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Animal Sociology
by
Joan Shambrook Weer

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Submitted for Honors Work
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Paul Miller

Project Advisor

The study of animal behavior has fascinated man ever since the time of Aesop. By long historical tradition, people have seen parodies of human behavior in the actions of animals. However, this subject did not receive any serious attention from scientists until the middle of the nineteenth century, when Darwin devoted part of his attention to the theory that the adaptation of an animal is largely accomplished through its behavior.

During the early twentieth century men like S.J. Holmes, Jacques Loeb, and Claparède followed Darwin's lead but dealt mainly with the lower organisms. Ironically, two significant discoveries at this time -- the rediscovery of Mendelian inheritance and Pavlov's discovery of the conditioned reflex -- actually impeded the advancement of the science of animal behavior as the majority of biologists became interested in the new science of genetics or the scientific analysis of learning and no longer concerned themselves with the broad problem of adaptation.

Finally, around 1920, two new discoveries concerning the behavior of birds revived the study of animal behavior and advanced it beyond its previous position as merely a branch of entomology. Howard's insights into the significance of song and territory and Schjelderup-Ebbe's description of the social hierarchy of hens were the stimulating new discoveries. Shortly afterward, began to appear the names of such men as W.C. Allee, Lorenz, and Wheeler who were to be only the first of many students of animal behavior. Today such names as Irven DeVore, Margaret Altmann, Clarence Carpenter, and J.P. Scott stand out in this field, and at this point, we arrive at the subject of my essay as, in the following pages, I am going to present a brief resumé of some of the recent information that has been uncovered by such scientists as these. As this paper is read, it may appear that I have ignored the most probable subjects

for discussion since I say very little about the well-known "social species" such as ants, bees, and termites. However, for the very reason that they are so well-known, I have chosen to exclude them in favor of animals whose social behavior is less celebrated or has been the subject of more recent investigation.

From the preceding paragraphs it is apparent that the idea of innate co-operation among animals has been a long time in being accepted. One reason is that such co-operation is not always plain to the eye. Another reason is that competition, a supposed contradiction of co-operation, can readily be observed. For a long time, it seemed that, social species aside, crowding, the simplest start toward social life which is easily apparent, was harmful both to the individual and to the race. It has been known from experimental evidence since 1854 that crowded animals may not grow at all, or, at any rate, grow less rapidly than their uncrowded brothers and sisters.¹ And under many conditions crowded animals not only do not grow, but they die.

Yet for some reason, under natural conditions and with very many sorts of animals, crowding in all degrees does occur and apparently always has occurred. Conceded that animals do not always act for their own best interest, still they must do so to a certain degree or be exterminated in the long run. Thus, even though the advantages of a long-established habit of a species may not be obviously apparent, it is not safe to say offhand that such advantages do not exist.

In the remainder of the paper, I will deal with four of the social relationships that often occur in such "crowds" or groups of animals. Perhaps an investigation of such social phenomenon will shed light on some of the obscure advantages of animal habits.

¹W.C. Allee, The Social Life of Animals (New York, W. W. Norton and Co., 1938), p. 62.

The four social phenomenon to be reviewed are:

Social organization in general

The structure of associations (hierarchy)

Maternal behavior

Socialization of young

Social organization

The word "group" refers to any collection of persons who are bound together by a distinctive set of social relations. It can be highly organized and stable or very fluid and temporary. However, almost all groups are patterned in some way. At any given time there are usually dominant groups and subordinate groups, allies and enemies, dependent areas and independent areas. Some of the members are at the center of the group, able to communicate with or influence many parts of the group, while others are on the fringe with limited access to other members of the group. Furthermore, group structure is not static; it is the product of continuous interaction in which the relations among the group are constantly being tested and transformed. The following are the basic forms of group interaction:²

competition, rivalry, and conflict -- Competition is the mutually opposed effort to secure the same scarce objectives. Rivalry is a form of conscious competition between specific groups. Conflict is when the competition is so keen that groups do not merely compete for the same scarce goals but seek to injure or even destroy each other. Often conflict increases the internal solidarity of the conflicting groups. co-operation -- Co-operation is agreed upon joint action. Each group gains, either in an immediate advantage or indirectly in seeing its ultimate goals advanced. However, they need not gain equally. Weak groups usually gain more from co-operation than do strong groups, and the latter are therefore often reluctant to enter agreements with weaker groups.

²Leonard Broom and Philip Selznick, Sociology (Evanston, Row, Peterson and Co., 1961), p.28.

accommodation and assimilation -- Accommodation is the mutual adjustment of groups that retain their own identity and interests. The conflicting groups adapt themselves to immediate realities. Dependent on each other, they find a way to keep themselves alive despite the continued existence of unresolved issues. The process by which the identity of groups is fused is called assimilation.

isolation and integration -- The degree of integration of social groups is the extent to which they share a common outlook, communicate with each other, depend on each other, and share responsibilities. Isolation reduces the chances that an individual will act in accordance with the needs of the larger society of which he is a group.

