Our first thought is that this behavior is part of a hunger system, and is not aggression per se; but satiated animals will sometimes kill prey without eating it. The attack reaction may be released by appropriate stimuli even in the absence of hunger.

In any event, this probably is a separate system from the others. In cats,

<sup>51</sup>Tavris, 1982, p. 129.

<sup>52</sup>Ibid., p. 253.

<sup>53</sup>Kalat, 1981, p. 345.

<sup>54</sup>Moyer, 1976.

for instance, the form of the action—quiet stalking and a pounce—is quite different from the rage reaction to pain, which includes arching the back, loud hissing, and striking out with unsheathed claws.

### Irritable Aggression

This kind of aggression is aroused by a wide range of aversive conditions. *Pain* is one. Pairs of mice or rats can be induced to fight by painful electric shocks.<sup>55</sup> Moreover, pain-induced aggression can be a motivational state, expressed by arbitrary responses. A squirrel monkey that receives shock may learn to pull on a chain to produce an object that can then be attacked.

*Frustration* is another frequent cause of irritable aggression. For example, if a subject is accustomed to receiving reward for some response, then the failure of the reward to arrive when expected can lead to aggression in pigeons,<sup>56</sup> chimpanzees,<sup>57</sup> and humans.<sup>58</sup> This happened with Victor on at least one occasion.<sup>59</sup>

### Irritability in Human Aggression

Something like irritable aggression has been intensively studied in the laboratory, with humans in this society. A frequently used procedure is as follows: Someone insults the experimental subject, or otherwise treats him badly. A little later, the subject has a chance to deliver electric shocks to the nasty fellow. Sure enough, subjects angered in such a way will deliver more shock than subjects who have not been angered.\*

We will not review this literature, for the results depend on a wide variety of factors.<sup>60</sup> What is important for us now is that it occurs at all. It means that the subject will make an arbitrary response—pushing a button, for instance—to cause pain to someone. And so we have a motivational state, induced by external means—the insult.

Moreover, subjects in such experiments, if they have been insulted and angered, often will give more shock even to a victim who was *not* the insulter. This is the kicking-the-cat phenomenon; one takes out one's aggressive urges against an innocent bystander. It implies that the motivational state *widens the range of effective stimuli*—that is, the range of target persons against whom aggression will be directed. It suggests a

<sup>55</sup>Azrin, Hutchinson, and McLaughlin, 1965.

<sup>56</sup>Azrin, Hutchinson, and Hake, 1966.

<sup>57</sup>van Lawick-Goodall, 1971.

<sup>58</sup>Barker, Dembo, and Lewin, 1941.

<sup>59</sup>Shattuck, 1980.

\*Such experiments are usually disguised as learning experiments, in which the subject punishes his victim—the one who angered him—for making errors. Typically the subject only *thinks* he is delivering shocks, whereas in fact no shocks occur. So the measure of aggressiveness here is the frequency, duration, or intensity of shock the subject *thinks* he is giving to another person.

<sup>60</sup>See Berkowitz, 1982; Geen and Quanty, 1977.

kind of priming of responsiveness to a person-stimulus by the motivational state. And—a final blow to the catharsis hypothesis—this aggressive behavior typically becomes greater, not less, as it is repeated.

This effect can be far from trivial. For example, an early team of investigators<sup>61</sup> found an inverse relationship between the price of cotton and the number of lynchings of black people in the South, over the period from 1882 to 1930. They suggest that the frustration of economic hard times was turned into aggressiveness, which in turn was murderously directed onto the black community.

### Maternal Aggression

Then there is *maternal aggression*. This is an interesting exception to the general principle of greater aggressiveness in males. Among rodents it is seen in pregnant or lactating females, which attack, and often defeat, males that approach their nest or their young.<sup>62</sup> This sex difference is less apparent in primates; adult male and female baboons, for instance, may defend a baby baboon with equal ferocity.

