Irenäus Eibl-Eibesfeldt

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The Natural History of Behavior Patterns

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Translated by Geoffrey Strachan

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TO MY CHILDREN, ROSWITHA AND BERNOLF

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Preface to the Aldine Paperback Edition

There are turning points in evolution. Structures and behavioral patterns that evolved in the service of discrete functions sometimes allow for unforeseen new developments as a side effect. In retrospect, they have proven to be preadaptations, by serving as raw material for natural selection to work upon.

The origin of maternal nurturing was one such turning point in the evolution of vertebrate behavior—one of those celestial moments that Stefan Zweig would call a *Sternstunde*. My book, *Love and Hate*, now restored to the English-reading public, discusses this event. When it was first published in 1970, it was intended to complement Konrad Lorenz's book, *On Aggression*, by pointing out our motivations to provide nurturing, and thus to counteract and correct the widespread but one-sided opinion that biologists always present nature as red in tooth and claw, and by presenting intraspecific aggression as the prime mover of evolution. This simplistic image, regrettably, is nonetheless still with us, all the more regrettably because it hampers discussion across scholarly disciplines. Thus I am even happier that the new edition will be available to a broader public with an interest in human affairs.

In this book, I discuss the phylogenetic origin of our behavior and motivations, which provide the basis for our cultural evolution and thus for our humanitarian hopes. My goal is that the book might contribute to overcoming the barriers that still exist between representatives of the natural sciences and those of the humanities and the social sciences, who continue to perceive biologists who remind us of our biological heritage as presenting a fatalistic view of man-as-unchangeable beast.*

*Here and elsewhere in this context, "man" refers to the human species. A more exact rendering of *Mensch*, less awkward here than paraphrase, it should be construed (like the German word) as gender free and inclusive—ed.

Love and Hate came out in German in 1970. The British edition followed in 1971; the American, in 1972. Thus far the book has been translated into thirteen languages, and with the fall of the Iron Curtain, further translations are under way. The German edition continues to sell consistently, and passed the 100,000-copy mark a couple of years ago. The book traces the origin of prosocial, altruistic behavior, with the evolution of maternal (or parental) nurture as its starting point. With nurturing came the motivation to take care of another individual, as well as the rich repertory of caretaking patterns such as feeding, grooming, and protection. In the young, the motivation to seek protection and care as well as the signals to trigger such responses evolved in turn. These characteristics proved to be preadaptations useful for the evolution of adult bonding.

Comparative analyses reveal that bonding rituals such as courtship, patterns of behavior that reinforce existing bonds between group members, and many behavioral patterns showing appeasement can be derived from parental nurturing behavior and from infantile appeals.

With the evolution of individualized brood care, love, defined as an individualized bond, also originated in the context of parental nurturing, wherein the upbringing of the young takes a lot of investment in time and effort. It is important that the adults invest in their own (rather than others') offspring, and for the young it is important not to lose the parents by mistakenly seeking contact with other adults. The vulnerable youngsters would risk being attacked and even killed. Thus individual bonding must be characterized by a certain exclusivity.

With individualized bonding and exclusivity, the mother-child bond emerged as the first manifestation of "us against them." Many mammals have the capacity to establish individualized bonds to conspecifics, and thereby form small groups in which each group member knows the others. They form a sort of extended family, held together by the familial disposition evolved in the parent-child context. Also, in humans, this familial disposition is at the roots of in-group versus out-group behavior. The familial disposition allows humans today to live in groups numbering millions, bonded by symbols and ideology. If we look at the basic mechanisms employed to bond members who are not close kin, we find that they tap into the existing phylogenetic adaptations of familial origin mentioned above. At the level of the kin-based society, one common means of bonding is through wider extension of kinship principles, terminology, and accompanying behavior be-

yond the circle of close kin to more distant kin, and in some cases to non-kin.

This is done by the creation of segmentary lineage systems and other systems of descent: Groups trace themselves to a common ancestor and are held together by both kinship and reciprocity.

In societies based on segmentary kinship, ideology thus calls on the metaphor of kinship to create fictive descent from mutual ancestors or creators, thus bonding all as quasi-blood relatives. Indeed, terms to address persons who are not blood relatives are often derived from terms that characterize familial relations. And regardless of group size, we tend to demarcate ourselves according to the familial pattern of "ourselves and others." We greet the resulting cultural plurality as an enrichment, and value it also as a means to secure and to elaborate human existence in the stream of life. At the same time, we deplore the competiveness and fear that lead to intergroup aggression and warfare. Are we thus trapped in a positive feedback cycle promoting aggression and war?

