Ethological Anthropology: An Examination of Biological and Experimental Influences on Some Behavioral Systems in Human and Non-Human Primates

Miller

Follow this and additional works at: https://scholarworks.wmich.edu/masters_theses

Part of the Social and Cultural Anthropology Commons

Recommended Citation
https://scholarworks.wmich.edu/masters_theses/2346

This Masters Thesis-Open Access is brought to you for free and open access by the Graduate College at ScholarWorks at WMU. It has been accepted for inclusion in Master's Theses by an authorized administrator of ScholarWorks at WMU. For more information, please contact wmu-scholarworks@wmich.edu.
BIOLOGICAL ANTHROPOLOGY:
AN EXAMINATION OF BIOLOGICAL AND EXPERIMENTAL INFLUENCES
ON SOME BEHAVIORAL SYSTEMS IN HUMAN AND NON-HUMAN PRIMATES

by

Robert Jennings Miller

A Thesis
Submitted to the
Faculty of the Graduate College
in partial fulfillment
of the
Degree of Master of Arts

Western Michigan University
Kalamazoo, Michigan
April 1976
ACKNOWLEDGEMENTS

I would like to gratefully acknowledge those people who have contributed significantly to the production of this thesis. They are: Dr. Robert Jack Smith, advisor and confidant, whose criticism and editing were invaluable; Dr. William Garland, who first introduced me to my topic and who served as a continual resource and reference source, as well as sounding board, and also Mrs. Mary Miller, my mother, without whose typing this opus would never have seen the light of day. Finally, I must acknowledge my dear friend, Dr. John Cooley, for his contributions to my sagging spirit and sanity and his continual encouragement. Without their efforts, this thesis would have been much more difficult.

Robert Jennings Miller
INFORMATION TO USERS

This material was produced from a microfilm copy of the original document. While the most advanced technological means to photograph and reproduce this document have been used, the quality is heavily dependent upon the quality of the original submitted.

The following explanation of techniques is provided to help you understand markings or patterns which may appear on this reproduction.

1. The sign or “target” for pages apparently lacking from the document photographed is “Missing Page(s)”. If it was possible to obtain the missing page(s) or section, they are spliced into the film along with adjacent pages. This may have necessitated cutting thru an image and duplicating adjacent pages to insure you complete continuity.

2. When an image on the film is obliterated with a large round black mark, it is an indication that the photographer suspected that the copy may have moved during exposure and thus cause a blurred image. You will find a good image of the page in the adjacent frame.

3. When a map, drawing or chart, etc., was part of the material being photographed the photographer followed a definite method in “sectioning” the material. It is customary to begin photoing at the upper left hand corner of a large sheet and to continue photoing from left to right in equal sections with a small overlap. If necessary, sectioning is continued again — beginning below the first row and continuing on until complete.

4. The majority of users indicate that the textual content is of greatest value, however, a somewhat higher quality reproduction could be made from “photographs” if essential to the understanding of the dissertation. Silver prints of “photographs” may be ordered at additional charge by writing the Order Department, giving the catalog number, title, author and specific pages you wish reproduced.

5. PLEASE NOTE: Some pages may have indistinct print. Filmed as received.

Xerox University Microfilms
300 North Zeeb Road
Ann Arbor, Michigan 48105

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
MASTERS THESIS

MILLER, Robert Jennings
ETHOLOGICAL ANTHROPOLOGY: AN EXAMINATION OF BIOLOGICAL AND EXPERIMENTAL INFLUENCES ON SOME BEHAVIORAL SYSTEMS IN HUMAN AND NON-HUMAN PRIMATES.

Western Michigan University, M.A., 1976
Anthropology

Xerox University Microfilms, Ann Arbor, Michigan 48106
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>PART I: DATA BASE</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>INTRODUCTION</td>
<td>iv</td>
</tr>
<tr>
<td>CHAPTER I</td>
<td>AGGRESSIVE OR AGONISTIC BEHAVIORS IN NON-HUMAN PRIMATES</td>
</tr>
<tr>
<td>CHAPTER II</td>
<td>AGGRESSIVE OR AGONISTIC BEHAVIORS IN HUMANS</td>
</tr>
<tr>
<td>CHAPTER III</td>
<td>EXPERIMENTAL STUDIES IN AGGRESSION</td>
</tr>
<tr>
<td>CHAPTER IV</td>
<td>COMMUNICATIVE BEHAVIOR</td>
</tr>
<tr>
<td>CHAPTER V</td>
<td>LANGUAGE</td>
</tr>
<tr>
<td>CHAPTER VI</td>
<td>HUMAN COMMUNICATION</td>
</tr>
</tbody>
</table>

## PART II: ANALYSIS AND INTERPRETATION

| PREFERENCES | 33 |
| CHAPTER VII | AGGRESSIVE OR AGONISTIC BEHAVIORS ANALYZED | 33 |
| CHAPTER VIII | THE PREMISE OF INNATE AGGRESSION | 43 |
| CHAPTER IX | COMMUNICATIVE BEHAVIOR ANALYZED | 54 |
| CHAPTER X | CULTURE AS ADAPTATION AND THE WAYS OF INNATE BEHAVIORS | 61 |

| CONCLUSION | 66 |
| BIBLIOGRAPHY | 72 |
INTRODUCTION

The overarching topic of this thesis will be an integration of the findings and methodologies of ethology with anthropology. Although this has been attempted to some degree previously, the area of integration has generally been the sub-field of cultural or social anthropology. Since the primacy of socialization and learning is emphasized in this sub-field, little attention has been given to the integration of biological and cultural factors.

The past fifteen years have witnessed a virtual explosion in the field of behavioral studies. Upon the pioneering work of such men as Konrad Lorenz in ethology (cf. 1966) and Clarence Carpenter in primate studies (cf. 1974), a vast data bank has been erected. K. R. L. Hall and his protege, Irven DeVore, were among the first, with their pioneering studies of baboon behavior (1972). They were followed by others entering the newly expanding field, among them Jane Van Lawick-Goodall (1965) and George B. Schaller, whose study of the mountain gorilla remains a classic of research precision and lucidity of expression. (1972)

In Europe, Irenaus Eibl-Ebesfeldt (1974, 1975), Lorenz's student, began to produce research the equal of his mentor's. Relying upon cinematic techniques, he produced a remarkable cross cultural documentary on facial expressions and gestures, demonstrating their startling similarity in both form and context in various cultures throughout the world.

The list of involved professionals is long, with new names being added with increasing regularity. Such researchers as James MacKinnon,
with his seminal study of the orangutan (1974) and Judith Shirek-Ellefson, who has written on social communications among Old World monkeys, as well as produced a fine study of the gibbon (1972), are examples of this newer group. Also, from a more theoretical perspective, anthropologists Lionel Tiger and Robin Fox have raised pertinent questions concerning the validity of our assumptions about man and his behavior. (1971) While their works have been more theoretical than research based, they nevertheless had a considerable impact in making a significant contribution to a new perspective in anthropology.

The approach taken in this thesis will differ somewhat from that mentioned as having previously been taken. We will deal here with a physical anthropologist's position, placing special emphasis on behavioral similarities between human and non-human primates. We will be attempting to determine, secondarily, what behaviors and behavior patterns, seen in man, could be described as innate or non-learned. With the data available to us, we will be able to construct a paradigm in which the roles of learned and non-learned behaviors are incorporated, and thus man's behavior will be better understood.

