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Comparative social structure among mammals

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COMPARATIVE SOCIAL STRUCTURE AMONG MAMMALS

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ABSTRACT

This present work deals with the social organizations of three non-human communities: chimpanzees, dolphins and wolves. In presenting such a study from a sociological perspective, a level of analysis is permitted beyond that of individual behavior. In viewing behavioral characteristics in accordance with group relations and actions — with particular emphasis on progeny — information is gathered pertinent to societal analysis.

In order to lay a foundation for such a perspective, the first section of the paper includes a review of literature that puts forth the basic ideas, theories, observations, and provides a synopsis of the development of social ethology. With this background the format is set for the subsequent description of specie behavior in the following sections. Within each of these social species, the group's structure and both their methods of organization and cooperative maintenance are detailed in conjunction with, and by, four key social influences. Although it is clear that each of these group facets are associated and are not singularly operative, concentration is on: environmental influences, the interaction processes and resulting relationships, the internal group structure, and the social learning process for the young of each species. Throughout the study a significant factor considered is the inevitable bond of the group with the young, and the processess of their social development. Finally, in the concluding section a summation of key behaviors, reaction, and their possible effects is presented. Additionally, the four areas of action previously concentrated on are discussed in relation to their influences on each species in this study.

COMPARATIVE SOCIAL STRUCTURE AMONG MAMMALS

INTRODUCTION

Presented in this thesis is a study of social organizations and those basic structural patterns which develop and operate to satisfy the needed requirements for survival. Specifically, this research is concerned with the importance of maturation within the social organizations of chimpanzees, dolphins and wolves; the author contends that slow maturation of the young is key to survival among these species. The young of each of these species are not biologically equipped at birth for survival or to function as productive group members. The offspring rely on participating group members for physical care, as well as direction for adequate social development. The behaviors and actions of the young must be regulated and directed to permit effective individual functioning within the structural system of each species; a process which demands a lengthy period of time between offspring. Because of the length of time required to rear the offspring of each species into competent and productive group members, a low birth rate is necessitated and becomes a vital structural element for the existence and persistence of these societies. Consequently, subsequent behaviors and patterns of action demonstrated by participating individuals are tuned to and

affected by the necessity for few offspring.

In examining the behaviors and conditions which operate in groups that are dependent upon a slow maturation period, a framework has been developed to consider each group's organizational requisites and their structural systems. In order for the organizations of chimpanzees, dolphins and wolves to continue, a manageable, low rate of birth must be functioning to permit an adequate length of time for the new offspring to be inculcated into the existing group. Slow maturation is a condition that is essential for the maintenance of each organization; without this factor the group would dissolve, as would all structural aspects with which it is associated. Accordingly, in each of these organizations the young are an invaluable and scarce resource, and it is critically important that the structural systems of each organization operate to support this primary requisite which enables the maturation process to succeed. A system of uniform and repetitive behaviors and actions must be structured to support slow maturation. Thus, the extensive period of time required for adequate social development of each new helpless and dependent offspring is a costly expenditure in time and resources.

Therefore, the condition of slow maturation in these organizations results from the operation of a structural system dependent upon supportive patterns of activity. Few offspring are an essential element in the particular set of

behavior patterns developed by chimpanzees, dolphins and wolves. However, since the functional requisites of any organization (in this study slow maturation) do not identify the organization itself, it is essential that this analysis involve a description of the parts of each organization and the processes by which the structure is maintained, and the relationship each organization has developed with its respective environment. Structural systems are developed — some more successfully than others — in conjunction with their surrounding environments, and any examination of the system would be incomplete without an analysis of the setting.

This examination of social organizations is concerned with the functions and structural components of organizations at the highest level of generalization. Analysis at this level provides a useable framework of analysis for further examination of existing organizational components. In setting forth an analytical frame of reference and guidelines, work in this study has been primarily drawn from Marion Levy's (1952) proposed criteria of necessary conditions in order for any society to persist, as well as from George Simmel's (1964) reading on sociability. By adopting Levy's societal requisites as a basic concentration of analysis, it is possible to focus the examination towards the specific structural systems which operate within the organizations of chimpanzees, dolphins and wolves in a theoretical framework that applies to all such social organizations.

The first of Levy's societal requisites — the interdependency of the group to its setting — has already been touched upon in this examination. Societal members must adapt to, and manipulate, the environment within which they function. The groups must cope with the environment in a way that allows for biological persistence. Biological survival is not singularly explained by the factor of a sufficient (low) rate of reproduction among chimpanzees, dolphins and wolves. Each of these species, as well as homo sapiens, cannot survive in their environments without "the active and current intervention of others of their kind" (Levy, 1952:152). The few offspring of chimpanzees, dolphins and wolves are physiologically helpless at birth; they lack instinctual self-sufficiency evidenced in groups where prolific reproduction is a factor for survival. Inherent in this requisite for individual development is the element of flexibility; since food resources within the environment are seasonal and vary. If behaviors and actions relied upon to meet physical and social needs were fixed, the organization would not survive. Chimpanzees, dolphins and wolves survive within their respective environments precisely because their structural system is not dependent on programmed behavior, but operates with enough latitude that behavior has a foundation in environmental and situational knowledge.

Factors for individual maintenance, nourishment, protection and defense are learned during the maturation process.

The young chimpanzee learns which branches are safe and develops skills and agility necessary for moving among the trees. The young of each species develop the necessary skills for survival during the socialization process — another of Levy's requisites. Adequate socialization is needed so the individual has a grasp of a sufficient portion of the structural system of a society to permit effective performance. Among these groups, acceptable actions, behaviors, and social regulations must be specifically transmitted to the young. In this context, socialization is a different concept than biological maintenance; for the organization cannot persist unless it perpetuates a self-sufficient system of action through the socialization of new members — a function which demands few offspring.

A third criteria, that of role differentiation and assignment, is essentially a preliminary qualification to the following criteria: the regulation of activities and control of behavior. The term "role", if viewed as the manner in which an individual actually carries out the requirements of a given position (Davis, 1942), is an effective analytical and descriptive mechanism for examining the organizations of chimpanzees, dolphins and wolves. Individuals do not act in terms of roles in these societies; their actions are their roles. Therefore, the concern here is not with role types (such as "occupational" or those defined in terms of status). For example, leadership among hunting wolf packs

can be variously assumed by a number of individuals according to the individual's capabilities and experience as well as the simple factor of their close physical proximity to potential prey. The individual can act as a leader and efficiently operate in such a role.

All of the activities of the groups, if performance is to be dependably insured, must be broken down and allocated to capable individuals. And, predictably, in any society there are activities that must be regularly performed if the society is to persist. Thus, the initiation and application of role differentiation implies organization, correlated with some form of structural order; a process which leads to the regulation of activities and provides mechanisms for controlling behavior. Such organization offers socially accepted directives for prevention of disruptive behavior or potentially disruptive situations such as the challenging of authority or the interference of personal space. Control mechanisms in each of the species in this study are primarily ritualized sanctions (demonstrated primarily by postural or facial clues), thereby minimizing the need for forceful coercion and injurious physical contact. Techniques for behavioral regulation are incorporated into the operation of the structural system and allow for the establishment and expression of appropriate actions and responses within the corresponding social gradings. The young of each species acquire such necessary skills during socialization; chiefly during

play/peer interaction. At an early age (about eighteen days), the wolf pup begins demonstrating assertive and submissive behavior during play fighting sessions with littermates (Mech, 1962).

Structural regulation of behavior involves a shared level of individual expectations in order for group life to be effective and harmonious. The organizations of chimpanzees, dolphins and wolves have adapted an adequately stable system of interaction and working relationships sufficient to ensure individual performance of necessary social activities. In this sense, sanctions must be enforced to ensure conformity; for general conformity is necessary for continuation.

Such regulation of behavior demands the capabilities for individual evaluation and discrimination. Reactions to stimuli by group members must be mutually communicable and comprehensible. Recognized activities and effects must be produced, communicated and directed; a societal criteria Levy refers to as affective states. Not only is a cognitive element necessary, but the ability to respond affectively in some appropriate way is equally vital for societal functioning. Facial expressions, postures, gestures and voice tones offer cues to each member of the organization that make affective expression comprehensible and manageable; ungoverned expressions are quickly curtailed. Goodall (1969) noted several occasions where one young chimpanzee consistently misinterpreted or inappropriately reacted to the visual

signals of an adult male and was repeatedly warned with both physical and visual sanctions. Successful operating structural systems which ensure adequate socialization, are dependent upon shared apparent forms of comprehensible signals. The ability and methods for communicating signals which indicate correct behavior are criteria essential for group functioning. Among chimpanzees, dolphins and wolves, communication is of highly general emotional states (i.e., anger, fear, play), and is essentially discussed by the author on this level of affectivity. However a great deal of work on the capacity of chimpanzees and dolphins for communicating on complex levels is currently being conducted (see: Lilly, Sonje, Gardner).

Therefore, using these criteria, a comparative analysis of social organizations and their components may be presented. Although the organizations in this study develop unevenly, each relies on a structural system of functioning, social elements, and subsequent interaction. Since common characteristics exist among the social organizations of these three nonhuman mammaliams, such a cross-species comparison provides fertile ground from which to obtain fresh perspectives of both social organizations generally, and their structural components.