I view our nurturing dispositions as the all-important antagonists of our violent ones. Since the mid-1960s, I have been engaged in the cross-cultural documentation of human social behavior, and in watching people through the camera, I have observed and documented predominantly friendly interactions—even in cultures whose members engage in frequent acts of violence and war. But humans are first and foremost familial, and within the family nurturing predominates, and so, too, in the individualized group in which everyone is familiar with the other, and whose members are thus as a result bonded quasi-familially. Leaders in such individualized groups are chosen for their prosocial abilities. Those who comfort group members in distress, who are able to intervene in quarrels and to protect group members who are attacked, who share, who in brief show abilities to nurture, are chosen by the others as leaders, rather than those who use their abilities in competitive ways. Of course, group leaders may need, beyond their prosocial competence, to be gifted as orators, war leaders, or healers.

Manifestations of repressive dominance are tabooed within the group, but not so between members of different groups, as the long history of intergroup aggression attests. But humans also have the capacity to become familiar with non-group members, and in the course of history, societies of millions of members have grown, and finally even the idea of a "family of man" has emerged. Our prosocial motivations seem stronger than our motivations for aggression, which, after all, can be sublimated in many ways. We must be aware, however, that in order to achieve world peace, the prob-

lems that were traditionally at one time solved by war and aggression now need to be solved by peaceful means. These problems are well known. Different populations on our planet seek to survive, and to keep their resources and their identities. But both are threatened by the global pressure of population increase that is about to ruin not only the ecological conditions necessary for survival, but also the social environment necessary for peace.

The text of the new edition of *Love and Hate* remains unchanged, since further investigations have confirmed the basic theses. I could have added a number of new examples, but then the book would have become bulky. In the original text of the book, I occasionally referred to now outdated ideas, e.g., *Arterhaltung* ('preservation of species'). We know today that selection does not operate at the level of species, but instead at the individual and group level. For those who are particularly interested in the subject, my treatise, *Human Ethology* (New York, Aldine de Gruyter, 1989) is available. As for war and peace, I refer my readers to a later book than the present one, *The Biology of Peace and War* (New York, Viking Press, 1979), in which I traced the cultural origin of war, its functions, and our potential for peace.

The key experience that led to this book struck me in 1954 on the Galapagos Islands. I was at that time a member of a diving expedition led by Hans Hass. I was fascinated by the large aggregation of marine iguanas covering the rocks on shore. They were evidently gregarious, since in some parts they basked tightly packed, side by side, yet they did not interact in the usual ways of birds and gregarious mammals, who show a rich repertory of prosocial behaviors, such as mutual feeding, grooming, and the like. The marine iguanas interacted only by display and submissive behavior. Even their courtship consisted of dominance displays by the males, and if a female was ready to copulate, she invited the male with a submissive posture, by lying flat on her belly. Later I found that in reptiles social behavior is generally based on dominance and submission, and so the question of how friendliness and love came into the world began to fascinate me. The result was this book.

I. E.-E.

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For the help they have given me during the course of my work I am indebted to a great many people, not all of whom can be thanked individually. I have received hospitality from countless mission stations in various countries and also received assistance through their local authorities, as well as from the consulates of Austria and the Federal Republic of Germany. My particular thanks are due to Professor Konrad Lorenz, who assisted my work in every possible way, and to Dr. Hans Hass, with whom I have made a number of expeditions. In the course of these, many of the lines of argument presented here were evolved both in conversation and in the observations we made together. I must also thank Dr. Inga Steinvorth de Goetz and her daughter, Frau Elke Fuhrmeister de Goetz, who made possible my journey to the Upper Orinoco. I should also mention with especial gratitude the collaboration of Herr Hermann Kacher, who drew all the illustrations for this book. In conclusion I must thank the Max Planck Institute, the Thyssen Foundation, and the A. V. Gwinner Foundation for the financial support they gave to my research.