It must be clearly understood from the outset that the innate behaviors and behavioral patterns with which we will be dealing are phylogenetically quite old. By comparative analysis of human and non-human primate behaviors, we are seeking similarities which stem from our common primate ancestry. This, of course, takes us millions of years into the evolutionary past, an expanse of time which has enhanced, via learning, the behavioral repertoires of man. This must also be taken into consideration when dealing with non-human primate subjects.
The basic hypothesis we will deal with is that man's behavioral repertoire is, in greater part than has hitherto been felt, under innate controls and dictates. The role played by innate behavior and patterns will also be examined. Again, the physical anthropologist's position will be examined and all behaviors dealt with will be studied with regard to their survival value for the animal, his group and his species. As regards this survival value, the primary emphasis is always placed upon the maintenance of the group as a social unit, one which, by its viability, assures the survival of the species. Individual survival value must be seen as of secondary importance; the group is the focal point of primate survival.

Although we are working primarily from a physical anthropological perspective, a basic principle from cultural anthropology must be kept in mind. When dealing with man in an evolutionary/adaptive framework, the primary adaptive phenomenon, culture, must always be considered. In our analysis, culture can be seen as learning, as it occurs in both structured and unstructured settings. Thus, as was stated earlier, we are dealing with quite old behaviors when we seek those which are innate. Adding to the difficulty of such analysis is the fact that man's learning ability is such that he has been able to combine behaviors into a tremendous variety of patterns and combinations. This has resulted, for man, in the superseding of biological evolution by increasingly important cultural adaptation. This has traditionally been the realm of the cultural anthropologist, as it has always been felt that biological considerations and analyses of behavior tend to diminish greatly as specialists have turned
their attention to a consideration of cultural evolution in its many aspects. It will be herein put forth that this need not be the case.

The behaviors with which we will be concerned can be categorized under two general headings, i.e., aggressive or agonistic behaviors and communicative behaviors. Data will be drawn from field studies primarily although theoretical works will also be consulted. Ethological sources will mainly center around studies having to do with human and non-human primates, other genera and species being somewhat less important here. The ethological writings will often be more theoretical in nature, whereas those derived from anthropological sources will be concerned more with data and the inferences derivable therefrom.

If we are to adopt the premise that much of our human behavior rests upon an innate framework and is under genetic control rather than having been learned, then we must seek reasons as to why this is so. What advantage is gained by maintaining a particular behavioral pattern under a rigid biological control? Has it not been always seen as a truism that man's greatest asset in his evolutionary success has been his behavioral plasticity, his ability to modify patterns of behavior to meet changing ecological and social exigencies? Are we saying that this has, after all, not been the case? Obviously not, for to do so would be absurd in the light of all available evidence. In fact, it has been shown that some innate behavioral patterns were proven inadequate as man developed his cultural complexity. For example, instinctive mechanisms for demonstration of subordinance were outstripped as man developed his ability to inflict wounds upon his fellows at distances which precluded the close
eye contact such submissive gestures required. (Lorenz 1966, 259) As a result, social sanction had to be developed which could function in place of the now inefficient innate posturings.

It should be pointed out that humans still possess the innate posturings in their behavioral repertoire and that in certain situations they continue to function quite adequately in militating against aggression. (Ibid, 240)

Although it will be dealt with in some detail elsewhere in this paper, it might be noted here that man's aggression, and aggressive displays especially, can be seen as having innate properties. Human threat displays, to utilize a primatological term, are remarkably similar to those evinced by the chimpanzee (*Pan troglodytes*). (Ibid. 269)

We must still answer the question of what advantages accrue to maintaining a behavior via genetic rather than cultural means. One obvious advantage is uniformity of the behavior. This makes certain that all actors will produce the same pattern, and thus will allow easy interpretation and response by other actors. There will be no room for misinterpretation, with its attendant results possibly disastrous for the individual.

As previously mentioned, the obvious advantages of innate control can be seen in analyses of human behavior greetings. It has been shown that greeting gestures and posturings, such as the open hand salutation, eye-brow flash and gaze aversion, during approach are exactly similar across cultures. (Eibl-Ebesfeldt 1975, 468) This makes interpretation of such behaviors a simpler matter. Furthermore, we know that in the part of the greeting ritual known as the close salutation, relative dominance, friendliness, familiarity and identity will all be signalled. (Kendon & Ferber
It would have been especially advantageous for our ancestors to derive such information via some unmistakable means. Since humans' best defense was flight for much of their evolutionary history, the recognition of friend or foe was vital. Thus, we can see that it would be advantageous to an organism to have some clear and unmistakable method of communicating vital information and that almost the only way to achieve this goal would be to have those communicative behaviors innately controlled in the animal, bypassing the vagaries of learning.

These examples will be greatly expanded upon as this paper develops. For now they will serve to establish the validity of the premise we have put forth. It can, of course, be said that all behavior is innately grounded at some point in evolutionary time. What we are here concerned with are those behaviors which have persisted in their phylogenetically ancient form, and how they operate today.

Yet another area with which we will deal herein, although to a lesser extent, will be a consideration of culture as man's adaptation to his environment. Obviously, such an adaptive strategy can be seen as highly advantageous; we will be concerned with how this is so.

Thus, it is not sufficient to put forth the proposition that much of man's behavior is genetically determined. The whys of this proposition are the more important questions with which we will deal.

The thesis will be divided into two major sections, dealing first with a data base drawn from studies on both human and non-human primates, and, secondly, providing analysis and interpretation of these data with regard to the premises previously set forth. We will focus first on aggressive or agonistic behavior and follow with communicative behavior.
This order will be adhered to in both sections. A short section on the adaptive strategy of culture will follow the analysis of communicative behavior, and close with a conclusion in which we will draw data and interpretation together and see where we have been and what can, and has, been said.
AGGRESSIVE OR AGONISTIC BEHAVIORS IN NON-HUMAN PRIMATES

Before we can address ourselves to an examination of aggression as either an innate or a learned set of behaviors, or consider if in fact such a dichotomy is valid at all, a delineation of the functions aggression or agonistic behavior serves is necessary. A guiding premise which will be adhered to throughout this paper is that, for a behavioral system to be evidenced, it must either be of some positive survival value or be neutral, that is, conferring neither an advantage nor a disadvantage upon the organism exhibiting it. Since primates, both human and non-human, are by nature social animals, we must view their behavior in a social context, including their agonistic behavior. The social nature of their behavior must at all times be considered.

With the idea of social situation in mind, we can put forth an initial generalization, namely, that agonistic behavior in primates is often seen to arise in situations of social disorganization. (Scott 1974, 426) It is the group which is of primary survival focus among primates, and periods of disruption of its structure, if not shortly corrected, are extremely dysfunctional. It is assumed that aggressive behavior may possibly function on one level as a means of restoring some order to the social structure of the group.

We also know that play groups among juveniles, and the sub-groups which result from these play groups, are important in maintenance of the
social order. In Clarence Carpenter's prodigious research are findings that patterns of play aggression, emerging in juvenile play groups, are carried over into adulthood and serve to delimit social orders and relationships and also influence the formation of sub-groups. (Carpenter 1974, 478) It has also been seen how dominant animals, those which are responsible for the regulation of behaviors within a group, are very attentive to distress cries of troop members, especially those of infants, and the dominant individual will punish subordinate animals which inflict pain on infants. (Buurski et al. 1975, 73) This serves a dual function, that of regulating play behavior among juveniles as well as protecting infants and the group as a whole. It should be remembered that the above citations are drawn from research conducted almost exclusively on terrestrial primates, both because they can be seen as somewhat more akin to man and also because data on them are more easily obtained and readily available.