In a group or social organization, roles play a very important part. A role is a pattern of behavior associated with a distinctive social position such as father, leader or teacher. Furthermore, most roles specify the rights and duties belonging to that social position. Roles are usually complementary or reciprocal. For example, the role of superior is complemented by the role of subordinate. In addition, the elaboration of roles is closely related to the division of labor as roles include ways of fixing responsibility for all the jobs that have to be done. Therefore, the greater the complexity of the society or group, the more different roles there will be.

All of the above information was taken from a textbook used for an introductory sociology course. Naturally, the information refers to the study of human social groups. But must it refer to only human social groups? How much of it, if any at all, can also refer to animal groups?

Let's begin our investigation of animal sociology by looking at a report by C.R. Carpenter on his study done of the wild population of the howling monkey on Barro Colorado Island in the Panama Canal Zone (1959).³ His report is considered to be one of the best general studies on the social organ-

³John Paul Scott, Animal Behavior (Chicago, University of Chicago Press, 1958), p. 163.

ization of higher animals that has ever been done.

The howling monkeys are rather small primates with hands, feet, and even tails developed for grasping. They live in groups in treetops, spending the night asleep in the trees and arising early, to move about in the trees in search of food. They rest during the middle of the day and then move on to feed in another place in the late afternoon. At dark they settle again in the treetops to sleep until the next morning.

One of this species's outstanding peculiarities is the small amount of fighting behavior that occurs among the members of the group. Chimpanzees and rhesus monkeys readily fight in instances where howlers only give out a loud roaring cry. Another outstanding aspect of their behavior is the prominence of allelomimetic actions. ("Alloleomimetic" may be simply defined as behavior in which two or more animals do the same thing, with some degree of mutual stimulation.)⁴ They constantly follow each other's movements while they wander about and feed. The males tend to stick together as they move through the trees with each one exploring for routes from one tree to another. When one is successful, he gives a clucking noise, and the others rush to follow him.

These types of social behavior are organized into definite social relationships. The most prominent relationship being that between a female and her infant off-spring. The mother constantly responds to the young monkey, carrying it everywhere during the first year or so of its life, picking it up if it falls on the ground, crouching over it at night to protect it from the cold or rain, and occasionally feeding it twigs as it grows older. Before it is weaned, at approximately two years, it often rides on her back with its tail coiled tightly around hers. The whole relationship may be described as one of care-dependency, consisting of a great deal of care-giving behavior on the part of the mother and going along with this, the nursing and care-soliciting behavior of the young one. When the infant falls, it cries,

⁴Ibid., p. 18.

and when it is restored to the mother's arms, it makes a sort of purring noise. The adult females do not fight with one another and usually stay close together, forming a little group of females and offspring within the clan. When the clan moves, they tend to follow the males in a group. However, there is no evidence of leadership among the females, a fact that is true also of the males.

Although the young monkeys stay by their mothers in the group of females, they still have a good deal of contact with each other. They chase each other through the trees, sometimes biting and wrestling, and these playful contacts seem to be the only fighting that takes place among this species. Frequently weak dominance relationships are developed among the young.

When a female is in heat, she will approach any nearby male and initiate sexual behavior. The male stays with her until sexually satiated and then the female moves on to another male. There is no evidence of jealousy or of one male being preferred above another. The sexual relationships are therefore temporary and non-specific.

The old males are usually indifferent to the young, but if a young monkey falls out of a tree, the males become very excited until it is rescued. The males will sometimes pick up the young one if the mother is unable to do so. Although the males of a particular clan do not fight among themselves, they roar at any other group or individual that comes near. They do this in unison, and we can see in this behavior a relationship of mutual defense.

From this brief look at the wild population of a specific species of primate, one can readily see that the field of sociology is not restricted only to the human race. In the preceding account, we have seen examples of several of the basic forms of group interaction, listed earlier. Integration and co-operation are the most conspicuous forms, however, in a more extensive study of the howlers, one could also find examples of competition, rivalry, and conflict.

The howling monkey society emphasizes three behavior relationships -- care-dependency, leader-follower (allelomimetic), and sexual relationships, all of which are usually well developed in other primates as well. However, social organization may be radically different among primate groups. In contrast to the howlers, male baboons are fiercely possessive of the females. Also in contrast is the baboon group organization which is structured around the dominance hierarchy of adult males. The nature of this hierarchy varies between groups according to the constitution of each group. The simplest form of organization is probably that of groups in which one, and only one, adult male is conspicuously dominant. The group consists typically of from one to four, rarely as many as nine, females who follow a single adult male, as do their offspring until they reach the age of one or one and one-half years. The juveniles, sub-adult males, and some adult males without females, live outside these units, yet all these, together with other one-male groups, tend to congregate in very large numbers at sleeping areas.

In looking at another primate group in the wild, the gorilla, we see another social structure that is quite cohesive. The central core of each group is composed of the dominant male and all females and young. The extra males, both black-backed and silver-backed, tend to be peripheral, a phenomenon similar to that occurring among the baboons. The diameter of a group at any given moment rarely exceeds 200 feet as every animal remains attentive to the movements of others in the dense forest environment.⁵ Except for extra males, single individuals rarely are more than 100 feet from other members of the group.⁶

The behavior of the gorilla group is coordinated by four means:⁷

⁵George B. Schaller, "The Behavior of the Mountain Gorilla," in Primate Behavior, ed. by Irven DeVore (New York, Holt, Rinehart and Winston, 1965), p. 344.