I. E.-E.

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1

The "Human Beast"— a Modern Caricature of Man

In the history of mankind one bloody chapter follows another almost without interruption; and the picture has remained unchanged right up to the present day. The only difference is that now we possess atomic weapons, and in the event of war we run the risk of destroying ourselves. We have subdued the forces of nature, we have conquered epidemics and wiped out the beasts of prey that once threatened us. Now we are our own greatest enemy, unless we succeed in taming our aggressive urges.

Is there the slightest prospect of our doing this? Are we not ruled by an innate aggressive drive, by a lust for killing which at best can be repressed but never eliminated? In recent times this has been repeatedly asserted.

"Cain rules the world. If anyone doubts it, let him read the history of the world," wrote Leopold Szondi in 1969 (*201*).* In his view a murderous inclination is inherent in all men and he speaks of a "Cain-tendency," a drive factor with which we are born. Robert Ardrey has sketched a similar portrait of mankind (*8*).

The same thesis has been put forward in the weekly and daily press. Thus, *Time* magazine (*204*) says that man is "one of the world's most aggressive beasts who fundamentally enjoys torturing and killing other animals, including his fellow man. . . . His hormones urge him to copulate with his sisters and

* The italic figures in parentheses in the text refer to the list of sources at the end of the book.

daughters just as well as other animals do generally. But his cortex tells him to barter his females to strangers for political advantage. . . . He would like to murder his father, but his natural impulse is cunningly suppressed: one day he will be the old man."

So the argument runs thus: man is by nature inclined to kill, but understanding and reason enable him to curb these impulses. One could speak of a concept of the tamed beast. The good * in man is, in this view, a cultural achievement, while the evil is a consequence of dark impulses, over which he has no control.

This thesis of man's antisocial, "killer" nature is not new. It had already been advanced by the English philosopher Thomas Hobbes (1588–1679), when he recognized in man only the drive for self-preservation and the lust for power. According to Hobbes, the struggle of all against all, which is the logical outcome of this drive, can be prevented only by an absolute sovereign forcing men against their will to unite.

But equally old is the contrary thesis of Jean-Jacques Rousseau (1712–1778) that man in his original state is peaceful and friendly and is corrupted and made aggressive only by civilization. The argument about the "true" nature of man continues to the present day and there has been no shortage of advocates for the two extreme viewpoints.

The Hobbesian thesis has reappeared in various guises in the course of time. In this sense Thomas Huxley (1888) (*101*) interpreted Darwin's "struggle for existence" as a ruthless contest in which only "the strongest, the swiftest and the most cunning" remain alive. He compares the animal world with a gladiators' show: the participants are well treated and the next day they are sent out to fight. The only difference is that the spectator has no need to give the "thumbs down," for no quarter is given. Peter Kropotkin (1903) (*122*), on the contrary, holds that mu-

* We generally refer to aggression as "evil," and to love and friendship and everything that brings individuals together as "good." This is correct insofar as aggression, despite its contribution to the preservation of the species (and therefore in this sense a "good"), does carry with it a tendency toward pathological degeneration and thereby endangers our existence. We are often too aggressive, rarely too friendly.

tual aid is as much a natural law as mutual struggle. He points out that this view can also be found in Darwin but that people have paid more attention to Darwin's catch phrases than to his principal ideas.

The modern champions of the "human beast" theory refer both to the findings of behavioral research (or ethology) and to those of psychoanalysis. Both schools of thought have established that man has an innate aggressive drive, but these champions interpret this fact in a one-sided way. Some use it to justify and excuse aggressive behavior; others, while rejecting this extreme, conservative attitude, do not (curiously enough) protest against the misuse of behavioral research but reserve their fury for the science of ethology itself, as if it were responsible. Thus Arno Plack (*163*) accuses the ethologist of adhering to the doctrine that "all is struggle," of claiming that the aggressive drive is the basic drive in all living things, and of using this doctrine of the antisocial nature of man to justify a culture based on violence. Many of the criticisms mustered in Ashley Montagu's book *Man and Aggression* (*154*), are aimed in the same direction. One must therefore assume that these two men seriously believe ethology teaches that human nature is unchangeable and sees an innate aggressive drive as the dominant motive in human conduct.* It is the concern of this book to refute such views.