As has already been mentioned, group behavior and a group structure are major factors in the social life of primates. In addition to regulating social behavior, aggression also serves the group as a whole by serving to maintain the integrity and composition of the group. This can be seen in a number of ways. K. R. L. Hall and Irven DeVore have been pioneers in the modern study of baboon social behavior and their observations of Papio anubis, among other things, illustrate this maintenance aspect of aggressive systems. They have found that in groups of anubis baboons, "... when there is some cause for disturbance from outside the group, members of the group tend to close up rather than to scatter, the generalized aggressiveness of the alpha male having the effect of bringing them together or at least preventing them from wandering away. (Hall &
DeVore 1972, 128) This aggressiveness on the part of the alpha male, resulting in a concentration of the troop members, is rarely seen except in times of threat or potential threat arising from an external source. In general, there are few examples of overt aggressive behavior directed toward troop members by the alpha male, except in instances of disturbance. (Buirski et al. 1975, 73)

Aggressive behavior, however, does arise in a somewhat unusual situation, that being during a period when groups are in the process of formation. Carpenter reports that: "Aggressive behavior was a prominent kind of behavior during the first year of the establishment of the Santiago colony. This was a time when groups were being organized and were becoming adapted to special areas of the island. (Carpenter 1974, 469) This situation could be likened to an extreme form of social disorganization, one in which no organization in fact exists. It also allows room for speculation on the seemingly high degree of need for establishment of a social structure and concomitant social bonds. More will be said of this later, but an observation seems appropriate here: That if the need to bond is innate, then it is quite interesting that the mechanism used to effect the bond, aggressive interactions and behavioral systems, is one which would seem, on the surface, to be bond destroying rather than enhancing.

In connection with the above ideas on group formation arising from aggressive encounters, aggressive systems must be seen in their total context; that is, that "... agonistic behavior is organized into a behavioral system having the function of adaptation and adjustment to conflict." (Scott 1962, 167) Thus, the total behavioral system is one in which avoidance of potentially harmful interactions plays as vital,
if not more so, a role, as does actual conflict or threat. This idea of the importance of avoidance will become even more apparent when we move on to the study of aggression in man.

But just how does avoidance serve to maintain the group, especially if cohesion among members is desired? Just as too great a separation among members is dangerous to survival, so is crowding a potential hazard for it brings with it an increase in tension and intra-group fighting. Spacing allows for each group individual to have access to an adequate food supply, to continue to benefit from membership in the group and, at the same time, to lower tension and so preclude much dysfunctional intra-group fighting. The group is maintained and, in general, all members benefit. Aggressive systems serve both in the formation of groups and in their maintenance by providing both protection from outside sources, such as predators, and by coincidentally keeping sufficient space among members so that resources are distributed adequately.

Beyond the group "intergroup aggression either leads to one group's having the resources of an area at its exclusive disposal, or at least creates a situation in which one group is much more likely to obtain the food in one area." (Washburn & Hamburg 1972, 286) This idea of intergroup aggression can be readily compared to the intragroup spacing function of aggression seen above. It has definite survival value for the species as a whole, since the larger troop will generally exercise dominance over the smaller. A somewhat unique situation has been observed in the case of Erythrocebus patas, the patas monkey, in which the normal social unit, consisting of a single adult male with several adult females and dependent young, has been seen to exert dominance over groups of males when
encountered near water sources and other resources. Hall 1972, 112)

Since, in an aggressive encounter among the males, the single male group would be at a serious disadvantage, it may be that adult females have more of an influence on dominance than has until now been felt. At any rate, the adaptive value of having the male/female group dominant over the all male group is clearly evident.

There may, however, be more to the determination of intergroup dominance than mere aggressiveness or the potential for it. This is one area in which more research is needed. Until now, we have been concerned almost exclusively with behavioral patterns drawn from the terrestrial Old World monkeys. Now we may turn to an example from the Hylobatidae, generally considered closer relatives to man. The gibbon and the siamang are considered both morphologically and behaviorally unique among the apes. Structurally they are extremely well adapted to their eco-niche, and their aggressive behavioral systems are also adapted to this niche.

Behaviorally, the uniqueness of the Hylobatids lies in their group structure, a bonded pair with immature offspring. Among primates this is found only among them and in man. The mating pair in the gibbon and siamang occupy and defend a territory and drive out their offspring when the latter reach sexual maturity.

Aggression in the Hylobatids is tied into the concept of territoriality, a phenomenon relatively uncommon among primates, Ardrey's contention notwithstanding. (Ardrey 1966, 213) Here aggression will be between groups, the social unit being the bonded pair and immature offspring, and will center around preferred food sources. (Ellefson 1968, 193) Generally, since the group is so small, inter-group aggression

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
will be the only form seen and clear dominance of one group (based on the male) over another is uncommon. (Ibid. 193) However, if the immature member of the group is a male, he will be driven out of his parents' territory upon reaching sexual maturity. Thus, aggression can also be seen as serving to maintain the basic composition of the group. This expulsion is carried out by the parent of the same sex as the offspring and seems to be a function arising in part from the parent's perception of the youngster as a sexual competitor and in part from the growing independence of the juvenile. (Bischof 1975, 51)

In overall perspective, we can see that inter-group dominance, especially as it is expressed in patterns of avoidance behavior, is a function of inter-group aggression and serves an important survival function for the species as a whole. The key to these patterns are those of avoidance, except in the case of the gibbon, and many authors have commented on how vocalizations seem to serve as spacing mechanisms which eliminate much contact and thus lower the incidence of actual aggression. (Ibid. 195) Seen in such a light, spacing vocalizations can be added to the aggressive behavioral system as part of the avoidance repertoire.

In addition to inter-group dominance, individuals within groups also strive for dominance for many reasons. This quest is not strictly a matter of aggressiveness or fighting ability. Age and experience also play a differential part in determining who will be dominant, such qualities having more or less importance from group to group and species to species. Also, the ability to form alliances and elicit aid in dominance interactions is of considerable importance in some species, such as savanna baboons.
Nevertheless, dominance and aggression are correlated and a degree of the latter is a prerequisite for the former. With that in mind, we can turn to those benefits which accrue to a dominant animal in a primate group. Clearly, one of the major advantages is the access to preferred food sources, especially in foraging groups such as baboons. (Hall 1972, 155) Since the dominant animal is often larger to begin with, thus requiring more food, this serves a vital function.

A cautionary note should be brought forth here, namely that this behavior is not typical of all primates and does not generally occur among the Anthropoidea. For instance, the chimpanzee, which does exhibit a form of dominance behavior, is generally not seen to exercise it stringently in regard to food. (Goodall 1965, 453) This is both a function of the rather lush environment of the chimpanzee and a reflection of its more amorphous social structure. (Ibid. 455)

Among those primates with a more hierarchical social structure, the more dominant individuals will generally have exclusive access to estrous females during their periods of maximum turgescence, when they are most likely to conceive. Thus, the dominant individual will have an increased likelihood of passing on his genes to future generations. This is of major importance for it insures the vitality of the group and serves as a safeguard by providing a continuation of the dominant line. This differential fertilization is one of the key adaptations seen in terrestrial primates, those which depend on dominant males for their survival.