⁶Ibid., p. 344.

⁷Ibid., p. 344.

1. Postures and gestures are important. A dominant male who stands motionless, facing in a certain direction, indicates that he is ready to leave, and the other members of the group crowd around him. An unexplained sudden run by an animal communicates danger. In order to be groomed, a gorilla merely presents a part of its body to another animal.
2. How much facial expressions communicate emotions is difficult to determine, for many occur in conjunction with gestures and vocalization. Some facial expressions, like the wide-open mouth and exposed teeth of angry animals, probably emphasize and elaborate information communicated by other means.
3. Vocalizations and other sounds are occasionally an important means of communication in dense vegetation, for not until the animal has drawn attention to itself is further communication by means of gestures or facial expressions possible.
4. Physical control appears to be of importance only in females handling their infants. A female pulls her small infant back when it wanders too far from her side, and she regularly shifts it from her chest to her back and vice versa.

The small number of overt social interactions is a most striking aspect of gorilla intragroup behavior. The most frequently noted interactions are dominance, mutual grooming, and social play. Although the members of a group spend most of the day very close to one another and are highly tolerant of each other, persistent aggregations of specific individuals are rare. Various members seek the vicinity of the dominant male for brief periods of time -- females now and then approach the dominant male to lie by his side and often rest their heads on his saddle or lean against his body. Also the infants and young members are attracted to the leading male.

The counterpart of one of the basic forms of social interaction, isolation, is apparent in the gorilla society in the existence of the "lone males", the males living on the peripheral

of the group. (Lone females have never been observed.) In a study of gorillas done by George B. Schaller in the Congo, six years ago, the response of groups to lone males was observed three times.⁸ Once a silver-backed male merely walked into a group without eliciting a reaction. In another instance, the dominant male of a group stared threateningly at an approaching lone silver-backed male, and the latter made no further attempt to join the group. A third time, two lone males, a silver-back and a black-back, approached and remained at the periphery of a group one afternoon; they were seen in the group the following day and had both left by the third day. The lone males associated with some groups but *not* with others. Of the six groups studied intensively, they were seen only with two of the groups, suggesting that the lone males exercised some form of selectiveness. It is possible that through previous contacts they have learned which group will accept them and which will not.

A study by Reynolds and Reynolds of chimps in the Budongo Forest in Central Africa will be the last investigation reviewed here in regard to general social organization.⁹ Many hunters, explorers and naturalists who have traveled in equatorial Africa in the last century and this have brought back accounts of free-living chimpanzees from personal knowledge and observation. Both these reports and the final analysis of the Reynold's observation state that chimp groups are not closed social groups and that they do not live in family groups. The groups are constantly changing, splitting apart, meeting others, congregating and dispersing. When two of these temporary associations come together, certain forms of behavior are observed that are not normally apparent in intragroup interactions, and this behavior varies in accordance with the age and sex composition of each group.

⁸Ibid., 339.

⁹Vernon Reynolds and Francis Reynolds, "Chimpanzees of the Budongo Forest," in Primate Behavior, ed. by Irvan DeVore (New York, Holt, Rinehart and Winston, 1965), p. 344.

If there is a mature male in each, there is normally a certain amount of excitement, which is greater when more males are present. Males may drum on tree trunks with their hands or feet, shake branches, run along slapping at the ground with their hands or call loudly. Females and juveniles often rush out of the way screaming loudly. Occasionally the chimps in an area vocalize and drum for several hours continuously. These prolonged outbursts are said to be memorable and exciting to any human observers. Sometimes whole valleys along a stretch as much as a mile resound and vibrate with the noise. Garner wrote that, according to native hearsay, "One of the most remarkable habits of the chimps is the kanjo as it is called in the native tongue."¹⁰ The word kanjo is translated to mean "carnival" but the word in the native language implies more than carnival. Garner went on to describe how the chimps fashion a drum from damp clay and wait for it to dry. Then the chimps assemble by night in great numbers and the "carnival" begins. One or two will beat violently on this dry clay, while others jump up and down in a wild grotesque manner. Some of them utter long rolling sounds as if trying to sing and the festivities continue in this fashion for hours, whereas ordinary outbursts of calling and drumming last only a few minutes. Although it was not possible to know the reason for this unusual behavior, Reynolds and Reynolds report that twice it seemed to be associated with the meeting at a common food source of bands that may have been relatively unfamiliar to each other.

The behavior of a single chimp or of a small group of from two to six individuals moving about together is normally sedate. The adult chimps climb up and down trees slowly, traveling from place to place in a leisurely manner, and seldom call out. When ten or more are together, there is an increase in the tempo of normal behavior. Individuals leap and swing more actively through the branches, more chasing is observed among the males, the distances covered during a day

¹⁰Ibid., p. 408.

may be greater, and there is normally an increase in vocalizations.

On approaching a food tree in which another group containing one or more males is already feeding, each member of the arriving group usually pauses for about half a minute on a low branch and then climbs up and approaches and greets one or more of the chimps in the tree, its place on the low branch being taken by the next newcomer. If the group established in the tree consists of females and juveniles, the members of another group do not pause before climbing up.