My basic premise here is that if a certain behavior pattern or disposition is inherited, this by no means implies that it is not amenable to conditioning, nor must it be regarded as natural in the sense that it is still adaptive (i.e., conducive to survival). A behavior pattern developed in the course of the history of the species can lose its original function. Thus, a strong aggressive

* Wolfgang Hädecke (*79*) has pointed out the danger of an ideological misuse of ethology: "The nature of ethological research, which is undogmatic and anti-ideological on principle, does not exclude the possibility of its being misused in a specific direction and furnishing arguments for such misuse. If ethologists do not guard against it, their findings may be placed at the service of one of the oldest doctrines in the world: that of the immutability of human society, and in particular the age-old principle of dominance and submission which is all too readily invoked. A science which investigates principally (though by no means exclusively) the inherited, and presumably unchanging, elements in our behavior lends itself to inappropriate use in this sense: indeed one must call it *misuse*. . . ."

drive may once have stimulated man's intellectual development and brought about the distribution of man over the whole earth, through the severe competition among different human groups. But an excess of aggressiveness today can lead us to total self-annihilation. One should not therefore accept aggression without reservation simply because it is innate, but strive to control it. After all, man is by his very nature a cultural being. Cultural control patterns do regulate his inborn impulses, as explained in more detail on page 31. This allows for a greater adaptability in our species, since cultural control patterns can change rapidly when circumstances demand it. Indeed we are now searching for new ways, since the traditional ones seem to a certain degree outdated. And it is here that ethological research can help us find the adequate measures by providing insight into man's nature. Ethology, as a biological science, seeks to investigate the functioning of those physiological mechanisms that influence a behavior pattern so that, by understanding the function structures we may be able to eliminate disturbances. In this process of investigation it may well become clear that some of the phylogenetic adaptations (those acquired in the course of the history of the species) are now retained like so much historical ballast, which is as useless—or even dangerous—to the organism as the caecum or "appendix." Behavior, too, has its "appendixes."

The basis for Plack's reproach that ethologists have recently been tracing everything back to the aggressive drive is not very clear, for Konrad Lorenz (*141*), whom Plack cites specifically in this connection, speaks insistently of a "parliament of instincts," making it quite plain that an animal is motivated by different systems of drives which often conflict. The aggressive drive is only one drive among many. But as the reproaches have nevertheless been made, it must be admitted that in previous discussions of aggression too little emphasis has hitherto been given to the social potential of men and animals.* It is in these tend-

* In my own *Ethology: the Biology of Behavior* (*Grundriss der vergleichenden Verhaltensforschung*) I have described in great detail the mechanisms that lead to the formation and cohesion of social groups. Hans Hass (*83*) also gives some striking observations about bonds, regarded from a general functional viewpoint, in his valuable book *Energon,* in which organic and economic structures are analyzed and compared.

encies toward sociability that the key to overcoming the problem of aggression will be found. I therefore propose to speak in some detail about the mechanisms for establishing bonds, those natural opponents of aggression, on which we can base our hope for a less bellicose future. Among the higher vertebrates, social repulsion (aggression) and social attraction form a functional entity, and I propose to present them as such here.

My thesis in this book is that both aggressive and altruistic behavior are preprogrammed by phylogenetic adaptations and that there are therefore preordained norms for our ethical behavior. In my opinion, man's aggressive impulses are counterbalanced by his equally deep-rooted social tendencies.* It is not only conditioning that programs us to be good—we are good by inclination. If we can demonstrate this, then my opening thesis—that goodness is merely a secondary cultural superstructure—is disproved. We will argue that the disposition to cooperation and mutual aid is innate, as are many specific behavior patterns of friendly contact. Why all these tendencies have not so far sufficed to restrain our aggressive feelings in all situations will also be discussed.

My starting point is the fact that as human beings, despite all our aggressiveness, we live in groups. I pose the question of just how we manage this. By what means do we maintain and form bonds with our fellow-men, in spite of the "aggression barrier"? Are there innate bonding drives that hold the aggressive drive in check? What part is played in this by the sexual drive? How do sociability and love develop both phylogenetically (in the course of evolution) and ontogenetically (during the lifetime of the individual)? And how does hate evolve?