### A Look Backward: Aggression and Regulation

What kind of system do we have here? Let us start by asking the same questions we asked about sex. Is it a negative-feedback loop? Is it homeostatic? The answer to the first is: sometimes, in a way. The answer to the second is no.

Aggressive action may remove the source of aggressive motivation. In that sense, negative feedback may describe what happens: A rival male comes along, the male stickleback attacks, and chances are that the rival goes away. The behavior removes the conditions that evoked it.

However, this is not homeostatic regulation in the original sense. Even if hormones enhance the reaction, the initiating condition is outside, not inside. There is no evidence for any buildup of energy, or any other physiological imbalance, which aggressive action corrects.

To what extent is it instinctive? Does Tinbergen's analysis of stickleback aggression shed light on more complex creatures? To address that question, we must ask how much of the system can be said to be untaught. We will turn to that topic in a minute.

### A Look Forward: The Role of Interpretation

But before moving on, we should note that even in the examples discussed, two problems arise for human aggression that stickleback aggression never encounters. First, you can't apologize to a stickleback. Second, you can't insult one.

<sup>61</sup>Hovland and Sears, 1940.

<sup>62</sup>Svare, 1983.

To take the second one first: In laboratory studies, irritable aggression is often induced by insults. That means that at minimum, the subject must first draw upon all the cognitive apparatus required to *understand* the insult, before he becomes angry. This at once takes us out of the realm of releasing stimuli, and into the realm of **interpretation of the situation**.

Then again, consider how someone may anger us, perhaps quite severely, and then *apologize* or *explain*. He may say, "I tripped," or "I can't see without my glasses," and thus assure us that his blundering into us and almost knocking us down was not intended as an insult. And the effect may be to remove our anger as if by magic.

Clearly, the study of human aggression will have to consider our interpretation of the situations and the actions within it, the beliefs we hold about it, and the causal attributions we make within it. Later chapters will have more to say about these matters.

## STIMULUS INHIBITION OF AGGRESSION

Hunger and thirst, we recall, can be *inhibited* by internal satiety mechanisms. There are also inhibitors of aggressive behavior. The difference is that they come from outside; in other words, certain *external stimuli* inhibit aggressive action.

### Submissive Displays

In many species—though not all, by any means—fights are restrained and ritualistic, seldom resulting in serious injury. Wildebeests, for instance, engage in butting duels (Figure 4-10) until one animal admits defeat and



**Figure 4-10.**  
Wildebeest engage in ritualized, stereotyped fighting.

retires. Often an animal's most effective weapons are not used against fellow species members. Poisonous snakes wrestle without biting. Antelope use their sharp horns to push and fence with each other, but they do not stab, as they would in fighting off a predator.

Again, in many species, an animal losing a fight will simply surrender to its opponent. Surrender is signaled by a characteristic action pattern, a *submissive display*. Sticklebacks give up by adopting a characteristic posture; then they flee. Gulls offer the backs of their necks to their opponents, as if inviting a peck without retaliation. Such a display provides stimuli that *inhibit* further attack by the opponent.

These restraints and inhibitions no doubt evolved because they enhanced reproductive success. Unrestrained fights risk serious injury even to the winner. Both contestants are likely to do better in the long run—that is, to have longer reproductive lifetimes—if one gives up, and the other lets it go at that, before injury occurs. So, if an animal is going to give up the fight, it is to its advantage to signal that fact; and it is to the other animal's advantage to get the message and stop fighting.

### Sexual Signals

In the stickleback and in many other species, both sexual and aggressive motives are augmented by the same hormones. But now we come to a curious phenomenon: Sexual motivation, or the stimuli that evoke it, can inhibit aggression. Let a male stickleback see a female and court her. After that, it will be more difficult to elicit attack behaviors for a while.<sup>63</sup> It is as if, despite their joint responsiveness to hormonal condition, there is inhibition of aggression by sexual stimuli at the next level down. Exactly where the inhibition occurs—whether the sight of the female inhibits aggression, or whether the sight of her triggers the courting system which in turn inhibits aggression—is not clear.