The structure of associations (hierarchy)

Human society is more or less closely organized and stratified. Social stratification is the classifying of members into categories and the placing of these categories above or below one another on a scale of superiority and inferiority.¹¹ This scale forms the social hierarchy of a society. Sometimes, as in military circles, some business organizations, and certain universities, there is a line organization which extends in a definite order, step by step, from the highest official to the lowest rank. Frequently, however, the organization is less complex, less intrinsic and more temporary.

It has been known for some time that in herds of larger mammals, where one can distinguish individuals, the group may be organized to some extent along the same lines as a human group with a dominant leader and frequently sub-leaders that stand out above the common run of the herd. Hafez, reports in The Behavior of Domestic Animals that levels of aggressiveness and types of agnostic behavior vary among domestic species and even between breeds or strains within species. For most domestic animals the social order is based on some form of domination. Aggressive and submissive behavior may be vocal signals, posture stances, or gestures, in addition to manners of attacking an opponent. Schloeth, in 1956, described the

¹¹Broom and Selznick, p. 165.

posture and signals for a number of bovine species. Dogs may growl, snap, or bite; cows bunt or butt; horses may kick, attempt to bite with bared teeth and ears laid back; chickens peck; and pigeons and turkeys slap an adversary with one wing as well as peck.¹² Subordinate status is shown by some form of crouching. Infantile behavior may even be evoked by extreme harassment. Although repeated encounters between dominant and subordinate members of a pair reinforce these habits, the submission or mild advance of the inferior is a weaker stimulus for aggression than is the normal posture. Therefore the intensity of aggression becomes reduced as does also that of avoidance, and the behavior patterns often shift to symbolic forms such as threats and other gestures. Thus toleration develops within the group. It is possible for the tolerance between some pairs of individuals to develop to the point of extinction of agnostic behavior and the dominance-subordinate relationship.¹³ In some cases incidences may arise to renew the relationship or to cause a reversal of dominance.

It has been discovered that flocks of chickens, for example, are often organized into a social hierarchy, frequently with a well-recognized social order which runs through the entire flock. The first study of the social hierarchy of birds was done by a Norwegian named Schelderup-Ebbe around 1935. Since then, there have been many studies done with fowl. Among birds, social rank is in part a matter of seniority. Mature chickens usually dominate immature ones and maintain their dominance long after the former youngsters have become fully mature and possibly stronger. This is good evidence that memory of former defeats plays a role in maintaining the social order once it is established.¹⁴

¹²A.M. Guhl, "The Social Environment and Behavior," in The Behavior of Domestic Animals, ed. by E.S.E. Hafez (Baltimore, Williams and Wilkins Co., 1962), p. 102.

¹³Ibid., p. 103.

¹⁴W.C. Allee, p. 190.

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¹³Ibid., p. 103.

¹⁴W.C. Allee, p. 190.

Maturity, strength, courage, pugnacity, and health all seem essential qualities for dominance. However, weight seems to make little difference. The location appears to be a determining factor at times -- the one who is in his home area usually wins more battles.

Among chickens, the males dominate the females. This is generally true among birds where the males is larger and more showy. With parakeets and pigeons, the females are dominant over the males except in the breeding season. With some herds of mammals, such as sheep, leadership rests with an old and experienced female. In such herds the females and young frequently make up the more stable part of the social group to which males attach themselves during the mating season. With other mammals, such as gorillas and horses, the male is the leader, sometimes a jealous one, that drives other males out of the herd although in some cases several males are tolerated.

In returning to the study of the social hierarchy of fowl, it seems worthwhile at this point to take a closer look at a social phenomenon that has had quite a bit of publicity in the last several years -- the pecking order of chickens. The organization of flocks of chickens is rather firmly fixed. This is particularly the case with hens. The social order is indicated by the giving and receiving of pecks, or by reaction to threats ~~to threats~~ of pecking; and hence the social hierarchy among birds is frequently referred to as the pecking order. When two chickens meet for the first time, there is either a fight or one gives way without fighting. If one of the two is immature while the other is fully developed, the older bird usually dominates. Thereafter, when these two meet the one which has acquired the peck-right, that is the right to peck another without being pecked in return, exercises it.

The intensity of pecks varies. A chicken may peck severely, lightly, or only threaten to do so. It usually turns its head, points its bill toward the subordinate, and takes a few steps in that direction.

There may be one bird at the top of the pecking order, or several, all of whom are pecked by the other top ones and likewise peck the other top ones. If a hen that is the alpha hen (the one at the top of the pecking hierarchy) is pecked by a low-ranking member, other low ranking members often peck at the impinging hen.¹⁵ This is also known to occur among male chickens.