To both physically survive and to mature into productive, cooperative group members, the young depend upon the care provided within an established social system of flexible and diverse interactions. Aside from learning behavior, the

social makeup of each organization consists of integral components for organization; principal of these is the integration of relationships among various members. Coupled with such relationships is the functioning of a structural framework to direct and maintain behavior. The development of relatively harmonious cooperation among group members provides a means of coping with internal conflict and keeping disorganization within manageable limits. This harmony, integration, and balance is itself a social process.

Review of the Literature

Development and Synthesis of Non-human Studies:

The actions and characteristics associated with social behavior vary greatly, as have the approaches in examining such behavior. The relationship between humans and non-humans has remained essentially separate with studies concentrating on the comparative uniquenesses of each species according to individual disciplines. Even with the general acceptance of human descendency from and/or with other animal species in the late Nineteenth Century (publically initiated by Charles Darwin's work in 1859 On the Origin of Species), such comparisons were still primarily concerned with physical structure and characteristics, rather than organizational and

behavioral similiarities.

Classical Ethology

In the early 1900's a few individuals began examining the influences and effects of animal behavior, recognizing that behavior is as equally important as physical development for species survival. Charles Whitman, in 1901, extensively compared similar and different behavior patterns characteristic of passenger pigeons in order to determine their zoological classification. Primarily from similar early observations the discipline of classical ethology evolved, based largely upon observations and experimentation under field or seminatural conditions. However, the influence and continuation of behavioral ethological studies was painfully slow in developing. One practical reason for such slow cultivation was the difficult and time consuming task of observing behavior among the enormous variety of species. Coupled with this difficulty was the obstacle of intra/inter species-specific behavior. Behavior — including human behavior — is adaptable and influenced by various external stimuli. Such environmental diversity may initiate unique behavioral actions and responses within the same species. Similarly, species that are closely related may show deep differences in behavior and social structure; while, conversely,

species which are biologically very different may display social similarities. Such dissociation between physical and social development can be illustrated with the species of canids; the wolf and red fox, for instance, are anatomically similar but have contrasting social behavior. Moreover, the solitary life of the fox is opposite that of the pair-breeding "extended family" unity of wolf packs (Fox, 1974:39). With continued study it became clear that non-human behavior, like human behavior, is not always distinct; but contains subtle, flexibly complex, and situationally adaptive actions. This classical, observational school of ethology provided a background for continued investigation of animal behavior and developed into a credible science, with Konrad Lorenz and Nikolaas Tinbergen being the leading proponents. Lorenz's paper, "The Comparative Method of Studying Innate Behavior Patterns" (1950) and Tinbergen's The Study of Instinct (1951) represent this school of ethology.

Currently there are divisions among ethologists with some seeking modification (including Tinbergen), and others steadfastly adhering to Lorenz's precepts. In classical ethology, based on observational circumstances, species behaviors are catalogued according to determined patterns. These patterns are equivalent to forms of innate movements triggered by key stimuli. The concept of innate as an "inborn" behavioral mechanism (Mortenson, 1975) is a major criticism of contemporary ethologists who consider that

experience or interaction with the environment are critical in development. Behavior was believed to depend both on environment and heredity (Hinde and Tinbergen, 1958). The patterns in the development of ethology varied from Fabre's "instinct is everything" to Verlaine's "instinct is nothing" (Fox, 1974:18). In America, a concurrent movement of ethology was developed: behaviorism. Behaviorism was initiated as a mechanistic study of stimulus-response in order to provide psychology with an accurate methodology (Thorndike, 1898). Behaviorism became a school of psychology interested in animals only as experimental material from conditioning and learning mechanisms (Skinner, 1938) and was consequently limited to laboratory experiments. However, from the beginning, a basic tenet of ethology was a thorough biological knowledge of animal species (Manning, 1967). Ethology has presently extended beyond mere description to the integration and coordination of observation with observations and theoretical constructs of other disciplines.

While ethology has developed as a science, and naturalists have increased the understanding of species behavior, its concentration has generally not been directed towards analysis of groups. Focusing upon the individual denies the ethologist the opportunity to learn of the complex patterns of interaction that occur among many species members. Questions concerning the presence or absence of instinctual reactions and behaviors are debatable within an ethological framework, but cannot be a focus in this examination. Slow maturation

required among the organizations of chimpanzees, dolphins and wolves is a process that involves the interaction of active integrated group members with totally dependent and helpless group members. The young of each species do not instinctively function and behave as productive group members. They slowly develop actions and behaviors fitting the complex structural organization of their societies. Biological behavior does not supercede socially acquired behavior necessary for survival. In order to function and remain operative, social structures of chimpanzees, dolphins and wolves must include many ongoing relationships and be working, flexible units regulated and accounted for by some means of social control and mutual communication. By transcending the argument of biological determinism, comparison of non-human behavior allows for further contribution to the understanding of human behavior and structural development.

Methodology

Information for this examination has primarily been gathered from recorded field studies — including those of long-term observations — although some material relies on studies of animals in captivity. While it is simpler to describe behavior from the observation of captive animals, species do behave and use resources differently in the wild.

These limitations and possible behavioral changes must be recognized.

Most of the information concerning chimpanzee behavior was gathered from the extensive observational studies conducted by Jane Goodall in the Gombe Stream Chimpanzee Reserve in Africa (now the Gombe National Park). Goodall's work In the Shadow of Man covers a period of six years of personal observation of a chimpanzee troop (about forty individuals) in the natural valley within the chimpanzee reserve. Goodall's observations and study have continued for a period of nearly fifteen years and subsequently published articles are also used as resources. Hans Kummer's studies of hamadryas baboons (1968-1970) in a natural setting, and Harlow's laboratory experiments with rhesus monkeys are also relied upon.

Information on wolf packs and their social behavior is primarily from a study by David Mech, and two of his students, Phillip Shelton and Peter Jordan, on Isle Royale in Lake Superior, Michigan. Mech's The Wolf (1970) is a composite of information gathered during the four year Isle Royale study. Mech is currently pursuing this study through the Department of Forest Service, and additional data of social behavior is published by government agencies. Although not observational studies, helpful data was also compiled on canid behavior by Michael Fox (1974), and the activities of wolf

packs by Adolph Murrie (1944).

Information on dolphin behavior is remarkably scanty and often that which is recorded, is unavailable for general circulation. A number of books on the communicatory abilities of bottlenosed dolphins are available (see primarily: John Lilly and Richard Sonje); however, information on the social behavior of dolphins is limited, and a number of such studies conducted by the United States Navy remain inaccessible. One published work is Forrest Wood's report of the Navy's work at the Marine Facilities at Point Mugu, California in 1967 and at Hawaii Laboratories at Kaniohe Bay, Oahu in 1971. Other studies of dolphin behavior rely chiefly on observation of captive animals. David and Elaine Caldwell and Dr. Samuel Moore, have examined captive dolphins through the direction of the Los Angeles County Museum at the University of California at Santa Barbara.

CHAPTER I

ENVIRONMENTAL INFLUENCES

Chimpanzees, dolphins, and wolves inhabit particular physical settings and operate within environmental divisions. As a result, their structural systems and social processes become inseparable from the influences of the geographic area. Behavioral patterns are developed which are most adaptive to the environment. Since the environment offers provisions and shelter, and because behavorial responses are influenced by existing physical conditions, consideration of ecological variables is pertinent. Although these factors do not solely provide a sufficient explanation to totally account for behavior, the habitat of each organization influences its manner of survival.

In order for the organization to persist, a certain amount of adjustment and adaptation must occur to enable it to modify to its physical surroundings. Adaptation and exploitation of the surrounding environment is an intrinsic factor in the survival and development of the organization. Adaptation, however, need not be perfect — only tolerable enough to ensure survival. At best, the arrangement is one of harmonious influence, achieved by the group's reliance on long standing actions that have proven successful. Therefore, fluctuating resources do affect social behaviors, and the

scarcity or depletion of available resources creates needs which require adaptability and skill. Adaptive functions must be sought on various levels; that which benefits one member might imbalance the entire group. The persistence of the operative structure, coordinated by member interaction, is essential (Levy, 1952). Although the individual may influence the system, the structure is developed for organizational regulation and support.

The social organizations of chimpanzees, dolphins and wolves have developed structures that are almost perfectly fitted to the exacting environments they inhabit. The process of procuring food is demonstrative of the structural adjustments that have arisen in response to both the availability and type of resources offered within their environments. Chimpanzees, for instance, function within a socially structured organization, but it is a casual and loosely structured society — clearly social but remarkably flexible. Chimpanzees have been observed to wander through a specific range of tropical forest, joining, splitting, and rejoining other members, although they do recognize a fairly cohesive and consistent membership (Goodall, 1971). Within each population most of the individuals recognize each other, and the entire troop functions as a community.

The feeding habits of chimpanzees demonstrate, and are primarily responsible for, their group flexibility. The troop's feeding areas vary, depending on the seasonal growth and the

availability of food. Chimpanzees move as a group from one feeding area to another. Their food supply is either abundant or uniform in very large patches and group movement is relative to the food distribution. Such availability results in neither hording nor sharing food, except in the sense of allowing others to feed nearby (Goodall, 1963). This also promotes a pattern of cooperation, or at least continued association of a group, in fairly consistent troop membership.