Thus, dominance confers obvious advantages on the dominant animal and the research of Peter Buirski and his associates has shown that
aggression and dominance are positively correlated in that aggressive baboons were the ones groomed most often and that those animals most often groomed were also the most dominant. (Buirski et al. 1975, 76) Such benefits as increased personal space and greater range of movement are also seen as advantages of dominant status.

Along with these obvious benefits, however, could there be other more subtle reinforcing properties of dominance? This is an area which is harder to investigate and, therefore, has had less effort expended on it, but indications point to it being quite fruitful and worthy of further study. According to K. R. L. Hall: "Being dominant appears to be its own reward—to be highly satisfying and to be sought, regardless of whether it is accompanied by advantage in food, sex or grooming. In the long run, position guarantees reward, but in the short run, position itself is the reward, ... satisfaction apparently comes from others being unable to challenge effectively, as well as from more tangible rewards." (Hall 1972, 290) While this is admittedly much more subjective than counting grooming encounters, it holds a certain fascination, for this seems to parallel the situation seen all too often among humans. When we turn to human behavior patterns, more will be said of this, but for now it will be enough to realize 1) that power and dominance are more than means to an end, but indeed constitute ends in themselves and 2) that this is true not only among man but also among his primate relations. (Ibid. 290)

There is considerable debate as to whether predatory behavior can be seen as aggression, or whether it should be considered as a separate behavioral system. Most opinion falls into the latter camp. The stand to be taken in this paper is that predation can be seen as a form of
inter-specific aggression, especially as it confers a definite selective advantage on the successful predator and is definitely disadvantageous to its prey.

Much has also been made of the significance of the transition to hunting in man's evolutionary history, of his adoption of a more predatory life style. More will be offered on this topic later. As for non-human primates, it was formerly generally accepted that they did not engage in hunting, but we now know that this is somewhat inaccurate. Goodall has demonstrated instances of organized cooperative hunting among chimpanzees, the prey being the red colobus monkey. (Goodall 1965, 445) Also, there are reports of gibbons capturing nestling birds as part of their diet. (Schaller 1965, 477) There are no reported instances of predation for either the orangutan or the gorilla.

Among the Cercopithecines, DeVore and Hall have reported that baboons in Kenya have been observed eating both birds and other meat sources, such as hares and gazelle infants; however, systematic predatory behavior patterns are lacking and this has led the authors to conclude that: "... meat eating is learned behavior, and may be frequent in some groups and rare or lacking in others." (DeVore & Hall 1965, 47) There are no other known reports of predatory instances among monkeys.

Thus, it would seem that predation, seen either as aggression or not, is a somewhat rare occurrence among non-human primates. It should also be noted that, in general, spoils that do result from a successful predatory foray are not distributed through the group as a whole, but rather remain the property of the dominant animals, since these are generally the ones doing the hunting. This latter point may be crucial since we
have already seen that aggressivity and dominance are positively correlated. Perhaps the aggressive impulses of the dominant animals, which must be controlled somewhat in a group living situation, find an outlet in predatory behavior. This must remain, at least for the present, within the realm of speculation.

In general, therefore, we can view non-human primate aggression as a behavioral system involving threat gestures, displacement, patterns of avoidance and actual fighting. This system serves to regulate social behaviors, provide for defense of the group, establish and maintain individual and group territories and provide access to food and estrous females. It encompasses, therefore, a great deal of the common or regular behaviors of daily life within a primate group.

We will next turn to a description of aggressive systems in human behavior in the hope of drawing some comparisons between them and those of our primate relations.
AGGRESSIVE OR AGONISTIC BEHAVIORS IN HUMANS

In recent years there have been several books and numerous articles published putting forth the idea that many of man's behaviors and institutions can be traced to his innate aggressive drive. It is not the purpose of this paper either to attack or defend such a position per se. Enough emotionalism has already been expended on the subject and to take a polemical position at this time and place would be futile and self-defeating. We will examine aggression in humans, first on a functional level and then from the experimental point of view. Perhaps some conclusions will be reached but they will be factually based, not merely founded on subjective speculation.

First of all, we must ask ourselves what functions, if any, are served by aggressive behavior systems in man today. We have seen that in some non-human primates such systems serve as regulators of social behavior patterns. Is this also true of man? This can be seen as a very subjective question, for it could well be said that the threat display manifested by policemen on duty serves to curb potential lawless behavior. Likewise, on a larger scale, military parades, with their overly ostentatious displays of weaponry, serve as visible reminders to potentially belligerent neighbors that attack will be returned, and thus it can be said that detente is furthered by the threat of reciprocal violence.

Certainly, these instances can be seen as proof, admittedly subjective, that an agonistic system of threats and avoidance behaviors is at work mediating behavior. But, at the same time, such examples overlook the fact that most social behavior occurring between people is carried
out more on the assumption that amiability, not aggression, is the basis for such interaction. It would seem that Konrad Lorenz may be more to the point with his thesis that prehistoric selection for a high degree of aggressivity is today confounded by the fact that man has no acceptable outlet for much of this aggression. (Lorenz 1966, 243) This would seem to apply whether one holds to the proposition that man's aggressivity is innate or sees it as basically learned. At one time it was thought that males with an extra Y chromosome, that is genotypically XYY, were more aggressive because they possessed the extra genetic material. This is now known to be false, since the original sample population was drawn from prison inmates, people who were highly aggressive to begin with. (Sundick 1973, personal communication) This is mentioned not to criticize geneticists, but rather to emphasize the fact that a person who exhibits an overabundance of aggressive behavior, for whatever reason, is dysfunctional in today's western society and will often end up in prison.

It must be stressed that we are discussing here an abnormally aggressive person, one who manifests such behavior in situations which are not socially sanctioned. For example, it is perfectly acceptable and condoned for hockey players to engage in fist fights during the course of a game because in that situation they are asserting their toughness and indicating that they cannot be intimidated, and spectators expect such behavior of these gladiators. Yet, such fighting outside the arena, or even among the paying customers in the audience, can be taken as grounds for arrest. For such reason it is often proposed that athletic events, both participatory and as spectator sports, offer vicarious release of pent up aggression. This may well be accurate, but such events may also serve as
eliciting patterns of aggression which would not otherwise have been manifested.

Human aggressive behavior has been characterized in the popular press as stemming from territoriality, with wars between nations being cited as *prima facie* evidence for this position. As we have already seen, in primates the concept of territoriality is only minimally developed, yet we cannot totally ignore territoriality as a basis for aggression. Niko Tinbergen, a pioneer in the field of ethology, correlates the rise of hunting with the development of defined territories: "As a social, hunting primate, man must originally have been organized on the principle of group territories." (Tinbergen 1966, 129) This position, of course, views territoriality as a product not dependent upon our primate heritage, but rather arising when man broke with his lineage and adopted a new mode of life.

On the other hand, Lionel Tiger and Robin Fox would see the rise of territory-related aggression as occurring even later than the advent of hunting. In their view, the small hunting groups which existed for thousands of years were so widely dispersed and of such relatively minor impact upon the land that ritualized aggression, which can be seen in primates generally, was the only form observed. It was not until the development and subsequent rise of agriculturalism that territoriality and disputes over same led to a more drastic form of overt aggression. (Tiger & Fox 1971, 271) Thus, hunting would have been of minor consequence as far as giving rise to forms of human aggression.