The lowest ranking chicken in a flock shows signs of isolation. He tends to avoid social contacts and often shows signs of fear. He spends time in out-of-the-way places, feeds after others have finished, and makes his way around cautiously, apparently with an eye out to avoid contacts. The lowest ranking chickens often appear lean, and their plumage is somewhat more ruffled because they have less time to arrange it. Dominant birds, on the other hand, are characterized by a complete absence of signs of fear or of any attempt to avoid birds of lower ranks. In studying the sexual behavior, the number of matings stands in direct relation to social position, with the ranking cock mating most frequently.¹⁶

It is rather interesting to note that Schjelderup-Ebbe, who has made observations on over fifty species of birds, including chickens, sparrows, ducks, geese, pheasants, parrots, and canaries, is convinced that despotism is one of the major biological principles; that whenever two birds are together invariably one is despot and the other subordinate and both know it. He has said, "Despotism is the basic idea of the world, indissolubly bound up with all life and existence. On it rests the meaning of the struggle for existence."¹⁷ He applies this principle to interaction of men, animals, and even lifeless things. W.C. Allee, author of an outstanding book on the social lives of animals, seems to dis-

¹⁵Ibid., p. 182.

¹⁶Ibid., p. 184.

¹⁷Ibid., p. 185.

agree with Schjelderup-Ebbe, in regard to this extreme conclusion for, following this statement by Schjelderup-Ebbe, Allee states, "This poetry of Schjelderup-Ebbe's is striking, but does it rightly interpret the facts?"¹⁸ Of the birds that he has studied, he states that only the flocks of white-throated sparrows approach the common chickens in the rigidity of their social hierarchies and they do not equal it. He agrees that many bird flocks are organized into social hierarchy, but none so hard and fast as with chickens.¹⁹

High rank in the social order of the flock means much greater freedom of action, more ready access to food and a generally less strained style of living. However, the alpha bird in a penned flock of chickens is not necessarily the leader of the group. The alpha bird does not usually lead in foraging expeditions when the flock has more space. Fischel, a German, reports that when hens of a known peck-order are released to forage in an orchard, the dominant and near-dominant birds may or may not be at the apex of the foraging flock.²⁰ This phenomenon appears to be true of other species of birds and possibly of other types of animals as well. W.C. Allee states in his book, The Social Life of Animals, that in migrating flocks of birds the stimulus to turn frequently seems to originate in one of the flanks and spreads from that point through the flock. Thus, the apparent leader at the apex of the flock, may not be the actual one. In herds of wild horses, the actual leader is thought not to be the charging stallion in the lead, but more likely a stallion in the rear. From this position he is able to drive the mares and subordinate males and also to keep watch over the entire herd. Among most of the primate groupings, the leader or leaders travel neither at the head or the rear, but in the middle of the group. Among chickens, leadership changes from time to time and, moreover, the leading bird seems

¹⁸Ibid., p. 185.

¹⁹Ibid., p. 185.

²⁰Ibid., p.196.

always more or less dependent upon her followers. If she gets too far out ahead, the leader turns back and rejoins the flock or waits for them to catch up. Similar hesitation by the leader when it has advanced some distance in front of its followers has been observed among other, notably among ants.

Leadership does not always go to the fastest or strongest animal as stated before when discussing the existence of female leaders. In howling monkeys there is a tendency for the males to lead the females, although no one particular male is always the leader. Exactly the opposite tendency is found in a flock of sheep organized on a natural basis, where the old female with the largest number of descendants consistently leads the flock. Young lambs are constantly being called to their mother's sides, and when they come they are rewarded by being allowed to nurse. Thus the conditioned reaction of a lamb when threatened by danger is to run to his mother and follow her. Since the older females have the largest number of offspring habituated to follow them, they become natural leaders when the flock moves. Wild herds of the red deer of Scotland show the same tendency for the older females to lead and the rest to follow. Actually, all members of the deer family follow the same natural law in regard to supremacy in which leadership is maintained by the largest and strongest deer in a herd, but most often by the most pugnacious. Sometimes a herd of elk is completely tyrannized by an old doe, who makes the young bucks fly from her in terror, when one prod of their sharp antlers would quickly send her to the rear. When bucks in a state of freedom fight for supremacy, the weaker does not stay to be overthrown and speared to death by the victor. As soon as he feels that he is mastered, he releases his antlers at the first opportunity, flings himself to one side, and either remains in the herd as an acknowledged subject of the victor, or else seeks new fields and pastures.

In a flock of goats, there is some tendency toward leaders, but not as extreme as with sheep. First one goat is in front and then another. In contrast to the sheep, the young kids are not kept constantly with the mothers but during the first two weeks of life adopt the "freezing" behavior similar to that of young fawns and are left behind while the mothers graze. This may account for the somewhat lesser degree of leadership.

Among the primates, the strength of leadership varies. Gorillas appear to have a linear hierarchy with generally only one definite leader. Dominance is largely correlated with body size, and therefore dominance behavior is at a minimum. It appears that the entire daily routine -- the distance of travel, the location of rest stops, and the time and place of nesting -- is largely determined by the leader. He also acts as the protector of the group. Baboons also have a rather rigid social hierarchy with definite leaders. Sometimes this is a single animal, but more than likely it is several of the larger males. Among chimps, there is no evidence of a linear hierarchy of dominance among males or females which is probably a result of their loose social structure.

Maternal behavior

Sex in its different aspects plays a highly important role in the social affairs of animals. Among some animals such as bees, sexual behavior serves merely a simple reproductive function with the male and female being in contact for only a few moments. In these cases, everything in the relationship is set up to insure fertilization and nothing else. However, among other animals such as eagles, beavers, and certain primates, there is a tendency for particular males to remain associated with particular females. These are the cases in which the sexual relationship is prolonged far beyond the needs of fertilization and the male-female relationship tends to become a stable and important part of a society. However, most animal sexual relationships

resemble neither of these extremes, but lie somewhere between the two.