It appears, although data is inconclusive, that there is a high degree of cooperation among dolphins in hunting and defense (Caldwell, 1968). Morgan (1968) hypothesizes that because dolphins have adapted successfully to their environment due to cooperation, skill, and being physically so well adapted, they have no urgent need to control their environment on their own initiative. As a result, Morgan believes that communication, rather than environmental control, is the important factor in dolphin behavior.

Like dolphins, wolves are also group hunters. Since the tendency of wolves is to prey primarily on animals much larger than themselves, cooperative efforts for feeding result; although a single wolf may be able to kill even adult moose and elk (Cowen, 1947), it is no doubt much safer, easier and more predictable when several animals hunt as a unit. Such a kill also provides more food than one animal can use. As a result, the tighter group unit of the pack becomes basic in the

structure of wolves. Cooperative hunting for prey, which is usually neither abundant nor readily accessible, requires a relatively small group membership controlled by a strict association of members that are generally intolerant of individuals outside the pack.

Among chimpanzees, dolphins and wolves, the number of members in each social unit is fairly stable; however size variations are not always attributable to mortality and reproductive rates. Temporary associations can also be formed between two or more groups of wolves altering the usual pack size of between eight to twelve members. Robert Rausch (1967) reported a south-central Alaskan pack as having thirty-six wolves; in the same vicinity he also sighted many packs with as few as three wolves. Similarly, dolphins also have been observed travelling in large groups — sometimes containing up to one hundred individuals — although it is unclear whether such sightings are simply separate small pods in close proximity to each other (Herman, 1975). Chimpanzees are not known to form such temporary associations for specific actions.

However, among each of these species, such large groups generally redivide into common, smaller units. These smaller groups have definite forms and are not a collection of random individuals; and are usually organized according to such variables as age and sex. It is common among dolphins for small separate pods of juveniles to form and travel as a single unit; although these pods maintain relatively close contact with

the main assemblage. In groups of travelling juveniles, the sexes are segregated (Caldwell,1968). Such structured regrouping in wolves often appears when maturing subadult males, who have become competitive with the mated male, leave the pack to find mates (Mech, 1974). Occasionally, the group separates when the pack becomes too large. If a pack is too large, after the strongest members finish feeding on a kill, there may be little or nothing left for the rest (Murie, 1944). In such situations, natural divisions can occur; hungry members go off to hunt, while the stronger, having eaten, remain behind (Murie, 1944:44). Nevertheless, among both dolphins and wolves, each newly formed unit assumes a separate and autonomous identity.

Ordinarily, outside of such arrangements, there is minimal intra-species association. The relatively large, flexible chimpanzee troops, although seldomly joined, are exceedingly liberal in accepting the temporary presence of strange troop members into their own troop. Dolphin pods that have been observed to travel closely together, might swim among the separate borders of each group, but do not appear to intermix. Among wolves, other than in migratory or rare situations, a clear distance is generally maintained between each pack.

CHAPTER II

INTERACTION PROCESS

Social relationships are dynamic, reciprocal, and structured interactions that provide members of a social organization with an awareness of expected behavior and appropriate responses. As a result, social relationships are complex, multifaceted processes involving a multitude of distinctive characteristics. Even though a number of social relationships exist within a social organization — some more than others — interaction maintains group structure.

Both the individual's perception of the interaction process and environmental factors characterize social behavior. Within a social organization, its members are typically exposed to fairly consistent and recurring situations in which past experiences and efforts are relied upon for defining present experiences. As relationships and situations are established and reinforced, the interaction process becomes ordered and systems of interaction become stabilized. The situations to which individual members are exposed require responsive action; at least if the member is to function and survive within the social organization. In order to correctly respond to another's behavior, an individual must pay attention to the broad situation — which may include any number of related aspects — and react to his assessment.

The relationships developed within the social structure of chimpanzees, dolphins and wolves, involve dynamic interactions between group members. The behavioral patterns associated with interaction are integrative factors — although to different degrees — of the existing structural framework. Even though structural variations mold distinctive behaviors which satisfy group needs, similar interaction processes between members develop. Through exposure and participation in individual relationships, group members become aware of both the appropriate procedures necessary for social functioning and their positions within the operative structure. Since the dynamic, active, changing aspects of social life are so varied, interactions appear in various forms and mixtures. Unifying, competitive, and conflicting interactions are all present within the organization, and all — even conflict — involve some cooperation. However, among chimpanzees, dolphins and wolves, the most basic and stable relationship is that between mother and offspring.

Mother-Infant

The young are reared, nourished, and protected in a manner that is species-specific, but the administration of physical care, as well as the establishment of a base for social development, is the connective factor in the mother-

infant relationship. Mother-infant interaction is a continuous process and is modified in terms of biological growth and experience. There are distinctive characteristics associated with each of these stages. First, this study will examine the infant's earliest stage of development — that controlled by his or her mother.

Dependency

During this time of physical dependency, the mother's behavior is primarily directed towards caring for her offspring; she is responsible for providing nourishment, transportation, and protection. At this stage of infant helplessness, the mother remains in close physical contact with her offspring. For instance, the wolf will not leave a young litter even for food. She relies on either cached food or that brought to her by other pack members. Dolphins and chimpanzees act equally solicitous toward their young, but their flexibility and mobility promotes different behavioral adaptations for infant care. The young chimpanzee must be transported continuously by his or her mother — usually under her stomach and supported with one hand — while she travels or feeds. This position changes as the infant matures and begins riding on her back. Occasionally — usually at signs of danger or excitement among the troop — the young chimpanzee will revert to the

early position (Reynolds, 1965). Additionally, this position allows the infant to nurse at will.

In essence, the dolphin mother also carries her young due to forces of water that move in a stream past the mother's body which lift and carry the calf, who would otherwise be unable to keep up with his mother. The infants also receive active support during nursing when the adults adjust their swimming speed to be aligned with the infant. Both chimpanzees and dolphins have been observed to continue transporting their dead offspring. The chimpanzee mother will continually support the infant, and push the body into the carrying position. She will also make repeated attempts to nurse the infant. The dolphin mother will repeatedly push her dead infant to the water's surface for air and occasionally will remain with the infant and be left by her pod (Caldwell, 1972).

During these first few months of life, each mother is normally protective of her offspring. The mother will generally attempt to prevent contact with other group members, either by the physical removal of the infant or by deterring the approach of adults. For instance, with the exception of littermates, wolf pups have no contact — other than with their mother — for the first few weeks of life (Mech, 1970). Among chimpanzees, at this early age, even contact with siblings is minimal. The supportive care provided by another single adult female is usually the first contact tolerated by the mother (Goodall, 1971). Occasionally, a female other

than the mother will show a persistent interest in the young. If permitted, this female becomes a "substitute" mother and assumes additional responsibility for the infant — although the mother generally watches her actions. Hinde (1967) has termed such behavior "aunt" behavior.

"Aunt" Behavior

"Aunt" behavior is not uncommon among dolphins. Frequently, another female is present during birth and demonstrates an active interest in the infant. If the infant has trouble breathing, she is often as dedicated as the mother in her efforts to provide attention and care for the infant. Such behavior is usually not frequently demonstrated among wolves. Occasionally, an unmated or outcast female, who has been harassed by other pack members, will attempt to become involved with the care of another litter. If a situation arises where she can serve as a "dry nurse" for the litter, she will care for, and protect, the infants. After performing in the "aunt" role, such an outcast usually regains a position in the pack (Rabb, 1962).

Among chimpanzees, older female siblings will often go to great lengths to hold, carry, or groom their younger siblings. They will even surreptitiously attempt to groom their mother while she is holding the infant; all in trying to touch the infant. When the infant is older, and the

mother permits some responsibility in caring for the infant, the young female will take every advantage of this trust, and attempt to monopolize the infant's care and fight off all other interested females. Such behavior is the closest parallel to "aunt" behavior among chimpanzees.

The mother-infant relationship is vital for social and physical development. However, after the infants are physically independent of their mothers, they remain emotionally dependent on them — although with less frequency as they mature. Among chimpanzees, for instance, the essential emotional and physical care the young receive can be affected by the degree of skill, caring, and attention the mother offers. Her experience, or lack of experience, can be reflected in both the amount and quality of care she provides (Goodall, 1968). Goodall observed a variety of behaviors among chimpanzee mothers — all of which ultimately influenced the behavior of the infant.

Much of the difference between each mother's behavior can be explained by the amount of experience or contact each has had with the young. Inexperience — and the potential subsequent mistreatment or neglect — can have long-term consequences in the infant's ability to appropriately respond and react to group signals. In one situation Goodall (1968) observed a mother callously mistreat her infant — denying adequate nourishment, physical support and protection. This infant was excessively fearful and remained emotionally

attached to the mother long after the infant's peers were becoming increasingly independent.

Development of Social Bonds

Social ties to the individual's group are developed early. Initial attachments are generally formed with individuals with whom most interaction occurs. Among the young, social bonds generally begin to form merely by the constant experience of contact; and the long period of physical and social contact each infant experiences serves to reinforce these ties.