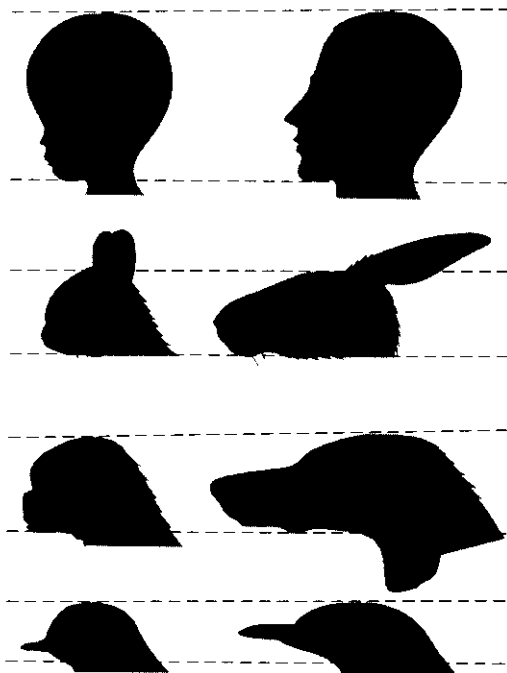
A similar inhibitory effect is seen in a number of primate species. Sexual solicitation is often used by an animal threatened with attack, to abort that attack. This takes the form of turning one's back on the aggressor and presenting the rump, inviting the aggressive animal to mount from behind and mate. This action may be used as a submissive gesture by one male chimpanzee to another. When that happens, the dominant male may actually mount and make perfunctory pelvic thrusts. But even if the winner does not do that, he usually will refrain from attacking.<sup>64</sup>

### Juvenile Characteristics

Yet another inhibitory factor on aggression in many species, is the stimulus or stimulus complex that identifies a *baby* of the species. Male rats,

<sup>63</sup>Sevenster, 1972.

<sup>64</sup>Jolly, 1972.



**Figure 4-11.**

Juvenile and adult heads. Note the high forehead, underslung jaw, and short snout of the juvenile form. Adult humans describe the configuration as "cute." (From Tinbergen, 1951.)

for example, may attack mice, but abort the attack if the small creature turns out to be a baby rat instead of a mouse. In such cases, it is the *smell* of a rat pup that inhibits the attack. If the male rat cannot smell at all, it will attack mice and rat pups indiscriminately.<sup>65</sup>

Or the inhibition may be *visual*. Lorenz<sup>66</sup> has pointed out that in a variety of species, the infant's face is shaped differently from the adult's. In Figure 4-11 we see the high round forehead, underslung jaw, and short snout that characterize the infant face. The baby's appearance may act to inhibit aggression that would otherwise occur. For instance, a troop of rhesus monkeys will attack a newcomer, introduced to the troop, if it is adult; but a strange infant monkey will not be attacked. It is most likely the *appearance* of the infant that inhibits attack.<sup>67</sup>

What of the human case? Here is an instance in which the sensible use of ethological concepts has led us to ideas that might otherwise not occur to us, about a pressing social problem—*child abuse*.

<sup>65</sup>Myer, 1964.

<sup>66</sup>Lorenz, 1943.

<sup>67</sup>Southwick, Pal, and Siddiqui, 1972.

Physical attack on children by their caretakers is not rare. There are now about half a million children in the United States alone who have suffered actual physical damage at the hands of their caretakers.<sup>68</sup> Why does it happen? For many reasons; obviously there is no single cause of all such tragedies. But let us see how absence of an untaught inhibitory control could be *one* such influence.