As far as wars between nations are concerned, it would seem that political considerations are often the basis for conflict and thus not
within the scope of this paper. There is, however, one aspect which
we shall consider, namely, that type of group behavior labelled "mili­
tant enthusiasm" by Konrad Lorenz. (Lorenz 1966, 271) To that we will
now turn our attention. Lorenz has written extensively on aggression
and his category of militant enthusiasm is particularly interesting.
He sees this behavior as a group phenomenon, a specialized form of group
aggression, functionally related to a more primitive form of petty, in­
dividual aggression. (Lorenz 1966, 268) This is the reaction of group
members against or toward non-group members. Eibl-Ebesfeldt has pointed
out that group members are much less hostile to other members of their
own association than they are to non-members, and he cites this as a
primary reason for the development of a rationally based morality. (Eibl-
Ebesfeldt 1970, 451) Although this may be an excursion too far into the
realm of subjectivity, it nonetheless does have correlates throughout
the annals of primate research. Aggression directed toward non-group
members is much more pronounced in intensity. Lorenz further states:
"... militant enthusiasm is an instinctive response with a phylogene­
tically determined releasing mechanism." (Lorenz 1966, 271)

One such release may well be music, more specifically the rhythmic
cadences of marching music. (Eibl-Ebesfeldt 1970, 452) One could see
considerable evidence for this in newsreel footage of almost any military
parade or demonstration wherein the observers are swept up in the mood
of the occasion. Adolph Hitler, demagogue that he was, was nonetheless
a master at manipulating large groups of people by appeals to their
sense of group membership as when he pictured Germany against an en­
croaching world. His use of martial music to inspire hatred and
aggression against "non-Aryans" was ample demonstration of its powers as a releasing mechanism when skillfully combined with his appeals to group loyalty. (Ibid. 516) Militant enthusiasm may indeed be a side of man's character none too pretty, and Lorenz seems to be at least partially correct in his assessment of it.

The powerful effects of group loyalty can be seen in non-human primates as well as in man, and quite possibly they were of immense survival value to our species. David Davis believes that both territoriality and social order are means of assuring survival of a species, and he sees these as developing over time. (Davis 1962, 519) In his studies of aggressiveness occurring among human gangs, a particularly intriguing social unit, he has found such behavior to be necessary for establishing and maintaining social order, that the aggressivity is innate and that only the methods of fighting and the chosen enemies are learned. (Ibid. 319) This would tend to confirm Lorenz and also serve to reinforce the idea of the survival value of militant enthusiasm, however nefarious it may become.

We thus find out, in humans, aggression and territoriality are closely linked. There are, however, other factors which also play a role in aggressive behavior systems. These include concepts of hierarchy or ranking of individuals and groups, the human life cycle and, as is well known among social psychologists, frustration. (Tiger 1969, 157) But all these factors can be related in one crucial sense: they all involve the idea of change of some sort and this is a key concept. Aggression arises in situations where a change is either in process or is being sought. (Ibid. 158) It can readily be seen that this is much the same
as we have found in our data from other primate species, referred to as periods of social disorganization. It would seem that primates in general react aggressively when some form of routine is disrupted. (Ibid. 158) It is in man that we find aggression utilized to disrupt a routine, and this would seem to be an outgrowth of man's powers of reasoning and his ability to displace the potential outcomes of an action into the future. (It must here be stated that Goodall has seen possible evidence of this ability in the Gombe Stream chimpanzees.) (Van Lawick-Goodall 1965, 443)

Change can be reflected in a number of ways. One of these is in some form of dominance relationship. Ralph Bolton, in his work among the Qolla of Peru, has found: "There is a strong tendency for persons holding official positions to be ranked among the most aggressive in the village. (Bolton 1973, 240) Again, parallels to this can be readily seen among other species of terrestrial primates.

According to Tiger: "I want to regard aggression as a 'normal' feature of the human biologically based repertoire, a type of behavior intrinsic to man's being and to his effective interaction with his social movement." (Tiger 1969, 159) This would suggest that a degree of aggressiveness is required in man simply to get by in day-to-day life. However, if true, such a level of aggressiveness has surely declined over man's time on earth, and today it must be carefully channelled and controlled lest it become dysfunctional both to man and to society.

There is also much empirical evidence that aggressiveness does not always have a clear end in sight. That is, it may be manifested for no logical, or at least readily discernible, social goal. Bolton may here be able to offer some explanation. He hypothesizes, from his research
data, that aggressiveness may be manifested as a compensation mechanism for inadequate production of internal metabolic substances, for example, a deficient glucose level. (Bolton 1973, 249) This is an area that needs much additional research, but which also offers great potential for explaining supposedly anomalous behaviors.

Since we have tied human aggressiveness, at least in part, to dominance, it should be mentioned that the desire to be dominant may at times be rewarding in and of itself. Certainly dominance or social status brings many rewards, dubious though some may be, but the goal of power itself may be a very positive one in humans, just as we have found it to be so in non-human primates.

From this rather subjective concern with human dominance, we will next turn our attention to some experimental studies of aggression in order to further our understanding of the phenomenon and, hopefully, to derive some rather more substantial conclusions about it.
EXPERIMENTAL STUDIES ON AGGRESSION

Because of our ethical foundations, scientists have found it very difficult to study aggression in man experimentally. Indeed, we have had to substitute other primates and interpolate from them to human behavior patterns. Due to this paucity of data on human subjects, much of this section will deal with results derived from research performed on non-human primates, supplemented with data from human subjects where they are available and appropriate.

In dealing with aggression studies, we must, of course, be sound in our definitions. We will here deal with two forms of aggression: primary and secondary. The former is seen as arising spontaneously either from some internal or external stimulus, while the latter arises as a reaction to a painful stimulus, originating either within or without the organism. (Plotnik 1974, 400) These distinctions should be kept in mind, for they are crucial. If we are to establish the innateness of aggression, it would seem that primary aggression would be what we are after, for the neural circuitry involved would, by definition, be less complex and thus would more likely be innate.

Among non-primates, there exists little neurological evidence for innate aggressive circuits, if we are to exclude predatory behavior. (Ibid. 392) Research has shown that animals such as rats and cats will exhibit predatory behavior not normally present in their repertoire after electrical or chemical stimulation. These findings would seem to indicate the presence of an innate circuit for predation which is not
normally displayed for reasons of breeding and/or environment. (Ibid. 392) The primary importance of this work is in exposing the forceful influence which environment may have on animals which we have long considered to be greatly controlled behaviorally by innate mechanisms. This will take on even further significance when we discuss experimental results among higher species.

Thus, we would expect environment to play an important role in shaping behavior and would expect that environment normally to include other organisms. One way to examine the effect of the environment is to control it. Gene P. Sackett (1966, 1472) has worked with isolation-reared rhesus macaques (*Macaca mulatta*) in attempting to locate some innate releasing mechanism. His results are of some interest in our study of aggression. It must here be remembered that an aggressive behavioral system includes not only threats and fighting, but also gestures of submission and appeasement, those which serve to mollify an aggressor.