The methodological approach I have used in this investigation is that of comparative biology, which proceeds from the understanding of our evolutionary history. As there are some misconceptions in lay circles about the value of comparisons between animals and man—and there are even some specialists in the humanities who speak in this connection of "inadmissible arguments by analogy" (*171*)—I intend before beginning the discussion to consider the basic concepts of ethology and the

* These friendly dispositions can themselves be misused of course: one has only to think of the dangers of excessive loyalty to a leader.

methodology of comparison, and to show how one can interpret similarities between species. To the reader untrained in biology it is not immediately apparent that we can learn things from the behavior of some bird or mammal that are significant for the understanding of our own species. At this point there is a discussion of the mechanisms of phylogenetic development and of such frequently used concepts as "adaptation," "ritualization," and "selection." I will then discuss aggression and bond-forming behavior patterns in both animals and man. I will show that the capacity to establish a personal bond has evolved phylogenetically, along with care for the young, and that to a certain extent this is repeated in the ontogenetic development of the individual. The human child first acquires the capacity to love another through love for its mother. The child would find it difficult, if not impossible, to identify with a group without first passing through this phase.

Man was originally created for a life in individualized groups. The transition to life in the anonymous community produces problems of identification. On the one hand the urge clearly exists to form a bond with strangers as well. On the other hand we can observe the inclination to cut oneself off in groups from others. We are inclined to cast members of an alien group in the role of enemies, giving rise to the question of whether we are adopting certain attitudes of mind involuntarily. For those engaged in peace research the illumination of these processes is of great importance. Man usually has less fellow feeling for strangers, and by the same token his aggressiveness toward them is less inhibited. This is one of the reasons why conflicts between different groups tend to be aggravated. The awakening of a new sense of social unity is therefore of vital concern. I shall discuss the prospects for this at the very end of my work.

In this book I make quite frequent use of the term "love." By this I mean not only sexual love but more generally the emotional, personal bond between one man and another, or the bond arising from identification with a particular group. The counterpart of love is hate, both hate as an individualized emotional rejection and the group hatred that arises from it. Strictly speaking we can only use the terms "love" and "hate" in this sense in the case of man. In animals all we can do is to note

purely descriptively either the individualized striving for contact and a bond or their aggression. Statements about the emotions that go with such behavior are fundamentally impossible for epistemological reasons. By analogy we can only conjecture that, at least in higher vertebrates, the relevant behavior patterns are also accompanied by corresponding emotions. Certainly the describable behavior patterns of making contact and rejection are often similar in animals and man. Such similarities often justify us in tracing them to the same roots. If, therefore, I speak on occasion of love, without expressly differentiating between animals and man, I am using this as a shorthand description for the sake of clarity, just as the physiologist will speak of "hunger" and "thirst" in animals.

Most of the drawings in this book are drawings based on film stills and still photographs. The details of the sources will be found in the captions. So that the reader can form an impression of the quality of the reproductions, some of the photographic originals are reproduced on pages 230–231. Other photographs that served as originals may be found by the interested reader in my own *Ethology: the Biology of Behavior.*

2

Preprogramming in Human and Animal Behavior

INNATE APTITUDE

Human beings are generally convinced that they act of their own free will. We think we have the ability to decide freely either to do this and to refrain from doing that. But when our anger is roused does it not sometimes cloud our clear judgment? And then do we not involuntarily say many things that would not be said in a different mood? Moreover are there not certain situations in which we react absolutely automatically and in what is in principle the same way, without reflecting in advance?

When speaking to babies we give a friendly smile and raise the pitch of our voices. We nod our heads encouragingly in conversation generally. When perplexed, we scratch our heads. In many respects we behave like programmed computers. The comparison is by no means far-fetched, for we do indeed react predictably—if this were not true, there could be no science of behavior. But this, in turn, means that at some stage in our development we must have been "programmed," and the question of how this process of equipping us with behavior programs has taken place elicits varying opinions.

Basically several methods are conceivable. Since animals and men have the ability to learn, they could acquire their behavior programs in the course of their ontogenetic development (i.e., their development as young individuals), as much through self-conditioning as from the example of their parents. But there is

the alternative possibility that organisms come into the world already equipped with behavior programs. This would mean that they have been programmed in the course of their phylogeny (the evolution of the species)* and that their behavior patterns are innate, just like the physical structures with which they are born.