Research has shown us these things<sup>69</sup>: (1) Abusive *adults* are likely to have certain characteristics: poor impulse control, and a history of abuse during their own childhood, perhaps leading to attitudes favoring violence and punitiveness. In addition, (2) an abusive episode is likely to occur under certain *environmental* circumstances, characterized by stress and frustration. But also, (3) certain characteristics of the *child* may play a role. Physical abuse of a child is likely to be selective. Even within an abusive family, some one child is likely to be singled out for mistreatment. In particular, a *premature* child is at risk for abuse.<sup>70</sup> And a premature child is likely to lack the distinguishing characteristics of a baby that Lorenz identified. Premature children often lack the large protruding forehead, for example.

A sensible ethologist would wonder: If a stressed and punitive adult is angry at a child, and needs all the inhibitory control he can muster to avoid attacking the child—might the *absence* of inhibitory baby features tip the balance so that attack occurs, where the presence of baby features would be enough to inhibit that attack?

The operative word in this is *sensible*. It is perfectly obvious that a premature baby's appearance does not automatically trigger attack, nor does a normal baby's appearance automatically suppress it. Most premature babies are well cared for, and quite normal children are sometimes attacked. We are not puppets on a string. Neither are animals, for that matter; a mother rat will eat her young under some conditions.

Still, the baby's appearance might be *one* influence, among many, on how it is treated by a caretaker. Think of attack as a system like feeding, with multiple inputs and multiple inhibitors. Then, imagine a case where there are strong tendencies to attack the child—frustration, stress, and perhaps a belief in the appropriateness of punitive action. Imagine multiple inhibitors, too—conscience, love for the child, fear of punishment by society, *and* the untaught inhibition generated by baby features. If the last of these is present, it might produce the last bit of inhibition needed to suppress a furious parent's physical attack. If it is missing, the balance could tip toward violence instead.

Is all this speculative? No; there is evidence for it. One experiment<sup>71</sup>

<sup>68</sup>See for example Bell and Harper, 1977; Frodi et al., 1978; Stern, 1977; Parke and Collmer, 1975.

<sup>69</sup>See Parke and Collmer, 1975.

<sup>70</sup>Gill, 1970.

<sup>71</sup>Frodi et al., 1978.

found that even non-abusive parents were less likely to feel nurturant, and more likely to feel stressed and annoyed, at the sight or sound of a premature baby than at the sight or sound of a normal baby. If *non-abusive* parents react that way, we would expect the abusive parents—stressed, frustrated, and perhaps inclined toward violence anyway—to react that way all the more, sometimes with tragic consequences.

## AGGRESSION, LEARNING, AND CULTURE

Like sexual behavior, aggressive behavior can be affected powerfully by experience. In humans, *culture* is of overwhelming importance in determining whether aggressive motives are aroused and, if they are, how they are expressed. Again the parallel with sexual behavior is a close one.

### Animal Studies

In many species, aggressive behavior is instinctive or untaught. Even when it is, however, it may be modifiable by experience.

One experimenter,<sup>72</sup> in a classic study, raised cats with rats as companions. As adults, these cats did not attack rats; instead they licked them and defended them, and peacefully sought their company.

Few experiments have been so widely quoted—and misinterpreted. The finding was widely read as having shown that cats must *learn* to kill rats. What it really showed is that cats can learn *not* to kill rats—a very different thing.

The difference becomes clear if we look at a replication of the experiment, adding the needed controls. Cats raised with rats did not kill them, as in the earlier experiment. But cats raised in isolation, having had *no* experience with rats or with other cats, promptly attacked rats—though not very effectively—on first exposure to them.<sup>73</sup>

Together, the studies support these conclusions: (1) Cats need not learn to attack rats, but (2) they can learn not to. This is a clear example of the point raised earlier: *Untaught* doesn't mean *unteachable*.

### Studies of Children

What about human aggression? As with sex, culture is such a powerful influence that we wonder whether the raw material includes anything untaught or instinctive. One way of finding out is to study aggressive action in children, asking: What is the system like *before* culture is brought to bear?\*

<sup>72</sup>Kuo, 1930.

<sup>73</sup>Eibl-Eibesfeldt, 1961.