Among chimpanzees, dolphins, and wolves, the first strong bond developed by the infant is towards the mother. However, because infant wolf pups are more or less reared in isolation in their den — unlike chimpanzee and dolphin infants — they simultaneously develop social bonds with their littermates. In the den, pups are in almost constant contact with each other, and move around until they make contact with each other or their mother (Scott, 1967). Although young chimpanzees and dolphins are exposed to other group members in early infancy, they are generally prohibited from social interaction.

As they mature, initial bonds are developed through interaction with siblings or peers. In turn, play reinforces the developing social bonds. Since wolf pups, for instance,

have been with their siblings from birth, bonds with other pack members are developed through the physical action of obtaining predigested food from adult pack members. This is the beginning of common social bonds, and subsequent interaction between young pups and the rest of their pack. Such interaction develops appropriate behavioral patterns which correspond to those acceptable by the group. Like the wolf pup, the young chimpanzee and dolphin are also integrated into their community in a gradual and widening sequence of associations, exposures, and experiences.

Among wolves, the social bonds that form are primarily directed towards maintaining pack unity. The formation of attachments within a pack is considerably strengthened by virtue of the fact that most pack members exist together for extended periods of time. Such relationships foster conditions needed to create and retain strong social bonds. In fact, length of time seems to be a primary consideration in developing bonds among members of a pack. Woolpy and Ginsburg (1967) found that young wolf pups easily lose positive feelings for specific others unless they are continually reinforced; where adults seem to retain these ties, once fully acquired, without further reinforcement. Young (1944) tells of a male wolf who was trapped, and his mate returned to him for sixteen nights until she herself was trapped.

Because the wolf lives in natural conditions which promote sociability, the efficiency of the pack is generally maintained.

The pups are usually in constant contact with each other from birth and associate with adult pack members who helped nurture them after the first few weeks of life. Thus, social attachments can be made and strengthened among the pups, and between the pups and all other members of the pack. However, their tendency to form social attachments begins to decrease soon after they leave the den and meet strangers. By the time pups are traveling with a pack (about seven months of age), their ability to form new social ties, without the forced training of experimental conditions, is very weak. As the size of the pack increases, the old social bonds can be broken either by a strong rivalry within the pack, or the reestablishment of new packs with new mates — mating is the single situation where bonds are formed between strange adult wolves. Even if the newly mated offspring remains with the original breeding pair, eventually the pack will become too large and they will den in separate places. In turn, the social ties of the original pack will weaken even though the groups might associate or occasionally hunt together. As a result, social bonds may be practically non-existent between the original litter members; a chance meeting of new and old packs might result in the acceptance of some pack members, and the rejection of the new members.

Siblings

Although interaction among littermates is unavoidable,

after the first few weeks of dependency such sibling interaction is associated primarily with pack interaction. Interaction between siblings is evident principally among chimpanzees. A flexible relationship develops among chimpanzee siblings, quite possibly because the older juvenile is still associating with its mother when the new infant is born. Resulting sibling relationships develop from plain contact and from the female sibling's intense curiosity toward the infant (Goodall, 1971). The relationship among siblings should not be minimized, particularly in adult males. Through her extensive observations of wild chimpanzees, Goodall believes that close friendships between adult males may often involve siblings. She was able to detect striking similarities, both physically and behaviorally, in many pairs of male friends observed. Her observations revealed only one pair of adult females who were likely to be sisters and shared a close friendship (Goodall, 1971).

When chimpanzee male siblings become socially mature, the friendship between them becomes a stronger bond. Adult friends (brothers), frequently travel together, engage in lengthy grooming sessions, feed together, and build nests in the same or nearby trees. In a number of instances, it was also observed that the presence of one companion/brother will provide needed courage and reassurance (Hinde, 1966). A single male chimpanzee will likely run away from an approaching potential male chimpanzee attacker, but often with the appearance of his

companion/brother will face the attack. Aside from providing such encouragement and companionship, the relationship between the supposed siblings involves a strong bond of caring. Goodall's (1971) study describes such a case between two brothers: one badly crippled by polio and one healthy. The afflicted chimpanzee was barely able to maneuver to feed and was shunned by the other troop members. During the last days of his life, his brother seldom "moved farther than a few hundred yards away from the older male": (Goodall, 1971:105), although he never approached to groom the sick chimpanzee. The healthy chimpanzee, after unsuccessful attempts to force his injured companion to follow the troop, would abandon his own attempts to follow the main troop and build his nest close to his friend. Once, he briefly attacked a larger male who was attacking the helpless chimpanzee. When the older chimpanzee died, his companion returned to the place they were last together for nearly six months. During this time, he seldom joined the other chimpanzees in travel; and if he did venture away, he would return in a few hours and resume his waiting.

Peers

Peer relationships are generally a natural progression from the individual's exposure to siblings. Peer play helps to develop the infant's skill, strength, and dexterity; and

helps to reinforce important social ties with the group. However, interaction within the peer group does not alleviate the dependency on the mother. As chimpanzees, for example, form closer ties with their peers, social grooming sessions with their mothers become longer to reinforce the existing mutual bonds. The need for social contact remains strong among chimpanzees. As the chimpanzee matures, the relationships developed by the young diminish and are gradually replaced by various actions that serve to establish their positions as adult members of the troop. Grooming allows for the needed security of touching and confirms mutual trust. Grooming also occurs in many other relationships in the troop besides that of the mother and offspring. Adult males engage in daily grooming sessions, as do females and their families. Grooming is often offered as an appeasing act after an aggressive encounter between either adults or adults and juveniles; and is both of great social importance to chimpanzees and incessantly sought by individuals. Goodall (1971) observed an adult male chimpanzee, badly paralyzed, repeatedly and painfully drag himself toward other grooming males. Fellow troop members would move away from the paralyzed animal, who, seeking the social contact of grooming, would laboriously attempt to follow.

Play

A striking fact among chimpanzees, dolphins, and wolves,

is their great amount of social play. At first glance, partly because of our perception of function, play seems to be without function. However, "...the amount of time and energy in play by, for instance, the carnivores or the primates, would surely put these animals at a disadvantage if their play were totally without function" (Loizos, 1967: 177). During play, the young learn their own strengths, the strengths of their playmates, and they begin to learn about the structure of their groups. The value and function of play behavior is in providing practice both for adult activity and for information necessary for survival (Pycroft, 1912). For instance, the continual chasing. leaping and play wrestling of the young chimpanzee serves to familiarize him or her with their environment. During play, the chimpanzee learns what type of branch is safe to jump on or from, and s/he learns gymnastic skills which will allow him or her to flee safely and quickly through the highest treetops.

During play sessions — positive, non-rigid interactions toward environmental features — extensive physical knowledge, not sufficiently learned during routine activities, is provided. Although it is not necessary to learn of the environment through play — and there is no positive distinction between playful and non-playful knowledge — play is successful in making the young more adept at managing their physical and social environments. Although play is not concerned with immediate survival, it is critically important preparation for adulthood.

That play is most always a characteristic of the young is chiefly explained by the amount of time required for learning from play. For play involves excessively repetitive and fragmented actions; and it is the young — whose needs are generally taken care of and who are relatively free from physical and social pressures — who primarily engage in play. However, the value of learning from play among the young of each species does not solely account for its persistence. Adults— particularly dolphins — also occasionally play. Play behavior among adults is generally associated with immediate periods of physical prosperity and tranquility. However, in the maturing adolescent, play sessions become less frequent. In fact, among chimpanzees tensions may exist between two older adolescent siblings; each trying to establish his social position. Rarely, though, will the younger male dominate the elder, even during play.

Finally, interaction within the play/peer group — while necessary for the development of appropriate social behavior — appears to be simply enjoyable to the young. That play is enjoyed by the young may be demonstrated in their reluctance to leave such activities. Goodall (1971:165) observed "no less than fifteen attempts" by one chimpanzee mother to retrieve her playing infant.

CHAPTER III

STRUCTURAL INTERACTION

With a myriad of possible encounters and potential relationships, the social organization of chimpanzees, dolphins, and wolves develop complex structures consisting of interdependent parts. A vast number of mechanisms are employed to maintain order, ease tense situations, or simply convey information within this structural network. These mechanisms include bodily posture, a wide range of greeting gestures, mutual grooming and touching, and vocalization. In order for any group to function efficiently, it must have an operative system of order and a system of communication that promotes that order. Chimpanzees, dolphins, and wolves possess both a strong structure or orderliness and a proficient system of communication. A well-developed social system is the basis for order, and such a system establishes both orderly relations among the members of each group and provides the means by which activities can be governed. With the establishment of a workable structure, individuals are able to assume functioning positions within the organization.