The sexual behavior of animals obviously often leads to the birth of offspring and consequently the display of parental behavior (which in most cases is solely maternal). In some cases, for example with lions, this parental care lasts for several years while in other cases, it lasts for merely a few days. Such relationships are called family relationships by some, but I feel it is better to call them simply primary relationships or possibly parental primary relationships. Cooley was the first to use the terms "primary relationship" and "primary group". He said, "By primary groups I mean those characterized by intimate face-to-face associations and co-operation. They are primary in several senses, but chiefly in that they are fundamental in forming the social nature and ideas of the individual."²¹ The inclusion of the statement that a primary group forms the ideas of the individual may not apply to the investigation of animal sociology, but perhaps one could substitute the word "habits" for the word "ideas" in Cooley's definition. Now this definition can easily be applied to animal sociology. Furthermore, an animal primary group embodies the two chief characteristics of a primary relation as required by Broom and Selznick:²²

1. Response is to the whole person rather than to segments.
2. Communication is deep and extensive.

As stated before, most animal offspring primary relations consist only of the mother and the young. The maternal behavior in mammals involves an important set of inter-relationships between the mother and young in which a high degree of variability exists both among mothers of different species and among mothers of the same species. This variability is related in various ways to the supply and demand for the common requirements of warmth, food, and protection

²¹ Broom and Selznick, p. 128.
²² Ibid., pp. 124-125.

against the elements and predatory species. Each species appears to have its own pattern of solving the problem of advancing its young from a rather specific, limited biologically controlled environment to one in which the external stimuli become of greater and greater importance.

In recent years, there have been a number of excellent laboratory studies of mother-infant relations in the rhesus monkey. Unlike the surrogate mothers that have been used in many studies, a real mother is responsive to the infant. In addition, the relations between mother and infant develop within a broader social context -- both mother and infant interact with other members of their group, who are, in turn, highly attracted to the infant. However, during the first few days after the birth of an infant, the female rhesus usually threatens or moves away from other monkeys that attempt to handle the baby. The baby, from birth, clings tightly to its mother's fur. Presumably, individual recognition is established during this early period of partial isolation. As the infant rhesus matures and becomes capable of independent locomotion, its mother makes use of two other devices for limiting its social contacts -- retrieving the infant as it moves away from her (sometimes pulling it back to her by its tail alone) and threatening other monkeys from the infant, especially ones that seem to be hurting him. The other monkeys come to recognize the zone of protection that is provided by the mother, and the infant is rarely treated roughly in her immediate vicinity. By three months, infants are leaving the mother for periods of exploration, and feeding and are often engaging in play with other infants. Most of the infants and mothers remain in intimate association for about a year or until the next sibling is born. The juvenile, however, retains some association with the female, and thus appears to be the closest associate of the new infant other than the mother. It is common, therefore, to see mother, infant, and juvenile in frequent association.

Among another species of primate, the gorilla, the ties between mothers and their infants remain close for about three years. The relationship between the mother and single offspring changes from the infant's complete dependence during the first few months of its life, through a period of gradual lessening of the physical and emotional bonds, to a stage when the youngster becomes integrated into the group. Only females care for infants, feeding, transporting, and protecting them when they are small, and after they are fairly self-sufficient, providing the social comfort which the young one seems to derive from the female's proximity. The mother is the only object in the environment to which the infant turns readily at all times even after it has been weaned and is able to travel under its own power. Large infants retain their social ties with their mother, remaining near them most of the day and night until they become fully integrated into the group at the age of about three years.

In both of the above examples of primate maternal behavior, the mother and young have extremely close physical as well as social contact. Somewhat different from this is the mother-young relationship of deer and elk. During the first, and most dangerous, days in the life of a deer fawn, the first concern of the mother is to hide her offspring in a spot cunningly chosen beside a rock, log, or in thick bushes. In the absence of all those she looks for a depression in the earth wherein the fawn can lie without making a hump in the landscape. The first impulse of the fawn, even before nursing if the birth occurs in daylight, is to fold itself into a very small package, hug the earth tightly, close its eyes and lie absolutely motionless until its mother gives the signal to arise and nurse. Such infants may lie for long and weary hours without so much as moving an ear while the anxious mother strolls away to some distance to avoid disclosing her helpless offspring. If a baby is discovered, it will bound up and dash into

any area that is open. The horrified mother will rush into view in dangerously near proximity and ^{will} often tear up and down in full view of the predators to attract the danger to herself. (Similar to this, a mother quail will flop and flutter playing wounded in order to lead danger away from her brood and work the ruse so daringly that she will save her brood and herself.)

Preparation for maternal care in elk begins with the approach of the impending parturition of the calf in late May or June. If the pregnant elk cow is still accompanied by last year's young, about two weeks before parturition, she will show increasingly hostile behavior toward the yearling and enforce a separation by chasing it from her side.²³ After the birth of the calf, in an area of undergrowth, the elk licks the calf and when it rises, stimulated by this contact, she nurses it. After nursing, the calf is gently pushed down to remain there alone until the mother returns from grazing with the rest of the group. The intervals between nursing visits increase from 20 minutes to several hours, however, at night the cow stays with the calf continuously.