\*Our "children without cultures" are of little help here. Genie was punished for any loud or violent behavior that might annoy her father, and no doubt that included any aggressive actions she might otherwise have displayed. As for Victor, he did display flashes of aggression, but he might have learned to fight for food or self-defense in the wild. It is much harder

John B. Watson, the founder of behaviorism, was also an experimental child psychologist. He studied the development of emotional expression in children, and concluded that anger, as an action pattern, is untaught. In newborns it is released by hampering of movement (frustration?). And the pattern is easily identified: "stiffening of the whole body, the free slashing movements of hands, arms, and legs, and the holding of the breath."<sup>74</sup> Thus, even this arch-critic of the instinct concept allowed that "rage," in babies, has the properties an ethologist would call instinctive.

Later writers also have noted the appearance of classic "temper tantrums" at about 3 months of age, with striking, kicking, and characteristic facial expressions. These seem not to be directed toward any particular target. In this society at least, such displays become less frequent as a child matures, though they are better directed when they do occur. It seems that a child does not have to learn to throw tantrums, but can and does learn not to.

These undirected tantrums *might* constitute an instinctive core of untaught action patterns, which are then elaborated, directed, and *suppressed* as the child grows up within a society. The pattern is seen in very different cultures and may be universal in small children. One writer says of a highly peaceful society, "[T]heir children seem to exhibit typical behavior [presumably angry or aggressive] toward thwarting agents. But they are *taught to be different* when they reach adulthood . . ."<sup>75</sup>

Taught by what? By the culture in which they grow up. Let us turn to that topic.

### Culture and Human Aggression

As with sexual behavior, by far the most potent determinant of a human's aggressive actions is the culture in which he or she was raised. The characteristics of whole societies determine the levels of aggressiveness and violence that their members display. As we did for sex, we will consider just two examples of this diversity.

In Tahiti, children are not rewarded for aggressive behavior by parents or peers. They are punished for it, not by blows but by parents' assurance that ancestral spirits will cause them accidents and bad fortune if they strike out. Tahitians have been described as "affable people who are slow to anger, who quickly get over any ill feelings, and who lack vengefulness and hostile aggressiveness. They are disinclined to create anger-provoking situations, and when they show aggression, it is generally expressed in words rather than physical fights."<sup>76</sup>

to imagine that he could have learned his apparent sexual urges there. (True, he might have seen animals mate; but how would he relate that to himself and to women?)

<sup>74</sup>Watson, 1924, p. 154.

<sup>75</sup>Mandler, 1984, p. 165; my italics.

<sup>76</sup>Bandura, 1973, p. 109.

Children can be raised in a society like that, and fit naturally into it as adults. Or they can grow up in a society like this:

All accounts of the Yanomamo [a tribe that lives near the Orinoco River in South America] are in agreement: They are one of the most aggressive, unpeaceful groups of people anywhere in the world. Fighting and intimidating others is a constant feature of their existence. The men demand immediate obedience from their women and frequently beat them to ensure it. The men also constantly "test" each other's "fierceness" and often fight among themselves over issues ranging from real or imagined insults to charges of committing adultery with each other's wives. Moreover, villages frequently wage war against each other, when the men's continual challenges and provocations lead to the ultimate aggressive behavior, the killing of human beings.<sup>77</sup>

Clearly, levels of aggression and violence, like frequency of sexual activity, can be modified up or down or by the course of instruction that characterizes a society. And—again as with sexual behavior—cultural training affects both the situational arousal of aggressive motivation, and its expression in action once it is aroused.