Sackett's subjects were reared in isolation cages with only pictures for visual input. They were able to hear other monkeys but could not see them. Pictures consisted of monkeys in various poses as well as humans and neutral pictures. After two to two and one-half months, disturbance behavior in the presence of the threatening monkey projections increased dramatically, peaking at two and one-half to three months and declining at three and one-half months. (Ibid. 1472) From this and other data, Sackett was able to conclude that "... at least two kinds of socially meaningful visual stimuli, pictures of monkeys threatening and pictures of infants, appear to have unlearned, prepotent activating properties for socially naive monkeys. ... the visual stimulation involved in threat
behavior appears to function as an 'innate releasing stimulus' for fearful behavior. This innate mechanism appears maturational in nature." (Ibid. 1473)

Although leaning toward the innate side of the argument, Sackett did not totally rule out the contribution of learning to behavior. "Although the maintenance of responses to socially communicated stimuli may well depend on learning and some type of reinforcement process, the initial evocation of such complex responses may have an inherited, species specific structure." (Ibid. 1473)

Interesting as the Sackett findings are, they do not address themselves to the question of how the aggressive reaction is elicited. To do that, we must seek other sources. There have been a number of experiments involving electrical and chemical stimulation of the brain, including studies on rhesus macaques and chimpanzees, as well as other species. (Plotnik 1974, 390) There have, however, been several confounding factors which serve to call their results to question. (The general trend has been to postulate some form of innate aggressive circuitry in the animal tested.) Little or no attempt was generally made to determine whether the stimulus being presented was painful or not, often the subjects were under restraint which could also act as an eliciting stimulus, and time of response after presentation of stimulus was often not recorded. (Ibid. 395) All of these factors have caused Plotnik to conclude that: "There are no studies on chimpanzees in which brain stimulation can be said to have elicited aggression." (Ibid. 399) He also finds no evidence for innate aggressive circuits in other primates, although reported data have previously supported such findings. (Ibid. 410)
Plotnik's review of available studies has suggested that the aggressive response may be due to activation of some neural circuit for aggression, or it may be occurring as a response to a noxious or painful stimulus, what we have previously differentiated as primary and secondary aggression, respectively. (Ibid. 400) However, "There is no evidence from brain stimulation data for innate neural centers in primates. There is evidence for secondary aggression (pain mediated) elicited by brain stimulation in primates. Secondary aggression is well organized, directed and responsive to environmental cues." (Ibid. 410) J. P. Scott, from similar data, has concluded that "... the physiological evidence is against Lorenz's notion of the spontaneity of aggression." (Scott 1973, 136) Plotnik concludes: "These studies indicate that there are two important variables in brain stimulation research. First, the occurrence and kind of aggressive responses elicited depends upon the kind of environment the animal is tested in. This indicates that, if neural circuits are activated, they do not act independently of the environment. Second, the more established the social relationships (dominant-submissive), the more likely it is that these relationships or patterns will be maintained during stimulation-elicited behavior. In other words, if there are neural circuits for aggression, established social hierarchies will limit the activation of these circuits." (Plotnik 1974, 396)

Thus, the primate data are sparse on the side of specifically innate aggressive responses. It should also be considered that, in a natural habitat, environment may prove even more important, since any particular animal is receiving continual sensory inputs from many more
sources than are available in a laboratory, and these might well serve to mediate aggression even further.

On the human side, Ralph Bolton's work among the previously mentioned Qolla, may be of considerable import, since it involves measurement of internal metabolic processes as they are related to, in this case, aggressive behavior. Bolton has found that high aggressiveness, among the Qolla, is positively correlated with mild to moderate cases of hypoglycemia, as measured via glucose tolerance tests. (Bolton 1973, 246) Thus, "Hypoglycemia may cause the individual to become irritable, thus lowering the threshold for aggression release by appropriate stimuli in the environment." (Ibid. 243) This, of course, takes into account the dual activating functions of internal and external stimuli. Furthermore, aggressive behavior " ... has potential eufunctional consequences, too, if, for example, it leads to spacing out or increased access to scarce resources important for an adequate diet." (Ibid. 249) This latter point can be seen as important in an evolutionary perspective, which we will next examine.

Suffice it to say that the experimental data presently available do not argue strongly for innate aggressive circuits. Bolton's work does, however, point the way to potentially revelatory studies which may serve to further illumine the relationships between internal states and externally manifested behavior. Until such time, and probably then also, aggressive behavior must be seen as occurring via a concert of internal and external stimuli.
Our second area of focus will be communication. Our main objective here is not to trace a continuum from lower primate communications to human speech. Rather, we will examine the areas of similarity, and those of difference, which make up the varieties of primate communication.

It should be mentioned at the outset of this section that we will be dealing, when we talk of vocalizations, with two distinct forms thereof. These are the call system and the language system. The former is found in all non-human primates and consists of a series of mutually exclusive vocalizations, each of which communicates a specific piece of information. (Hockett & Ascher 1973, 321) The call system thus differs in this regard from a language, but this is not the only distinction between the two. A language is said to possess displacement, namely, the ability to communicate information about an object or event which is not immediately present. A call system cannot do this. A language possesses duality of patterning; that is, both the form and the content of the message are invested with meaning, whereas a call system does not. And, thirdly, a language is transmitted via learning, although the propensity for, and the drive to acquire it, are probably inherent. In contrast, a call system, according to present research, is probably genetic in origin. (Ibid. 321)

There is, however, much more to communication than meets the ear, although it may not seem so to humans. Notwithstanding the fact that Homo sapiens is most attuned to transmit information aurally, he is the only real break from the general primate communicatory pattern.
Non-human primates place heaviest reliance upon visual contact and signalling, utilizing all parts of the face and other bodily regions, as well as variances in posture to communicate information to their fellows. Also, these communicative gestures, postures, etc., are generally found to occur in clusters and these clusters are seen as grading into one another. (Shirek-Ellefson 1972, 300) In this fashion, subtle shades of meaning and variations in the level of internal states can be transmitted, an important quality generally found to be lacking in the primate call system.

With these concepts in mind, we can turn to an examination of the communicative patterns among various primates.

We will begin with a brief look at communication among arboreal, forest-dwelling monkeys, which include members of both the Cercopithecinae and Colobinae. It is unfortunate that there has not been an abundance of field research done on forest-dwelling primates due to the inhospitable, observation-hampering habitat in which such monkeys dwell. A general pattern which does emerge from the available data is that calling plays a major role in maintaining social boundaries. (Aldrich-Blake 1968, 88) This is somewhat important, when combined with data on social structure, for it allows us to offer speculation on evolutionary aspects of communication. It appears that forest-dwelling arboreal primates live in smaller groups than do species living terrestrially in open country. This would seem to indicate that visual communication is a necessary component of large group formation, since large groups are apparently lacking in forest species, and visual communication over more than a few yards is generally impossible. (Ibid. 94)
There are, of course, arguments counter to this line of reasoning, the first being that we are arguing from negative evidence when considering forest-dwelling species and, also, that we have not systematically observed all forest dwellers. The data base is, indeed, scanty, as was previously mentioned. A second line of argument would be that, even if we accept as adequate the number of studies done, we must question their results since problems of observation are acute as has been pointed out in every study written.

Even if we accept as valid these criticisms and keep them in mind, we can make some comment about communication from an evolutionary standpoint. The primary focal area of visual communication is the face, an area which offers a centralized, easily seen canvas for varied communications. Thus, for animals which depend on visual signals, especially the primates, the face is a key area and one which "... has undergone rapid specialization, culminating in the highly complex organization found in man." (Van Hooff 1967, 15) Thus, we recognize the chimpanzee face as more "human appearing" than that of a Colobine, for visual signals are more important to the chimpanzee and his social structure.