The "environmental theory" puts forward the view that, apart from a few reflexes, as human beings we learn our entire behavior programs in the course of our ontogenetic development. The newborn baby comes into the world a blank page, as it were. Only recently Ashley Montagu (*154*) said: "There is in fact not the slightest evidence or ground for assuming that the alleged 'phylogenetically adapted instinctive' behavior of other animals is in any way relevant to the discussion of the motive-forces of human behavior. The fact is that with the exception of the instinctoid reactions in infants to sudden withdrawals of support and to sudden loud noises, the human being is entirely instinctless." This belief in the exclusively cultural determination of human behavior is widespread. It is the underlying premise, too, for a number of political utopias. According to the environmental theory, not only physical motor sequences but also the human being's dispositions, such as, for example, the striving for dominance or aggressiveness, are the product of conditioning. Those who consider either tendency to be antisocial will speak of bad programming through education and advocate the rearing of children in such a way that the undesirable tendencies never develop.

In practice man has proved to be firmly resistant to attempts to educate him differently in quite specific areas. Perhaps there are after all elements of preprogramming in human behavior and, if so, in which areas?

It was initially in animals that biological behavioral research showed that specific motor patterns could be present as "adaptations" evolved by the species. Animals come into the world with an innate capacity for certain movements. As soon as it is hatched a chaffinch knows how to open its beak wide to beg for

* By means of mutation and selection. See p. 33.

food, a chicken how to peck for corn and a duckling how to dabble in the mud for food. And a duckling will do this even if it has been hatched by a hen; it will not, for instance, follow the foster-parent's example and peck for grains of corn. The duckling has inherited this coordination of movements for filtering mud from its parents as an "inherited coordination" or fixed action pattern. To be precise, it is not, of course, the motor pattern that is inherited, but only the set of instructions encoded in the genes on the basis of which those nervous structures and connections develop that underlie the behavior pattern. Inherited motor patterns are not necessarily always fully matured at the moment of birth or hatching. Many behavior patterns mature only gradually, as experiments have shown. Thus F. Sauer (*177*) by rearing whitethroats individually and insulated from sound, has established that they developed their species-specific calls and song without any example to copy. It is true that certain environmental conditions have to be fulfilled for this development to take place; what is striking is that the bird develops the species typical song pattern without being exposed to the patterned information of the song. We can therefore assume that the information about the song pattern is all contained in the genome and is decoded during the ontogenetic process of self-differentiation.

When carrying out a deprivation experiment, ethologists are concerned with how the observed adaptedness of a behavior pattern comes about. If two birds sing the same song, if two mammals exhibit the same expressive movements or otherwise show their behavior to be molded to fit certain environmental features, in all such cases we are forced to assume that a common pool of information has been tapped. That means that information about the environmental feature which the behavior in question copies or was shaped to fit must have at some time been fed into the organism. This acquisition of information can take place during ontogeny by learning or during phylogeny. By withholding patterned information we can check whether the adaptedness in question is a result of individual learning or of phylogenetic processes.

Inherited motor patterns have also been demonstrated in

mammals. The Central European red squirrel hides nuts in autumn as a provision for winter. In so doing it follows a uniform pattern: with the nut in its mouth it climbs down to the ground and looks about until it finds the base of a tree trunk, scrapes out a hole with its forepaws, lays down the nut, presses it in firmly with its nose, and finally scrapes back the loose earth over the nut with its forepaws. This behavior pattern is not seen at all in baby squirrels, for they are born in nests, blind and naked. But I have reared several squirrels in such a way that they had no examples to copy and no opportunity to learn how to hide nuts by trial and error. Nevertheless, these animals were able to carry out the species-specific hiding technique. When I gave nuts to the grown squirrels for the first time, they began by eating them. When they had eaten enough, they started to hide the nuts. Each squirrel would run round the room with the nut in its mouth until it finally began scrabbling away in a corner; after that it laid down the nut, pressed it down with its nose, and finally made the raking over and pressing down movements with its front paws—although it had not dug up any soil. This shows clearly that what we have here is the blind unfolding of a hereditarily programmed behavioral sequence (*45*).

Observing inexperienced squirrels teaches us something else besides. In their efforts to hide the nuts the squirrels show a marked interest in vertical obstacles. It is most frequently beside table legs, chair legs, or in corners of the room that they begin their digging movements. This innate preference for vertical objects stems from the fact that squirrels most frequently bury things at the bases of tree trunks or rocks, which facilitates finding them again later. Thus these animals not only inherit the mechanisms for hiding food, but also, in broad terms, a knowledge of the most suitable hiding places.