The maternal care exhibited by the mother moose is somewhat different than that of the deer and elk. In this case, the mother spends much more time with the new fawn, in fact, at no time during the early weeks does the moose cow leave her young calf. They spend the first few days within a dozen square feet of living space. When the calf is from 4-20 days of age, both mother and calf move around more, with the calf beginning to show the "following response". This heeling response of the calf is likened to imprinting but differs in that the response is reversible, more flexible, and less limited in respect to its sensitive period.²⁴

²³Margaret Altmann, "Naturalistic Studies of Maternal Care in Moose and Elk", in Maternal Behavior of Mammals, ed. by Harriet Rhinegold (John Wiley and Sons, Inc., 1963), p.235.

²⁴Ibid., p. 245.

In the last sentence I referred to imprinting. Imprinting is a phenomenon that often occurs during the first few days or even hours of an animal's life. The Austrian zoologist Konrad Lorenze introduced this term in 1937 and defined it as "the process of acquiring the biological 'right' object of social reactions by conditioning them, not to one individual fellow-member of the species, ~~but the~~ ~~species~~, but the species as such...."²⁵ If a new-born chick of 9-20 hours old is presented with a large moving object, it will closely follow this object be it hen, human, or rubber ball. This following reaction will persist as the animal matures, and the bird will often behave toward the object in the same manner as it would toward a member of its own species, even to the point of directing its mating behavior toward this object. This is an example of imprinting behavior.

Imprinting has been primarily studied in birds although a similar, possibly the same, phenomenon has been described in other animals. However, in regard to mammals, it appears to be limited to those animals whose young are able to move about almost immediately after birth. Its importance lies in the fact that imprinting appears to be a fundamental determinant of later social behavior. This phenomenon has been called a special type of rapid learning which differs from associative learning in the following ways:

1. Imprinting occurs only during a very definite period early in the animal's life cycle, in many cases a period which is of short duration (usually less than 48 hours).
2. Once imprinting has occurred, its effect is irreversible.
3. Imprinting determines future adult behavior, for example, turkeys, imprinted to humans, directed their courtship activity in adulthood towards humans rather than toward

²⁵Victor Denenberg, "The Effects of Early Experiences", in The Behavior of Domestic Animals, ed. by E.S.E. Hafez (Baltimore, Williams, Wilkins Co., 1962), p. 112.

members of their own species.

4. Imprinting can be transferred (generalized) from the specific stimulus object to other members of the class from which that stimulus object came. In other words, the imprinted animal will respond to the species (general) characteristics of the stimulus object rather than to the individual (unique) characteristics of the subject.

Socialization of young

When we look at an animal society as a whole, we find a striking correlation between the final organization typical of the species and the social development of the young individual. In the dog and wolf, for example, the mother stays constantly with the young in the first few weeks, then begins to leave them for long periods just at the beginning of the period of socialization. This means that the strongest primary relationship is developed with the other pups rather than with the mother. This in turn lays the foundation for the formation of the pack, which is the typical social group of adults. Similarly, the behavior of female goats in leaving their new-born offspring while they feed is correlated with the relatively weak leader-follower relationship in these animals. It may be possible, then, to conclude that one of the important factors determining the structure of an animal society is its type of socialization.

During the early period of socialization, known as the period of primary socialization, the group of animals with which an individual will become attached is determined. This group is usually of the same species, but socialization can be experimentally transferred to other species, a fact noted in the discussion of imprinting. Secondary socialization takes place later in life, as in the formation of sex relationships. However, primary socialization often limits very strictly the kind of secondary socialization which may take place. Most species seem to have behavioral mechanisms which make it difficult to form attachments to dissimilar individuals

once primary socialization has taken place.²⁶ These mechanisms differ from species to species. There is also evidence that much variability can occur within a single species. All of this leads to a second conclusion that critical periods exist early in the process of socialization. go to sheet X

One of the most interesting examples of primary socialization is that of the young ant. The socialization process of this little insect is somewhat different than that of the mammals as its period of primary socialization lacks completely any instances of maternal behavior. Presumably a newly hatched ant quickly senses the chemical taste and odor of its own colony. In this way the young ant apparently sets up a permanent social bond with members of its own anthill.²⁷ The taste or smell of the colony is associated with mutual feeding or protection, and other tastes or smells with attack. There is no opportunity for an ant to become socialized to another species, since death follows any contact with other colonies

The socialization of the dog involves two factors that are not found in the socialization of other mammals. One is the extreme genetic variability possible and the other is the fact that socialization takes place readily with either dogs or human beings. The developmental history of puppies has been studied in great detail and their life can be divided into regular periods based on important changes in social relationships. During the first 20 days of their lives, the puppies are strongly protected from the environment both by the lack of ability to form habits and memories and by non-functioning sense organs. However, most of the important patterns of social behavior appear in some form early in the period of socialization. Besides nursing, the puppies exhibit playful fighting and by the sixth or seventh week, they are

²⁶ John Paul Scott, p. 184.