How is it, then, that we have previously distinguished man's communication from that of other primates on the basis of its being aural rather than visual? An explanation would seem to be in order. It is true that visual cues play an important role in human communication, but a different role from the one they perform among other primates. In non-human primates, it is the visual signals which bear the substance of the message being communicated, and vocalizations, if any, function as modifiers; that is, they serve to add emphasis or communicate levels of
intensity, which may modify the actions or perceptions of the recipient. In human communication these roles are reversed. (Hockett & Ascher 1974, 320) The substance of the message is transmitted verbally; postures, expressions and gestures are the modifiers or intensifiers. This strict dichotomy is, of course, not rigidly followed, but by utilizing it here, we can illustrate the distance separating basic human from non-human primate communication. Also, we will refer back to it, later, when discussing the possibility of the innate nature of all primate communication.

Thus, one of the major evolutionary advances of Homo sapiens was the ability to break the bond of the primacy of visual communication and to develop a primarily verbal language. Visual communication had made possible larger aggregations, as witnessed in the terrestrial open country forms such as the baboon, but it was basically an expansion of arboreal primate patterns. (Ibid. 322)

With this in mind, we turn our attention to the Anthropoidea and examine some of their typical communicative behaviors. The first to be considered will be the chimpanzee, often thought to be, behaviorally, man's nearest primate relative.

As with other non-human primates, facial expressions and gestures are some of the most important components of chimpanzee communication. (Van Lawick-Goodall 1972, 34) However, unlike some other primates, notably the gorilla, vocalizations are also quite prevalent in their communicative repertoire and seem to serve many functions. These include, among other things, transmitting location of available food sources, signalling movements of the chimpanzee group and giving notice
of the location of various members of the group. (Reynolds & Reynolds 1965, 414) "The loud calling in chorus and drumming displays may ... be correlated with their loosely organized unstable society, which itself can be seen as an adaptation to the needs of large fruit eaters in a forest environment." (Ibid. 415)

In this way, we can view the chimpanzee as possessing that characteristic vocalization pattern typical of forest monkeys, but combined with a highly mobile facial region and a complex, intergrading repertoire of gestures and attendant postures. In this sense, he is much closer to man, as we would imagine.

The gibbon and siamang, much like the chimpanzee, rely extensively upon vocalizations. "The characteristic great-call of gibbon females (the loud, shrill, wailing crescendo that fills the forest each morning) serves several functions, the most important being that of location. It is simultaneously a proclamation ('here we are') by the callers, and a signal ('there they are') for the hearers." (Lilleforsom 1968, 183)

Expressive gestures and postures do not seem to be as emphasized in the hylobatids as they are in the chimpanzees. This may well be attributable to their arboreal habitat and peculiar locomotory pattern, one which is not conducive to expressive and expansive gesturing. In addition, the smallness of the social group, a bonded pair and immature offspring, and their relative isolation from other such groups, would seem to preclude an extensive gestural repertoire and place a premium on vocal communications.

In contrast to the very vocal chimpanzees and gibbons, the gorilla is a quiet, rather aloof animal. Communication among gorillas is on a
much lower level of intensity than it is for the chimpanzee. "Although
the number of basic vocalizations emitted by gorillas was fairly small,
there was great variation in the pitch, pattern and intensity of each
sound. These variations broadened the scope of the gorilla's vocal re­
pertoire, for the animals responded selectively to the sounds they heard.
Their reaction depended not only on the condition under which a sound
was given, but also on the member of the group that gave it." (Schaller
1972, 118) This would correspond well with the observed interaction
pattern within groups of adult gorillas, which is notably deficient in
such interactions. Exchanges, even acknowledgements of other gorillas,
are relatively infrequent among adults unless they are disturbed. (Ibid.
125) Accordingly, there is less emphasis on visual communications.
These are present to some degree and are combined with vocalizations in
the stereotypical chest beating display. This well-known behavior can
generally be termed a displacement activity which serves to release ten­
sion in the animal which has built up and exceeded some critical point.
(Ibid. 122) While it may serve some communicative function, that would
be secondary to its function in easing tension.

And, finally, the orangutan has been, until recently, the least
known of the great apes. Recent studies, however, have shed light on
his behavior and illuminated some hitherto unknown aspects of this South­
east Asian primate. It would seem that the primary mode of communica­
tion among orang males is the long call, a vocalization seemingly multi­
functional and one which can elicit differing responses from conspecifics.
This can be seen, for instance, in the differing responses shown by other
males upon hearing such a call. In some instances calls were given in
return, accompanied by vigorous, aggressive displays of branch shaking, while at other times, the hearer would not respond vocally or would even move away from the direction of the call. (MacKinnon 1974, 54) Similarly, female orangs also evidenced varying responses to these great calls. At times the calls would attract a female drawing her toward the calling animal; however, the somewhat more common response among females was either silence or active avoidance of a calling male, the female moving off in the opposite direction from the caller. (Ibid. 54)

From such evidence, John MacKinnon has been able to conclude that calling by orang males "... may attract sexually receptive females to the caller ... enable dispersed sub-groups to remain in contact with the dominant animal or animals of the group ... to consolidate and protect the genetic contribution he has already made." (Ibid. 55) It also probably allows those animals admitted into his fluctuating territorial sphere to draw on the greater knowledge of food sources which the adult male possesses. (Ibid. 55) In these ways, the vocalization pattern, which is not regular, can be seen as a very real survival mechanism for a dense forest-dwelling arboreal primate.

Thus, it would seem that, among forest-dwelling monkeys and the great apes, excepting the gorilla, vocalizations play a major role in communication. This, among monkeys, seems to contrast with the primacy of visual communication among terrestrial species. This would seem to correlate with their habitat and the limitations placed on visual communication by dense forest cover.

We will next focus on language and what experimental studies on it may tell us of man and our fellow primates.
In recent years, there has been considerable interest and research in language acquisition among non-human primates. Much of this has centered on the chimpanzee, since it has always been considered as man's closest primate relative. Recently, this work has expanded to include the orangutan and the gorilla, with some very gratifying results for the former. It was realized early that non-human primates could not incorporate a human vocal language, it being physiologically impossible for them to form words. Thus, for a long time, people did not consider language as a non-human primate potentiality. In 1966, however, the Gardners began their work with a chimpanzee named Washoe, utilizing the American Sign Language for the Deaf as a means of exploiting the chimpanzee's facility with its hands. This led to most gratifying results, showing that the chimpanzee could not only understand such a language but could utilize it both in conversing with humans and also with other chimpanzees. (Linden 1974, 6)

There are, of course, definite limitations to the success that Washoe and her successors have accomplished. It must, first of all, be kept in mind that the language she has learned is a human language, not one of her own development. Also, there is little evidence of a passing on of the language trans-generationally, although it is still too early to assess this properly. These problems, mentioned here as a cautionary note, will be elaborated on later.