#### SITUATIONAL AROUSAL OF AGGRESSION

The young wife leaves her house one afternoon to draw water from the local well. . . . On her return from the well, a stranger stops her and asks her for a cup of water. She obliges, and in fact invites the man home for dinner. He accepts. The husband, wife, and guest spend a pleasant evening together, and eventually the husband puts the lamp out and retires to bed. The wife also retires to bed—with the guest. In the morning, the husband leaves early to bring back some breakfast for the household. Upon his return, he finds his wife again making love with the visitor.<sup>78</sup>

At what point in this scenario will the husband become angry or aggressive? It depends on the society in which the actors live. A century ago, a Pawnee Indian husband would hurl a furious magic spell at any man who dared request water from his wife. An Ammassalik Eskimo husband would be showing common courtesy in offering his wife to a visitor; he signals the offer by putting out the lamp. But he would be very angry if the episode were repeated the next morning, without a mutual agreement to exchange mates. Most American husbands would resent any man who made sexual advances to their wives; in some communities the husband might kill the guest, and local juries would acquit him—the famous "un-

<sup>77</sup>Hunter and Whitten, 1976, p. 397.

<sup>78</sup>Tavris, 1982, p. 46.

written law." But a husband of the polyandrous Toda tribe of southern India, at the turn of the century, would have found no grounds for anger at any point in the scenario.

The point is clear. Whether a situation arouses aggression depends on how we *interpret* that situation, and the interpretations are taught to us by our culture. A peaceful people, then, may be a people in which few situations are *interpreted* as grounds for aggression.

#### THE EXPRESSION OF AGGRESSION

Suppose we do interpret a situation as grounds for anger. What do we do about it? In this society, most of us feel that only a very serious situation justifies physical violence, but we are likely to feel that the verbal expression of annoyance—scolding the offender, let us say—is usually permissible. But even this is by no means universal. "Try getting angry in front of an Utkuhikhalingmiut Eskimo, as anthropologist Jean Briggs did, and you will be ostracized for your childishness."<sup>79</sup>

Finally, just as the details of mating behavior itself are constrained by cultural influences, so are the fine-grained details of the aggressive actions we do emit. Observations of Tahitian children provide an instructive example:

[L]ack of fighting is particularly striking among children in public settings. . . . [But when anger does get] serious in children's conflicts (I saw only two such episodes), the fashion of expressing a threat is carefully ineffectual. An offended boy chases his tormentor but never catches him, while other children look on with serious expressions. Then, giving up, the boy throws a small piece of dry coconut husk at his antagonist but carefully misses. Children are excellent marksmen in other kinds of throwing.<sup>80</sup>

It is as if, in this case, culture took hold of the action at a low level in the hierarchy—the finger and arm movements that give a missile its aim. The throwing itself *might* have been an instinctive action pattern. It is most unlikely that Tahitian boys are taught by their elders to throw things at each other; and after all, if a throw is aimed to miss, why throw at all? Perhaps there was an instinctive core to the action; but, if so, its details, at the finger-movement level, were carefully modified so as to ensure its harmlessness. We saw the converse case in sexual behavior (p. 127), where arousal seems to have primed low-level fragments of sexual approach, while any tendency toward organized and purposeful approach was carefully inhibited.

<sup>79</sup>Ibid., p. 44.

<sup>80</sup>Levy, 1973, p. 280.

## A Look Backward: Is Aggression Instinctive?

Is there an instinctive core to human aggression? Perhaps the most important thing to see is that this is a theoretical question. Its social implications, one way or the other, are minimal.

Confusion arises here because the question has often been confused with another question: Is aggression inevitable? The two questions are different.

If we ask the first question—is aggression instinctive?—we are asking: Do people have to be taught to be aggressive? We don't know the answer for sure. In the description of Tahiti, we are told that children are punished for aggressive behavior—not that they don't express any.

It is possible that aggressive motives, like sexual ones, are evoked by certain situations, but that cultural influences determine whether they are expressed in action, and if so, how. This could then be an example of a motive that *may* be instinctive in origin, but still modifiable by training.

If we ask the second question, we are asking: Can people be taught *not* to be aggressive? We do know the answer to that, and the answer is yes. The evidence is before us, in every peaceful person and every peaceful society. Perhaps we can stop arguing about that, and get on with the teaching.