Relationships formed within each structure are, in a sense, controlled by that structure. The structural needs of each group influences the development of the member's behavioral patterns. Among chimpanzees, dolphins, and wolves

structures are developed which consist of recognized and respected social distances surrounding individual members. Such behaviorally observed distances allow the individual to feed, rest, and interact with a minimum of disruption. Since in these species individuals are essentially responsible for self-proficiency in numerous survival behaviors, the structure cannot be geared towards specialized functions. Each individual must obtain food and find shelter through his or her own efforts; although these actions are carried out within a group structure. The element of acceptable and recognized physical distances between each member allows the individual to be self-sufficient, yet retain a position within the united group. The behavioral patterns that develop in association with social distances differ in accordance with various interactions. In situations of defense or protection, individuals within all three populations minimize distance and separation. The positive behavior of grooming among chimpanzees, as well as the actions between mother and offspring in each species, allows for close physical contact between two individuals. However, other behaviors create circumstances where a greater physical space between members is enforced, such as in feeding, resting, mating, and courtship. The high degree of cooperation required by wolves in hunting, for instance, necessitates a quite rigid and close structure to maintain and ensure cooperation when in pursuit of food; whereas chimpanzees, without the need for cooperative

food gathering, develop a flexible and receptive system of order. Chimpanzees are remarkably tolerant of most behavior and demonstrate a great deal of individuality in their preference of companions and moving patterns. Such inter-individual relationships among the troops serves to regulate a certain amount of social friction and maintain social order.

There is little available data to indicate acceptable social distances in maintaining a system of order among dolphins. However, among dolphins curious placement patterns are often formed when sleeping that might be attributable to such order. The larger male takes a resting position barely beneath the surface of the water, and the remaining dolphins position themselves vertically underneath the male. Such positioning is inconvenient for the dolphins at the lower levels of the "ladder" who must rise a greater distance for air and risk possible interference with other dolphins. It is unclear why dolphins prefer such an arrangement, particularly when they have the expansiveness of the ocean. The formation of such a structure has not been observed among dolphin's in captivity.

The various processes and manners of interaction among each of the species are, in themselves, a cohesive element of the groups structural system. Interaction is regulated by adherance to established relationships and movements— although to varying degrees. Structural order is maintained through the behavioral patterns developed by interacting members. For example, during the course of interaction between the mother

and offspring the young become acquainted with behavioral regularities that essentially enforce respected social distances. Through interaction with the mother the chimpanzee learns to maintain a certain distance from adult males, yet learns they can approach adult females with little apprehension. The interaction process helps define the structural ordering required for functioning within each organization. During interaction an ordering of social positions, by social distance, is established and preserved.

In each of the three species a certain amount of structural coordination and adaptation is essential, and achieved, through behavioral regulation. Among chimpanzees, since individual behavior is varied and flexible, the social structure imposes few individual restrictions. The activities of seeking food and shelter remain individual actions. Coordination, more than cooperation, is required for internal regulation and order. Structural coordination allows the chimpanzees to continue to roam as individuals among a flexible and fluid troop, while providing a means for group protection, warning and communication.

Among wolves, cooperation and cohesiveness, rather than coordination, is a necessary structural characteristic. Within the wolf pack the breeding pair is the focus of structural cohesiveness. The wolf pack relies on strict cooperation to ensure successful hunting. The lone wolf — the unmated adult, old, or weak — find it difficult to survive without the support of the pack.

Among each of the species, since cooperation or coordination, rather than competitive actions are predominant, leadership is not an essential factor for the guidance of activities; although when circumstances warrant leadership activity, it is generally an adult male who responds. In all cases, leaders are somewhat dependent on, and influenced by, other group members for direction and cooperation. Dominance does not necessarily compel leadership and the group's actions are rarely, if ever, determined by coercion. Leadership, in such cases, is not forced and carries no literal sense of greater skill in finding food or discovering and avoiding danger. Among each of the species, in relaxed situations, such as play or travelling, movement may be directed by any individual. Among wolves, when a pack moves in single file along a regularly used trail, any of several wolves may be at the head of the line and both initiate movement and set the pace (Mech, 1966). Similarly, among dolphins, in exploratory situations, leadership is often a position not assumed by an adult male. In situations of potential danger or uncertainty, a "scout" often initiates examination. The scout is usually a smaller subadult, but if a pod does not contain a male subadult, any of the group animals, either male or female, may take the lead.

Each species' pattern of behavior is complexly adapted to its own particular lifestyle. The level and frequency of both aggressive interaction and threat — whether ritualized

or real — is influenced by their organizational structure and interference with personal space. Among chimpanzees, adult males exhibit displaying behavior when threatened, when bothered by other troop members, or when excited or frustrated. Displaying chimpanzees charge about accompanied by a series of hoots and screams, and often wave sticks and branches when available. In fact, Goodall (1971) observed one enterprising chimpanzee who deliberately used empty kerosene cans when displaying. The resultant noise, from kicking and throwing the cans about, heightened the effectiveness of his displays considerably. However, most displaying in a chimpanzee troop seems to be principally for show. In defense situations, the males will challenge an intruder with barks and abortive charges, although such defense is usually precautionary and only bluff. Predation is quite uncommon among chimpanzees, and aggressive or predatory threats are usually avoided by the chimpanzees inaccessibility among the trees. If individual escape is restricted, defensive means will be mutually provided by the troop. Joint defense is a unifying mechanism among the troop that provides greater strength, surveillance, and distraction advantages. Chimpanzees seldom defend a territory as a specific land area; rather, the troop shares a living area more or less harmoniously with others. Ignoring the activities of other troop members is a method of maintaining social order among the group.

Among dolphins, physical confrontation is similarly

avoided. However, the adult male dolphin can be extremely aggressive. In captivity, adult males have fiercely attacked, and attempted to harm, younger males who are placed in the same observational area.

In large part, however, direct physical confrontation is avoided in each of the species. Adaptive relationships are a basic part of the social behavior within each group. Each organization has developed a structure which is condusive to their needs for cooperation or coordination. By interacting within such a system order is achieved.

CHAPTER IV

SOCIAL LEARNING

Due to the complex social structure of chimpanzees, dolphins, and wolves, it is necessary that a process of learning be operative to develop social behavior and integrate individuals into the organization. The young of these species are born helpless and completely dependent upon their group for survival; they possess no biological mechanisms that either automatically direct social behavior or drive them to participate socially. Chimpanzees, dolphins, and wolves acquire patterns of social behavior only after a period of observation, experience, and interaction with other group members. The amount of time needed to acquire the correct patterns of social behavior is of a duration that negates the value of a high birth rate among these social groups. Time is needed both for the individual to become socially adept and to interact as a productive and integral group member.

Social learning is a form of conditioning, imitation, and trial and error. As a participant in a larger social system, the group member learns suitable actions and an awareness of others. Through such interactions, s/he becomes familiar with types of behavior appropriate with members of one group, but not necessarily appropriate with others. Not only does s/he learn social behavior within the group, s/he also learns of the physical environment; s/he becomes familiar with boundaries and

territorial divisions, food sources, what to approach, and what to fear. Thus, social learning is a social phenomenon.

Among chimpanzees, dolphins, and wolves, most actions and responses applicable to both social behavior and physical adaptation are transmitted to all new members through social learning. As a result, the denial of this transmission by early social deprivation can interfere with this necessary learning process. The influence of a group is supreme, either encouraging or blocking learning; for it is within the social organization that learning is achieved. However, even though a strict definition of learning implies "instruction", there is no evidence that chimpanzees, dolphins, or wolves actually "teach" each other (Barnett, 1968). Each organization does, nevertheless, cooperate to achieve set objectives. Crawford (1937) and Miller (1966) observed such cooperation in a group of young chimpanzees who were attempting to pull a box of food that was too heavy for solo efforts. When one chimpanzee was not helping, the other would go over and touch his hand or otherwise indicate that he wanted help. But this begging communication, as in the begging for food by wild chimpanzees, is only a request for cooperative action, not a demonstration of how to do an action. Still, it cannot be denied that some form of teaching takes place, albeit indirectly, even if chimpanzees, dolphins, and wolves have not the direct purpose of teaching. It is primarily the relationship between the mother and her offspring where the fundamental learning is

transmitted.

Learning Process

The transmission of the proper interaction process among all members is principally achieved through a system of social learning. The young learn about their world and the appropriate behavior in a social context. They learn the correct food trails, land boundaries, what to approach, and what to fear by the actions of others. If the young were left on their own to learn appropriate behavior for survival, they often would not survive long enough to learn.

Most behavior is conveyed through the social relationship developed between the mother and her infant. Social behavior is essentially an adaptation by individuals to their environment, by following the actions of their mothers and then transferring these actions to other group relationships. It is this relationship, and the social development it provides, that is both vital to produce correct behavior and ensures the continuation of the organization. Studies (Hall, 1968; Washburn, 1965) have emphasized the importance of social learning among primates. In the early 1900's Eugene Marais, working with hand-raised baboons, found the baboons incapable of distinguishing between poisonous or nourishing food — a distinction

even young juveniles in the wild could make. The hand-raised baboons were, in fact, terrified of the insects that were typical of the wild baboons' diet. In addition, the captive baboons had not the dimmest idea of how or where to locate food (Marais, 1912). Without a degree of social contact, new group members are often incapable of performing even minimal actions necessary for adequate survival. The young of each species rely on a period of exposure to group behaviors to learn their required lifestyle.