But what about human beings? Are we also equipped with innate motor patterns? Certainly a baby does not need to learn how to suck; it can also smile, cry, cling, and much else besides. But many human behavior patterns develop only gradually in the course of growing up, and it is hard to establish which of these have simply matured and were therefore programmed in

advance. Human beings cannot be reared so that they are deprived of experience. Nevertheless, children are occasionally born blind, or even blind and deaf, and the study of such children is particularly informative in relation to the question under discussion. Blind and deaf children grow up in permanent darkness and silence. They never see their mother's smile nor hear the sound of a human voice. If the most extreme tenets of the environmental theory were true we should expect such children to differ greatly in their behavior from healthy people who have grown up normally. But in observing children born deaf and blind I have established that this is not so. At many crucial points they behave almost exactly like us. For example, they smile and laugh as we do when they are happy and emit the correct sounds when they do so. In addition, they weep as we do, stamp their feet, clench their fists, and frown when something annoys them (Fig. 1).

The possible objection that the children might have learned,

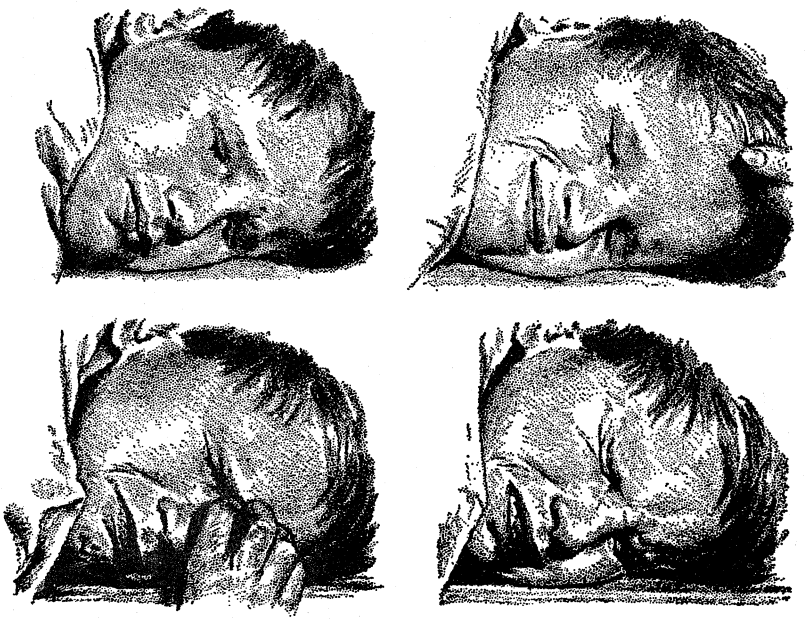

Fig. 1. Facial expressions of a nine-year-old girl born deaf and blind. Above, left: relaxed mood; right: smiling; below: crying (from film stills by the author).

say, to smile because they had constantly been rewarded with friendly encouragement whenever they "happened" to show a behavior pattern similar to smiling, can easily be overcome. Even severely mentally handicapped children smile, laugh, and weep—though it is impossible, even with great effort, to teach them to eat with a spoon. It is unthinkable that they could have learned complicated motor patterns while failing over tasks that are much simpler to learn. Anyone still insisting on the hypothesis of learned behavior would have to postulate, as a supplementary hypothesis, a particular innate disposition to learn. Nor will the argument hold water that the children could have explored with their fingers the faces of their parents or those who look after them and thus read the expression and copied it. I know a boy who was born blind and who, probably as a consequence of thalidomide damage, possesses only little stumps of hands with which he cannot feel anything. His facial expressions are essentially normal; he laughs, for example, as we do when one plays with him.

One final argument that can be marshaled against the learning theory is that such children also develop a whole range of "naughtiness"—for example, typical human angry behavior. Certainly no one has taught them this, nor can they have had the opportunity to feel adults who were stamping their feet, clenching their fists, and looking angry—and so assemble data about the expressions and gestures of anger. Ultimately such behavior patterns evolve directly without the educative pressure of the environment. The same is true of certain basic social attitudes. Normal children are afraid of strangers. This same shyness of strangers is also shown in blind and deaf children, who can distinguish familiar people from strangers by smell. They reject strangers at first, even though they have never been treated badly by strangers. Quite the reverse: everyone makes an effort to be nice to these children.