## A LOOK FORWARD: CONFLICT AND CONVERGENCE

Two final complications, and then we will move on.

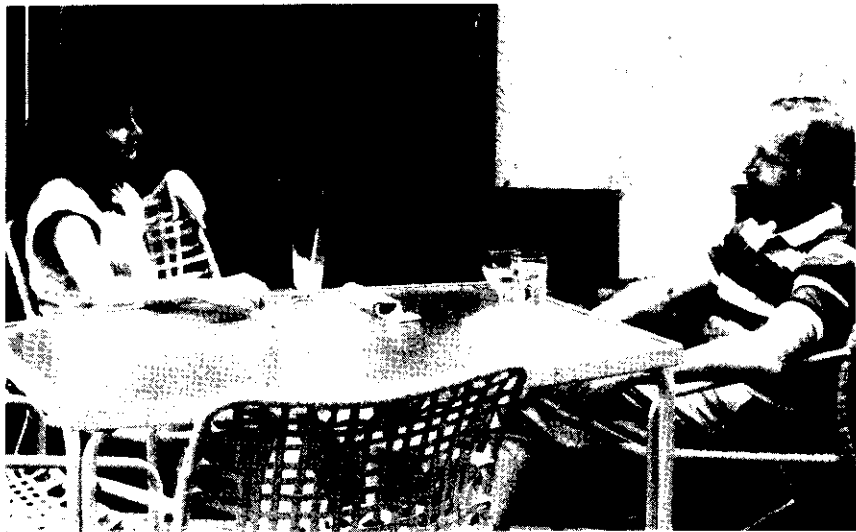
### Motives and the Lattice Hierarchy

First, we should remind ourselves once more that in complex creatures, even the simplest actions are subject to multiple controls. We can see this clearly in the case of aggression. Think about a bombardier who kills people he never sees, by pushing a button. He may be doing his duty, calmly and without anger. Is the action motivated by aggression at all?

We face a similar problem in sexual behavior. A prostitute's mating behavior may not reflect sexual motives at all, but economic ones. Or consider violent rape. The movements of forcible intercourse may be sexual, but the motive, most writers agree, is not sexual but aggressive. If so, then rape is not a sexually *motivated* act. It is the crime of assault.

The problem arises even in feeding behavior. Consider pie-eating contests; or, a less exotic case, consider how we may eat to be polite to a host, and not because we are hungry.

Such actions provide yet more examples of the *lattice hierarchy* in behavioral organization, in which a given action may be called into play by different motivational systems in different people or at different times (Figure 4-12). Any action may reflect any of a variety of motives, and these in turn may have little or nothing to do with each other.



**Figure 4-12.**

Drinking behavior can be called into play by a number of different motivational systems, including complex social ones that have little to do with the biological causes and effects of fluid intake.

### **Conflict: Priorities and Compromise**

The other major complication is this. In most human societies, sexual behavior is embedded in a complex network of expectations, obligations, constraints, and beliefs. Therefore, sexual motives must be balanced against many other motives. Sexual behavior will occur—if it does—only after resolution of the conflicts.

As an obvious example: Is sexual action *safe* in this situation with this partner? Adultery is punishable by death in some societies.

A less obvious example: Men of the Mae Enga of New Guinea believe that sexual intercourse puts them at risk for illness and even death, unless appropriate magical steps are taken to ward off the dangers. This may require the recitation of protective spells during the act of intercourse itself. Where such a belief is sincerely held, it is hardly surprising that sexual relations may be infrequent. In short, *sexual motivation* must be weighed against *fear of consequences*, real or imagined.

These are examples from sexual behavior, but obviously they arise with respect to any motive. Can we afford to buy a meal? We must consider that question, however hungry we may be. Is it safe to eat now? Is it polite to do so? And so on.

All this only scratches the surface, but that scratch is enough to reveal the complexities we face. Any serious discussion of human motivation must look forward to discussions of decisions, costs, allocation of re-

sources, and other considerations that later chapters will address. And it must consider the multiple reasons that may exist for feeding, fighting, or even mating actions. In humans, even the biological drives stubbornly refuse to stay within their biological context.