Scott (1967) recognized this "socialization period" as very important in the development of wolf pups and believed that the unique behavior in this period is associated with the formation of emotional attachments to places and individuals. In such a process, the pups form strong attachments first by becoming distressed when away from familiar individuals, and secondly by associating their relief with the presence of the adults who come to their aid. The formation of mother-infant bonds creates an important dependency. The ties that develop due to this dependency create a situation whereby the young closely observes his or her mother's behavior in different situations, and subsequently performs in a like manner. Chimpanzees, dolphins, and wolves have extensive periods of dependency. However, the ability of the young to form such ties decreases as they mature. By the time captive wolves, for instance, are three months old, it requires considerable effort to make them form new attachments (Woolpy and Ginsburg, 1967).

Fentress (1967) noticed that when his hand-raised male was twenty weeks old the animal suddenly became very wary of new persons; however, he would still greet individuals he had met even weeks before with enthusiasm. This reluctance to form attachments after a certain age is one other method of ensuring the cohesion of the pup to the pack.

The skills developed by the young during this period require a degree of retentive ability, along with an accumulation of experiences. Chimpanzees, dolphins, and wolves demonstrate great adaptability to varying conditions, and appear to be able to readily learn and retain what they have learned for long periods. Depending upon the circumstances, in fact, wolves have learned to avoid open areas where they are hunted by aircraft; and, conversely, biologists studying wolves by aircraft have conditioned them to remain in the open and behave normally (Mech, 1966).

That chimpanzees have the capacity to learn a great deal is now also recognized; however, it should be stressed that unless learning is social, the reliability and usefulness of acquired skills is diminished. Hall (1964:61) suggests that social learning "is so obviously the way of life (for primates) that it has so far defied a realistic experimental analysis, partly because it is so obvious". They further suggest three categories of social learning: following, facilitation, and learning by observation. These three categories are distinguishable by the time periods in which the performer

commonly engage in exploration due to their curiosity, the organization is allowed the benefits of their finds while avoiding potential hazards itself.

Curiosity is less pronounced among adult members of each species. Walters' (1968) found that older members are less likely to manipulate or explore new objects. Menzel (1969) suggests that this lack of curiosity is a natural step with increased experience. He hypothesizes that adults can quickly survey their environment and accumulate the needed information or retain the information after one exploratory trip, whereas the younger chimpanzees must go over the same territory many times before they gain the same knowledge. This ability to appraise the situation is based on the total amount of stored knowledge accumulated with experience. Thus, curiosity towards new objects depends as much on the individual's initial interest in the object and previous experiences in approaching objects, as on their learning capacities.

However, in spite of the dolphin's general tendency to explore and their inquisitive nature, they are usually apprehensive about strange objects in their environment. New objects are carefully surveyed from a distance and cautiously approached with the dolphin remaining alert and ready to flee. Caldwell (1972) hypothesizes that this waryness is an indication of advanced intelligence among the dolphin; whereas other animals are alert when approaching strange animals or objects, but do not demonstrate the dolphin's readiness to flee.

When new objects are placed in a tank with captive dolphins, after a period of silence and immobility, there is general vocalization and attempts by the dolphins to avoid the object. In some cases, the dolphin will attempt to get rid of the object by tossing it out of the tank in spite of the fear of the strange object. Such fear almost always occurs at the introduction of new objects; even the smallest object causes fear not demonstrated by the introduction of a new animal or placement in a new tank. This hesitancy in approaching objects may also offer an explanation for their reported incidents of aid. Occasionally, there are reports of dolphins shoving or nudging troubled swimmers on to the shore. It is not known if this is the result of an affinity towards man or is an impulsive urge, for dolphins have also reportedly pushed a sodden mattress toward shore (Alpers, 1960). It is equally likely that many objects have been pushed from shore. Moreover, the natural fear dolphins have of strange objects would seem to hinder such isolated rescues without the familiarity and acceptance of the swimmer. Such actions are equally likely to be attempts by the dolphin to defend its territory against the intruder, and push the strange object out of the area.

Play

A striking characteristic among chimpanzees, dolphins,

and wolves, is their social play. However, the temptation to approach play as a formless collection of trivial experiences engaged in for the sole purpose of having "fun", is misleading. Perceiving play as an activity merely for enjoyment, ignores the considerable merit inherent in the nature of play. The involvement of the members in play cannot be underestimated. Play, in a sense, is serious business; both experience in group interactions and skill in environmental manipulation are sharpened — if not often learned — during play. Furthermore, the individual's position in the social hierarchy, the behaviors necessary for enforcement and maintenance of this position, and communications skills are practiced and refined during play.

It is usually in the course of interaction within the peer play group that numerous future behavioral characteristics and positions are developed and stabilized. For, in fact, social play is both how individuals arrive at a great deal of their adult behavior and is a crucial part of their development. Social play provides the individual with a constant input of vital environmental and behavioral information, and it provides both the chance to practice the acquired knowledge and to improve the efficiency of behavior required in adult life.

The value of play has been verified in many experiments. In 1927, Köhler was working with chimpanzees in experiments designed to determine their ability to attach two bamboo shafts (they were of different sizes with one being able to

fit neatly inside the other to form a long stick) in order to obtain a banana. The chimpanzee was able to fit the shafts together; but only after numerous failures at retrieving the banana with each single stick. After more or less abandoning the hope of pulling in the banana he began aimlessly playing with the sticks and consequently connected them. He then was able to retrieve the reward.

The same experiment was repeated by Buch in 1945, which showed that previous experience with sticks did contribute to the chimpanzee's eventual solution of the problem. More interestingly, Schiller (1957) gave chimpanzees the same and other problems, but in play — with no reward offered — they correctly made the same manipulations, being able to stack boxes, connect sticks, and weave string in and out of the cage wire. In fact, they arrived at these solutions even more quickly in play when not distracted by a banana.

Among chimpanzees, while the infant is still dependent on his mother, he learns to explore his physical environment through play. He becomes skillful at climbing and manipulating objects — such as branches and twigs — and such skills become useful for feeding, nest-making, and protection. Although young chimpanzees will usually share their mother's nests for about the first four years of life, they first attempt to construct a nest when they are about ten months old either by bending small twigs and sitting on them, or holding them with their feet while searching for more twigs.

This is often done in the context of playing. This practice ensures that when infants are ready to sleep on their own, they will be competent at nest-making techniques.

The young become adept in using twigs and sticks for insect-eating; infants play with such materials long before they are capable of seriously using them. Even when the young do not have the dimmest idea of the purpose of tools, they will ineptly try to mimick the behavior of their mother. They will poke short or broken twigs into the ground, leaves, or any available surface, imitating their mother's observed actions when eating termites (Goodall, 1971). Another feeding action practiced by infants is "mopping," a process by which older chimpanzees mop up termites with the back of their wrists, picking off the termites that become entangled in hair (Goodall, 1968). The young will attempt to "mop" things like the ground, their own body, or their mother's back — usually anything but termites. Although the connections have not yet been made by the infant, play leads to the acquisition of skills necessary to construct a sturdy sleeping nest and in obtaining food in adulthood. All of these techniques are observed and practiced by the young who develop and participate in the social community of chimpanzees.

Play provides wolf pups with the significant assets of endurance, strength, and speed — qualities essential for the hunting activities of the pack. During this period, the pup begins to demonstrate habits and actions of predatory

behavior. At about six weeks of age, pups will snap at offered food, and pounce, tug, and chew on objects. They also take an interest in peeling and stripping objects during this stage. Mech (1966) reports that his captive wolves completely stripped the bark from two small trees in his yard, and would rip his clothes during play sessions and then try to "peel them off." This tugging and pulling is similar to the actions wild wolves use in killing prey. In the wild, pups are probably given chunks of hide on which to practice this technique (Mech, 1966).

Like other juveniles, juvenile dolphins are also very fond of play. Caldwell (1971) observed a community of juveniles play continuously for thirty hours without sleep. Dolphin play usually ranges from nosing or carrying some object around to chasing other dolphins, including adults. Teasing by using objects as bait occurs frequently and is preceded by clear-cut signals of invitations to play. This is accomplished when one dolphin, while dangling an object between his teeth, swims slowly up to another at closer and closer intervals until the invitation is accepted. In addition, young dolphins are also very adept at inventing their own new games. For instance, Caldwell (1971) observed small dolphins lying motionless in mid-water obviously making different sounds (as evidenced by the emitted bubbles from its blowhole) for no apparent reason other than play.

A large percentage of the studied play behavior of young dolphins is, however, sexual (Claiborne, 1972). The fact

that such a great deal of play behavior is sexual may be due to captivity, but the development of sexual behavior in dolphins is an important part of their overall behavioral pattern. In the same manner that play-chasing may lead to fight-chasing which leads to the establishment and defense of territories, suckling and inexperienced attempts at mating eventually lead to the development of sexual behavior. In fact, because dolphins in captivity do not become sexually mature until they are six or seven years old and dolphins in the wild may take twice that long to reach sexual maturity, a long period of time exists in which the dolphin may sexually explore, play, and experiment.

As the dolphin matures it remains playful, but its actions show less undirected activity than when it was young, and it expends less overt effort exploring the environment. However, adults both continue to play and tease each other, and also continue to play by themselves. In playing, adults continue to toss items into the air and carry and pass objects back and forth among themselves in the same manner as when they were young. Play is so enjoyable that captive dolphins have been known to perform an entire routine without stopping for rewards after each act (Claiborne, 1972). In addition, dolphins in the wild will often play by riding the waves made by a moving ship (Caldwell, 1972).