²⁷ Ibid., p.177.

exhibiting allelomimetic behavior as they run in a group.²⁸ The only types of behavior not found are mature sexual behavior and care-giving behavior which do not appear until the adult stage. As far as can be told by the accounts of trappers, a very similar kind of development takes place in the wolf.

A very interesting aspect of the socialization process -- transferral of social rank -- takes place during the social development of the moose calf. The socialization of the calf occurs when it is from 20-90 days old. During this time his radius of activity widens.²⁹ As the summer advances the investigative behavior of the moose calf leads it to visit other moose, quite often moose bulls. The dam will then retrieve the calf, chasing it back without attacking the other moose. Gradually more leeway is given the calf by its mother. With the progression of the season and the beginning of the rutting time, the moose cow and calf will be joined by a bull. It is obvious that the encounter of the moose bull with the calf is of importance as a friendly reaction by the bull will enable the calf to stay close and thus keep the moose cow contented. If the bull is unfriendly to the calf, the cow will call her offspring to her side and both will quickly leave the bull, ending the courtship. While the calf is thus integrated into the mating group, he is about to face his first big crisis -- the arrival of a new calf. At this time, the cow turns rather hostile to the yearling and drives him to the fringe area of her "calf territory". Only rarely does the yearling leave the area of its family group, although a close approach to the mother is not tolerated. The next big crisis for the yearling occurs in the fall. If it is a male, it is forced to be on guard in respect to the other bulls; if it is a female, it must beware of the mother as the mother now sees her daughter as a rival female during the rut. This second displacement of the yearling strengthens the independence of the young moose from the family group. The general weaning process

²⁸Ibid., p. 18.

²⁹Altmann, p. 244.

is ended by this time, but the bond between cow and calf still remains a close one as guidance and protection are still needed by the calf. As stated in the opening sentence of this paragraph, one of the outstanding features in the socialization of moose calves is the fact that the social rank order of the calf is set by the social rank order of the mother. If a moose cow is killed, the calf rarely survives the winter as a winter group of moose will not take care of an orphan. The strong competition for the available food during the winter puts an orphan calf way down in the rank order to obtain food. The calf with a dam would otherwise share the ranking of its dam. The same thing happens with the elk calf. For example, in a hail storm, the calf of a high-ranking elk cow will enter the shelter-tree group with its mother, whereas yearlings and other lesser elk remain outside. Another interesting aspect of an elk's socialization is that much of a young elk's play is spent in water games, which prepares the elk calves for the many crossings of swollen streams which have to be made during the spring migrations.

Before ending this area on socialization, I want to describe briefly the socialization process of a representative of the primates, the baboon. The young baboon has its first contact with others than its mother during the first month of its life, when members of the group are attracted to the new infant. They touch the infant lightly with their hands and mouths, groom the mother and exhibit lip-smacking. From the first to the fourth month, the infant crawls near or even on the adults of the group who display complete tolerance. From the fifth month to the completion of the first year, the infant spends most of his time playing with the other young. The females of the group now occasionally threaten or even attack the youth while the adult males remain completely tolerant and protective. During the second year of life, the young animal tends to flee to the protection of the adult males and not to the mother or other adult females. The juvenile now spends most of the day with its

peers, feeding with its age group or with other young animals. During a Young baboon's third and fourth years, the juvenile is still oriented to play in a peer group, but play has become rougher and dominance interactions are more intense. Adult males no longer tolerate play with older juveniles and often threaten them when they play too roughly with the infants. During this period, the older juvenile females leave the play group and join the grooming clusters of adult females. By the fifth year, the subadult male is larger than adult females and establishes dominance over them. He is still much smaller than the fully adult males and tends to avoid them. Throughout the stages is noted the protective function afforded to the mother-infant combination by the adult males. On several occasions in a study done by Hall and DeVore in Kenya, adult males were observed carrying infants on their backs for as long as 20 minutes.³⁰ Such a phenomenon was never observed in any other primate group. An extremely interesting reaction was noted by Hall and DeVore on the Cape Peninsula in which the dominant male of a group was seen to be extremely attentive to the infants in the group. He once carried an infant up the sleeping cliffs, often picked up or touched other infants, and was also seen to sit with one juvenile against his chest for several minutes on a day of strong cold wind.³¹

Certain basic principles have already been derived from the study of animal behavior, and from some of these principles have been developed broad theories and hypotheses which explain the organization and behavior of other social groups and populations. The results are impressive, but the need for further work is even more impressive. Very few wild species have been thoroughly studied from the behavior point of view and we still cannot say that we thoroughly understand

³⁰K.R.L. Hall and Irven DeVore, "Baboon Social Behavior," in Primate Behavior, ed. by Irven DeVore (New York, Holt, Rinehart and Winston, 1965), p.86.

³¹Ibid., p 85.

every major type of behavior in even a single species. We need to extend and intensify our observations and experiments after which it may be possible to state general laws and theories with a great deal more certainty and to use them as a real foundation for human knowledge.

Headings or titles should have been used more where the subject changes, e.g., when you change from one specie of animal to another.

A distinct concluding section should appear in which the relationship of this subject matter to sociology is clarified.

How, e.g., is this paper justified as a sociology honors paper.

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