There is nevertheless a limit to the data we can obtain from blind and deaf children, since many of the most complicated human behavior patterns—say greeting and flirting—are elicited via the eye and the ear. These gates of perception are closed in deaf and blind people so there is no possibility of experimenting with them. But more is innate than is commonly sup-

posed; this I have observed in a ten-year-old girl, born blind but with perfectly good hearing. She played the piano for me and I paid her a compliment. She immediately blushed and turned her face briefly toward me and then looked down, just as any sighted girl does when she is bashful.

If we wish to know how much in the complicated behavior patterns of mankind is innate, then we must generally rely on comparisons between different cultures. One may take as a starting point man's tendency to vary culturally whatever can be modified. In New Guinea alone several hundred dialects are spoken. This is part of the tendency of human beings to isolate themselves into small groups, especially by means of customs—a phenomenon known as "club-formation" when it occurs within an ethnic group. But if one finds that, in certain situations, such as a greeting, or the behavior of a mother toward her child, the same behavior patterns recur repeatedly even among the most differing peoples, then it is highly probable that these are innate behavior patterns. Charles Darwin in his day worked on this assumption and in so doing laid the foundations for the comparative study of the expression of emotions in man and animals. But he lacked the means for objective documentation of behavior. In his day film was not yet available. This situation has long since changed and today man is certainly the most filmed being on earth. One might therefore suppose that it would be no problem to verify this question about innate elements in human behavior. One would have only to take films from one of the larger film archives of psychologists or anthropologists and examine, say, the greeting behavior of different peoples for common invariables, taking great care that these represent unposed natural documents of human behavior (for man alters his behavior considerably if he notices that he is being filmed).

But anyone who sets out to make use of film archives in this way will rarely come across such documents. There are certainly a great many films showing cultural activities such as mat-weaving, tool-making, or set dances. But how people greet one another, how they flirt, or cuddle a child has never been systematically documented.

During the past few years, in collaboration with my friend

Hans Hass, I have directed my efforts toward the collection of this kind of data. Using cameras with "mirror lens" attachments, containing prisms that permit filming to the side, we have filmed people in the most varied parts of the world without their knowledge. With each film document we made a written record of what the person did before and after being filmed and in what social context the behavior pattern in question took place, for it is only in this way that one can avoid an oversubjective interpretation—a great source of error. The comparison of such documents has revealed similarities extending to the details of the motor sequence. Thus, among the most differing

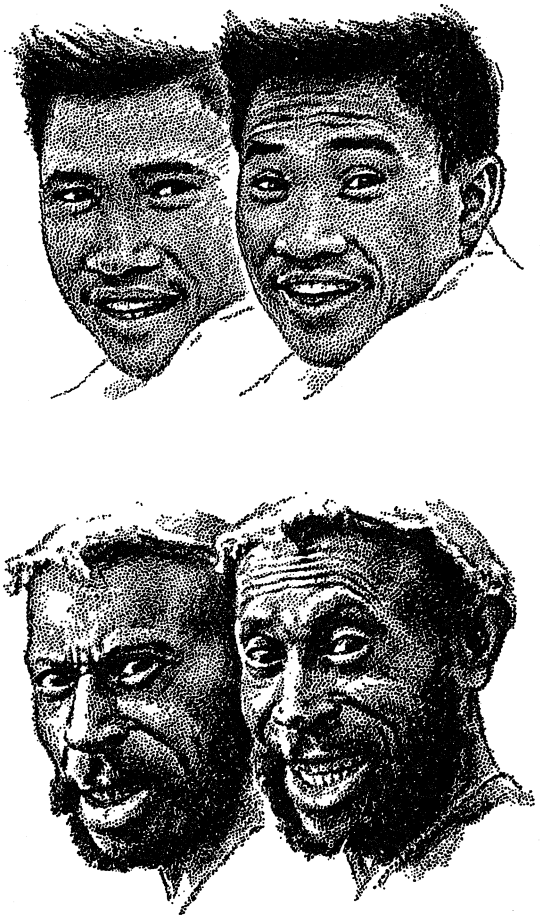

Fig. 2. In greeting with the eyes the eyebrows are jerked upward for about one sixth of a second. The series of people shown in Figures 2 and 3 shows in each case the facial expression at the moment of visual contact and on greeting with the eyes. They are drawn from film stills. Above: Balinese; below: Papuan (Woitapmin); (photographed by the author).