Playfulness also seems to be an important part of the dolphin's motivation in learning (Tavolga and Essapian, 1957).

Although the dolphin has adapted to its environment even to the extent to which manipulation of the environment appears unnecessary, the dolphin is capable of such manipulation when desired. For example, even though generally not tool users, dolphins have been observed fashioning objects of the environment for a purposeful action, usually having play as their motive. Morgan (1968) describes an incident where an adult dolphin, confronted with a stubbornly reclusive eel, purposely sought out a scorpian fish, killed the fish, and used its spines to poke the eel out of its hole. Such deliberate and insightful manipulation indicates that the dolphin is capable of manipulating its environment when necessary, and will use tools in furtherance of that need.

Social Development

Chimpanzees:

During the chimpanzee's fourth year, the very tolerant atmosphere in which s/he has existed gradually begins to change. The young engage in rougher and wilder play sessions and their behavior, if disruptive, is likely to be met with increased sternness. This is also the time the young chimpanzees are likely to be weaned — a process which, in some cases,

can last for nearly a year. Usually, when a young chimpanzee is weaned from the mother, s/he will become increasingly dependent on her for a short time. If the mother is reasonably tolerant during this period, the young will eventually become adjusted to independence. If, however, the weaning is accompanied by other adverse circumstances, this time of rejection can be devastating to the young chimpanzee. One young chimpanzee whose weaning coincided with the loss of a brother as a playmate due to his adolescence (and consequent separation from the family), the new pregnancy of her mother, and the approach of termite season (a normally boring season for any young chimpanzee), became lethargic, inactive, and seriously dependent on the mother who, in turn, would continually reject her (Goodall, 1968).

More and more during the fifth and sixth year, the chimpanzee begins to spend time away from his or her mother, preferring the companionship of peers or even being alone. Nevertheless, the chimpanzee still relies a great deal on the presence of the mother and will not leave for extended periods of time. For the most part, adolescent chimpanzees, male and female, respect and rely on the stabilizing factor of their mother, even when they are ten or eleven years old. And as the adolescent male grows older, he becomes increasingly likely to aid his mother when she is threatened or attacked. Moreover, the adolescent male, though six or seven years away from physical and social maturity, is able to dominate most

females.

As they approach full maturity, adolescent chimpanzees must be increasingly careful in interactions with adults to avoid aggressive encounters. The adolescent male may frequently be attacked by older males for any number of reasons that range from insubordination to creating an irritating commotion. Still, the frustrations of having to be vigilant do not decrease the adolescent's desire to associate with the mature males. Even after severe attacks by adults, the young males will continue approaching them. Goodall (1971: 176) states that among chimpanzees, the need for "friendly physical contact from a male who has just threatened or attacked them appears to be imperative". Unlike the young female chimpanzee who can learn necessary behavior from her mother — particularly when a new sibling is born — the young male also must purposely leave his mother and seek adult male company. Throughout this time of adolescence, the young male spends long periods alone, completely away from other chimpanzees. Eventually, the male will gain acceptance into the group's social structure, and around the age of thirteen or fourteen will become accepted as an adult member of the community.

The female chimpanzee must also be careful of her interactions with adults; not only with the adult males, but with adult females and adolescent males as well. Also, at this age, the female is even more fascinated by infants than she

was as a juvenile, although it will be three or four years until she is able to have her first child.

Dolphins:

The infant dolphin is also reared in an attitude of almost total permissiveness. As the dolphin grows, however, the gentle reprimands give way to sharp bites and slaps from adults. The maturing dolphin begins to acquire some cautiousness in his approaches to unusual animals or objects, although his curiousity and eagerness to play diminish this caution somewhat. The dolphin learns the difficult, ambiguous signals of play versus the signals of seriousness given by members of its society. Unfortunately, the mother's behavior in such circumstances is sometimes interpreted by the infant as a game of chase. In such instances, mothers will reprimand their calves by biting at them or even forcibly holding them on the bottom of a tank for a few minutes. Following this punishment, during which the calf often does considerable struggling and vocalizing, the calf is generally subdued and stays along side its mother once again. The cuts, scrapes, and bite marks the dolphin accumulates indicate the amount of "guiding" the young need.

From obervations, it would appear that young dolphins

learn much about sex from adult females, and learn signals, visually acquired aggressive techniques and flight, from adult males (Lilly, 1967). It is primarily through interactions with peers, however, that dolphins practice these actions, and learn both the ways of life and the established social relationships within the community (Alpers, 1960). It is also at this time that territorial aggressiveness begins to develop among males. Sometimes in captivity, a maturing male is removed from a tank containing a mature male because the presence of the younger individual may irritate the adult and cause conflicts. Unless a female has a calf, she generally does not become very aggressive.

Wolves:

Unlike dolphins, whose play appears to be either for simple enjoyment or is sexual in nature, play among wolves is primarily oriented towards establishing order or a position within the social structure. At about three weeks of age, playfighting — the beginning of antagonistic behavior — begins among wolves. Fuller and Dubuis (1962) suggest this helps establish the social relationship among littermates. Mech (1966) reports that two hand-raised pups began fighting at the age of seventeen days. At twenty-one days, the pups

were fighting seriously enough to necessitate separation to avoid serious harm. After a separation of approximately twenty-four hours, however, the pups were reunited and behaved quite differently. The female pup assumed a passively submissive position while the young male assumed the dominant position. From then on no serious fighting ever took place, and each time the pups were together they performed the dominance-submission ritual. However, in pups raised with adults there is no evidence of such serious fighting among pups. The presence of adult wolves seems to control the aggressiveness of the pups' social orientations.

At about twelve weeks of age, the wolf pup enters the juvenile period which will continue until the pup reaches sexual maturity. During this time, the young gains increased control over his motor abilities, and imitation also grows more and more apparent. They then begin behaving almost as a social unit. Although general physical development ends after the first year, sexual and psychological changes continue until the second year and maturity. From then on the only changes that might take place would be a possible increase in ability and the continued learning of hunting skills.

CONCLUSION

Social organizations, both human and non-human, consist of identifiable elements and characteristics. This structural examination is concerned with the functional requirement of slow maturation involving the progeny of three species. Comparison, however, proceeds beyond physical regularities and interactions to include the dynamic, multiple levels of association within the structural systems of chimpanzees, dolphins and wolves. Each of the developed networks are regulated by the social processes of adaptation, integration, cooperation and coordination. These processes are collective functions facilitated by social learning. As a result, cohesive organizational characteristics as dependence on sociability, environmental adaptation and mastery, social interaction, and structural order allow for feasible comparisons pertinent to the overall understanding of organizations.

Although the requirements for survival in each organization is similar, the mechanisms and methods of the organization are variable. While Zuckerman's (1932:17) contention that organizations are based upon "three main lines of behavior, search for food, for mates, and avoidance of enemies" remains essentially correct, such a concept is misleading. Although such elements are necessary factors in both the

emergence of a social organization and the subsequent behaviors within, when viewed as isolated characteristics, they are an incomplete description of the involved social processes. Viewing social characteristics as being categorically exclusive components negates the value of examining organizations as social processes inclusive of such elements. Observations presented in the form of subjective concepts — such as play or leadership — provide descriptions that may be misdirecting, and lack a comprehensive basis in social distribution, activity, and in behavioral patterns and responses.

The study of social organizations, therefore, should not fail to consider social behavior as a group process. Behavior, although an individual action, is also a social process. An awareness of interaction procedures among organizational members is not wholly sufficient in understanding the processes that subsequently develop from such interaction, and socialization. Thus, efforts have been made here not only to describe the social processes that operate within the organizations of chimpanzees, dolphins, and wolves, but to connect them to their structural system.

Structure

Social organizations that are structurally dependent on social learning are not limited to human societies. The

organization of any society is, at least in part, the result of membership actions to satisfy their diverse prerequisites for survival. Although homo-sapiens can advance and elaborately intensify these requirement, all organizational structures — whether minimal or elaborate — are initially developed to accomplish certain ends, to meet certain needs, and to serve certain functions. However abstract or intricate a particular organization becomes,this fundamental basis is a shared characteristic of all organizations generally.

Environmental Influences

In discussing these integration processes, one relationship this examination has drawn upon is that between each group and its respective environment. Although chimpanzees, dolphins, and wolves accupy unique and vastly different habitats, adaptable and comparable societies have been constructed. For instance, each of these social organizations is extremely well adapted to their environment largely because their structure provides the means to function in relative harmony with their physical surroundings. This relationship is condusive to an ecological and organizational balance which, in turn, provides the opportunity for each group to meet its physical requisites in feeding, shelter, and defense. A social organization of chimpanzees, for example, fosters skills in the young that

enable them to take advantage of the trees within their natural habitat for escape — a primary means of protection — and defense.

However, successful adaptation among chimpanzees, dolphins and wolves, as with some other complex organizations, including man, favors the continuation of the group, not the individual. Within each social organization, a pattern of expendability is evident which usually revolves around both age and the amount of acquired experience. The young and other less valuable members are both the most expendable and the most susceptible to predation. Within each of these organizations, it is the juvenile who usually explores — in large part due to their curiosity — new and potentially dangerous situations. This not only eliminates the risk to members with the most experience and knowledge of the environment, but also places the young in a position to perhaps contribute meaningfully to the group. This process, by which the weakest members are most often subject to predation, enables the strongest and most valuable individuals to continue functioning; a consequence that indirectly strengthens the group by allowing it to function with the most capable membership available. This, in turn, allows for greater effectiveness.