## SUMMARY

Sex and aggression are closely linked in many species, and resemble each other in some respects. Like hunger and thirst, they are subject to both internal and external influences. Unlike hunger and thirst, they are not homeostatic and do not serve to regulate any internal commodity. As a result they can be more variable in their expression, and more modifiable by learning.

*Ethologists* study the behavior of animals, usually in its natural environment. Early ethological researchers identified instinctive *action patterns*, patterns of movement evoked by characteristic *releasing stimuli*. In male sticklebacks, for example, attack patterns are released by the red underbelly of another male; courtship patterns are released by the swollen underbelly of a female. Action patterns are hierarchically organized; higher levels of the system activate lower-level components by priming their responsiveness to appropriate external stimuli. Thus releasing stimuli trigger courtship or attack only if hormonal conditions are appropriate.

Such instinctive action systems are characteristic of a species. And they are *untaught*. This means that their appearance in the animal's behavioral repertoire is not produced by any specific learning experience. It does *not* mean that learning cannot modify the action—a frequent source of confusion.

In some species, instinctive systems can articulate with *goal-directed* motivational states. In sticklebacks, behavior is variable and goal-directed until the releasing stimulus is encountered. From that point it becomes *stimulus-bound*, elicited by stimuli rather than directed toward a goal.

Sex in mammals, as in sticklebacks, can be influenced by internal messengers, the *hormones*, borne by the blood. In men, for instance, sexual interest and potency may be low if hormone levels are very low, and can be restored by hormone treatment. In women, ovarian hormones have not been shown clearly to affect sexual interest, but hormones secreted by the adrenal gland may do so.

But these hormones operate, in mammals as in sticklebacks, by priming responsiveness to external stimuli. The animal's hormonal state affects responsiveness to chemical signals (pheromones), or visual or tactile sexual excitants. Hormones may do this by affecting the pleasantness of such stimuli, as in the *alliesthesia* phenomenon in feeding.

Conversely, external stimuli can affect the body's hormonal state. In

some species that in turn can affect readiness to mate, though this has not been demonstrated in humans.

In some species, varied partners can keep male sexual behavior going much longer than a single partner. This *Coolidge Effect* may have evolved because males, but not females, can increase their number of descendants by mating with many different partners.

Learning can affect sexual behavior even in animals, where it seems to affect not so much arousability as the skills mating requires. Studies of "children without cultures" suggest that the same might be true in humans. With normal development in a society, however, culture selects and defines both the stimulus conditions for sexual behavior and the responses by which it may be implemented. This happens at each stage of a courtship-mating sequence. Even the goals are defined by one's culture, as when the society teaches us to seek a partner's pleasure as well as our own.

As with sex, hormones may prime aggressive behavior, but they do not cause it directly. There probably is no buildup of energy behind aggressive activity, as Lorenz proposed. The idea that aggression drains off such energy—the *catharsis hypothesis*—has not been supported by the data in humans or animals.

As with sex (and hunger), aggressive reactions may be triggered by the environment—by prey, pain or frustration, perhaps threat to the young, and others. There are also external *inhibitors* of aggression; for example, submissive displays, sexual signals, or the physical characteristics of babies. A failure of inhibition from the latter source may play some contributing role in some cases of child abuse in humans.

Human aggression, like sexuality, is shaped at every level by cultural training. We are taught what to be angered by, and what to do about it.

Is human aggression instinctive? If this means, "Is it partly untaught?" we are not sure. If it means, "Is it an inevitable part of our behavior?" the answer is no. We may not have to learn to be aggressive. We clearly can learn not to be.

Finally, aggression, sex, and even feeding and drinking can be responsive to many motives beyond biological ones. A full understanding of them must look forward to more complex mechanisms of decision-making, choice, and allocation of resources.