Social organizations are both established and operate within the confines of a physical setting. The resulting environmental influences are accounted for and evidenced in the structural arrangements of each group. Predominant among environmental influences is the regulation of group size. For

instance, chimpanzees are individual feeders. This characteristic is encouraged by a structure that provides a framework suitable to take advantage of the abundant and accessible resources within the environment. As a result, due to both the abundance of food and non-social feeding habits, there is a distinctly flexible and less cooperative element surrounding feeding. Structural rigidity is not necessary in this activity, as each individual is more or less responsible for his or her own nourishment. Consequently, the organization of chimpanzees — as well as those of dolphins, who are primarily individual feeders — can operate effectively with large populations. Wolves, on the other hand, due to the scarcity and difficulty in procuring food, are pack hunters. They rely upon a high degree of coordination and efficiency for successful hunting. Therefore, the maintenance of a small pack with a regulated structure is essential to insure this needed cooperation.

Nevertheless, evidence does not suggest a marked willingness for any member to share food, even though it is occasionally found to be done among chimpanzees, either spontaneously or through incessant begging. In fact, in a sense of almost enforced cooperation, wolves share food simply because their source of food is generally large single prey; even this sharing is accomplished through a system of access and proximity. In times of great scarcity, when wolf packs have been forced to rely on small rodents for food, they hunt individually (Jordan, 1947). In none of these species is there

any indication of pooling food — as is found among some human social organizations. Thus, while the direct effect of environment may mold the structure of a social organization, behavior is not limited only to those interactions influenced by the environment. In partnership with environmental adaptability is the adaptation and vital development towards sociability; both the group and the individual are dependent on a social structure.

Sociability

Sociability is sought and reinforced through contact with others on many levels throughout the lives of individuals in each species. Through this social contact, members learn appropriate behaviors and methods of action and survival, as well as receive the benefits of group protection and experience. In addition, through this contact, the society is able to continue functioning. As a result, sociability is a fundamental process for both learning and organizational progression.

Socialization

Pursuant to the unique and special aspects of chimpanzees, dolphins, and wolves is the care required by the young and the means by which they become functioning members of their respective groups. Included in the care of the young is the

vital process of social learning and its patterns of preparation and development. It is clear that these groups are based upon behaviors developed by individual members through socialization. The young are born into a society unable to become functioning members without mastering the behavioral patterns exhibited by their organizations. The persistence of any society depends upon the existence of members who share behavioral actions that make the society an ongoing process. Everything the young will eventually know and be able to do they must learn. Group knowledge and individual skills develop over time only when the individual is involved in the interaction process.

Among chimpanzees, dolphins, and wolves, the young are born helpless; they lack any predetermined social behavior and are totally dependent upon others for survival. This helplessness, in turn, necessitates a lengthy maturation period in which the young learn expected behaviors and essential skills. In addition, this prolonged immaturity necessitates having fewer offspring. In fact, high fecundity and high intelligence are incompatible, since many offspring cannot be cared for during the long maturation period needed for the learning potential to be fully realized (Wallace, 1965).

Through this extended contact with the group, the infant is conditioned and made aware of both group structure and his or her place within it. As s/he matures, the social characteristics needed for group survival become more evident, and through

constant input and stimulation from the group, s/he becomes familiar with appropriate responses to situations. The young learn what and how to hunt or obtain food, what foods to eat, what to fear and what not to fear, to whom they should be submissive and who is submissive to them; and all other vital characteristics for group survival through interaction — primarily during play — with peers, siblings, and other group members. Since group members respond to many social stimuli at once, the individual develops capacities of observation, evaluation, and response. From exposure to the group during this maturing period, the young acquire experience in all aspects and elements required by society. This repetitive continuation of behavior facilitates group cohesion and preservation. Thus, the group is the specialization. Although a long maturation period is not the sole primary interaction pattern, it is the key measurable consequence of interaction which influences the behavior and functioning of groups. While no interaction pattern is specifically established for the strict purpose of maintaining the organization, without such characteristics the social organizations of chimpanzees, dolphins, and wolves would cease to exist.

The social relationships that develop provide individual experiences that shape behavior according to acceptable patterns; and it is possible that all major activities and relationships flow from the social learning process. There are close links between social interaction and development through social learning. Social behaviors are reciprocal reactions

between group members and commonly accompanied by specific characteristics. However, to assume that the behavioral interactions of the members are similarly directed by innate and species specific processes, is unwarranted. Such an assumption is misdirected and leads to an inadequate approach to social organizations.

Interaction Process

The most binding relationship developed in these organizations is that between mother and infant. It is within this relationship that most social learning occurs, and the basis for further group assimilation is set. It is also during this period of dependency that bonds are formed concerning outside attachments. Among wolves, group ties are formed quite early and the willingness to accept new members is inhibited. This rigidity does not appear to be predominant among chimpanzees and dolphins, however. Their flexible association permits wider acceptance of other group members and promotes weaker territorial bonds. Although all groups develop relationships that foster cooperation, the prevalence of flexibility is a factor which seems most applicable to the larger non-hunting organizations.

The lengthy period of dependency and the need for constant care among the young accounts for the strong bond developed between mother and infant. Most subsequent relationships

are progressions of this basic relationship. As the offspring gains independence, relationships develop — usually first among siblings or close adult females who have previously cared for the offspring. All these relationships are usually experienced with individuals familiar with the offspring from contact with the mother. Commonly such care is provided by an older sibling or occasionally an adult female. This could be indicative of "aunt" behavior.

As the infant becomes less dependent upon his or her mother, relationships expand to include interactions with peers. The primary peer group is an effective element of social control. It emerges spontaneously and naturally from among the interactions of social equals who are, thus, likely to share the same life conditions. The peer group does not have the same social gradings as the larger unit.

A great deal of peer interaction is within the context of social play. As previously noted, it is difficult to achieve a consensus in the definition and value of play activities. One implication is that animal play cannot be serious, since if play has a function — which it does in the sense of survival — it is not play. However, "play" is useful in describing behavior and similar activity characteristics. Play periods among some social organizations are essential towards the development of proficient group members. Morris (1964) suggests that animals whose mode of survival is highly specialized — either structurally or behaviorally — have higher

levels of activity, including play. This appears to be indicative of the social organizations of chimpanzees, dolphins and wolves, where there is a great deal of play. The more flexible social system of each of the groups permit such play activities; and, occasionally, even adult group members engage in playful interaction. Therefore, the level of play activity can differ with each group. Among wolves, play behavior is evident but to a lesser degree, since structural rigidity and harsh physical demands inhibit a certain amount of play. However, as in most species, play is an action primarily engaged in by the young. Participation in play and exploration allows the individual to acquire diverse environmental knowledge that is important in adaptation (Washburn and Hamburg, 1965). During association with the mother, the infant learns basic skills, but it is within the play group that manipulative and motor skills are practiced and refined. It is also within the play group that positive social bonds, positions and behaviors are developed.

In adult group members, a predominant feature of interaction is that of social grooming. Although parental grooming is present, significant social grooming does not fully develop until after the juvenile stage (Yerkes, 1933). Again, with social grooming, a rough correlation can be observed with the type of social structure that prevails within the species. In studies of primates, Marler (1965) concluded that grooming is particularly prominant and more frequent in species where

authoritative relations play a significant part. This pattern seems to indicate that in the more flexible organization of chimpanzees there would be less demonstration of grooming behavior. However, social grooming, as a method of appeasment and assurance, does play a significant part in the maintenance of the chimpanzees' social structure. Even among chimpanzees, however, grooming relationships vary; there were fewer examples of grooming among chimpanzees who occupy habitats that allow little time for relaxed social activities because of the difficulty in obtaining food (Reynolds, 1956). Although wolves maintain a fairly rigid system, social grooming and contact does not appear to be utilized. Rather, a system of ordered distance is relied upon to achieve unity. Among chimpanzees, grooming can serve this purpose and act as a protective characteristic against aggression or reduce avoidance and fear responses in individuals.

Thus, this examination of cross-species organizations and subsequent social interactions cannot be conceived as structurally rigid or specifically identified. Social structure is a dynamic process influenced by multiple interactions and tolerant of diverse environments. Although individual interaction can characterize the organization, structural consistency depends upon a degree of control over the developed behavioral patterns. The process of social control emerges with the integrated group. The approach in comparing organizations has focused on the social process of maturation, necessary for each group to function. The importance of social learning, and the influences

of the environment, as well as the relationships and systems of order that have been integrated into each organization are essential characteristics for survival. The recognition of these elements of the social organization and the resulting behavioral patterns have been presented as descriptions of social processes — not in terms of single actions and responses. Although particular influences, situations, and actions may be species specific, similar processes are present and exhibit a consistent total structural pattern; although not on the same level of intensity and with diverse individual structures. Thus, social learning, cooperation and coordination remain consistent organizational requirements.

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