At about the same time, psychologist David Premack was achieving a similar success with another chimpanzee, Sarah, and her acquisition
of a token language he had devised. Like Washoe, Sarah showed that she could rapidly grasp the fundamentals of language and could easily incorporate them in her relations with humans. (Ibid. 175)

Recently, Duane Rumbaugh at the Yerkes Primate Center has begun a language acquisition project with an infant orangutan. By pressing various controls on a large panel in her enclosure, she is able to converse with her keeper, and he with her. The initial results would seem to be even more positive than those found with the chimpanzees, but this must await further findings before it can be confirmed. (Beck, personal communication)

All of these findings have shaken the scientific community, for it has long been thought that man was the only primate who could utilize symbols. (White 1959, 5) This may well still be the case, but we are nevertheless much closer to the other primates in the communicative abilities than was previously thought.

It also raises the question of why some other primates, such as the chimpanzee and the orangutan, have not been capable of self-stimulation in developing some form of language at some stage in their evolutionary past. A possible answer might be that, because they were so well adapted to their environments, both social and ecological, there was no pressure being exerted upon them which would perhaps have given rise to some form of language-using chimpanzee. It is axiomatic that an organism does not radically change unless it is under selective pressure to do so. While there would, perhaps, be advantages for a language-using chimpanzee, if there were more than one, the environment has not selected for them. Hence, while the capability is there, in
differing degrees in different chimpanzees, it awaits exploitation so far found only in the psychologist's laboratory.

We can apply the same reasoning to the question of why man did develop a language and see that it was a decided selective advantage for him to have done so. For man, language is a part of culture, which is our form of adaptation to our environment. (Ibid. 8) Lacking other biological adaptations, man was pressured into taking the cultural road, of which the use of a language, with all its advantageous properties, was such a vital part.

It will be quite interesting to observe the changes in chimpanzee behavior among those which have learned a language and especially among their descendants, for they may possibly be the prototype of a new chimpanzee. For that we must wait and see.

Language, therefore, may not be solely the province of man, although he alone possesses a social language. Also, man alone has demonstrated both the capacity to devise a language and the seeming innate disposition to do so. More will be said of this later. The various primates now utilizing language are still operating with a human language, one which they must acquire. As yet no chimpanzee has devised a language system, and until one is developed by a chimpanzee, man's uniqueness, although somewhat shaken, will remain.
HUMAN COMMUNICATION

As earlier mentioned, the possession of language has long been considered the hallmark of mankind, a dividing line separating man from the sub-human animals. Now, however, that Rubicon is no longer valid, or is it? Our present research findings, such as those of Duane Rumbaugh, the Gardners and David Premack have demonstrated quite convincingly that chimpanzees and orangutans possess the ability to learn a non-verbal language, and, even more significantly, they can incorporate that language into their daily lives. They have also shown the ability to formulate new signs out of components of their language, thus demonstrating a heretofore unsuspected creativity.

A major fact, however, has been somewhat overlooked in the rush to attribute a certain "humanness" to the chimpanzee, namely, that while he has learned a language, he has not developed one of his own. A hypothesis attempting to explain this has been previously presented, one which would seem to be accurate. The point here is a simple one. While the chimpanzee has shown capabilities far beyond those attributed to it a scant few years ago, it is still not on the level of even a proto-human. Man alone has been able to devise language, with all its myriad possibilities and advantages. Thus, while the ability to learn and use a language may not suffice to separate us from the higher primates, the ability to devise such a form of communication is still a dividing line. Future research may well contradict this division, but for the present, it must be allowed to stand.
It should also be borne in mind that all of the languages of man are basically similar. That this is so should not be surprising, for all humans are members of the same genus and species, *Homo sapiens sapiens*, and are basically similar in genetic constitution. Thus, it is possible for people of one culture to learn and use the language of another culture, even if they have trouble with syntax and tense at times. This does not radically affect their ability either to comprehend what they hear or to make themselves understood.

This basic similarity also makes understanding the various aspects of non-verbal communication possible cross-culturally, easier even than learning a new language. Non-verbal communication is also one of the primary areas of ethological study, one to which we will now turn our attention.

The German ethologist, Eibl-Ebesfeldt, has been a pioneer in the study of human non-verbal communication, utilizing various cinematic techniques. Among his results, he has found total congruence to the smallest detail in the patterns and movements of flirting behavior among girls from Papua, Samoa, parts of Africa, Japan, France and other countries. (Eibl-Ebesfeldt 1974, 465) He has also found that a raising of the eyebrows, the "eyebrow flash", occurs in all greetings among the many differing cultures which he has cinematically studied. (Ibid. 468) These similarities, while seemingly insignificant, can be seen as important if we consider them phylogenetically. That they are easily understood by people of differing cultures points out the fact that man easily recognizes communications and signals, that he is not totally dependent upon a verbal communication.
"With respect to gestures one also finds many agreements among people of different cultures. Bowing everywhere seems to be a gesture of submission. ... Differences are only quantitative. We may nod, while a Japanese bows very low." (Ibid. 471) Thus, basic emotions, such as rage or exultation, are communicated by gestures which are easily understood by all. This would seem to indicate that basic emotional states are manifested in ways which are innate in man, are a part of his basic biogram.

But are these the only aspects of non-verbal communication which can be seen as unlearned, a term which will be substituted for innate, or can more complex information be so transmitted? Adam Kendon and Andrew Ferber have provided us with material which would seem to favor the latter. In a detailed study of greeting behavior among American middle class party attendees, they found that: "In the manner in which the greeting ritual is performed, the greeters signed to each other their respective social status, their degree of familiarity, their degree of liking for one another, and also, very often, what roles they will play in the encounter about to begin." (Kendon & Ferber 1973, 592) It is quite significant, in light of these findings, that Goodall has found that the Gombe Stream chimpanzees also signal relative social status in their greetings, in much the same manner as do humans. (Van Lawick-Goodall 1972, 78)

Kendon and Ferber went even further in their analysis, however, finding other patterns in human greetings which paralleled those of the primates. One quite obvious similarity was found in the averting of the eyes, as two people approached one another. The function here would seem
to be twofold. On the one hand, staring is a common threat gesture and the averting would be seen as a means of signalling non-aggressive intent. A second function would be to facilitate approach by the person himself by lowering the level of stimulus input and thus possibly countering the urge to withdraw from an unknown and thus potentially dangerous situation. (Kendon & Ferber 1975, 634) These gestures can easily be seen as having real survival value, especially in a time when the need for association was great and yet contacts were much fewer due to a drastically smaller population. Thus, from these and other data, Kendon and Ferber concluded that: "... much in human greeting appears to be phylogenetically quite old." (Ibid. 665)

There are, of course, others who would see unlearned or innate patterns underlying human communications. Otto Kohler, after studying innate communication patterns in animals, concluded that: "Communicative human motor patterns are also innate, for instance, shouting, crying, smiling, and laughing in babies." (Koehler 1968, 82) This meshes well with the observations of Bibl-Ebesfeldt on emotional responses in humans. Detlev Floog found that non-verbal communication still plays a vital role in human interactions, and that there are innate aspects of non-verbal communication. (1973, 586) He has also offered a cautionary word for those who would go about comparing all human and animal gestures, mainly that there is no such thing as pure animal behavior in man or pure human behavior in animals; all behavioral analyses must take into account the entire structure of the organism. (Ibid. 584)
We can see, keeping Floop in mind, that man's patterns of communication are not unique to him, but are part of his shared primate heritage. This will become clearer as we next examine some functions of the communication process.

We now realize that a primary function of non-verbal communication is the communication of moods or emotions. This is of tremendous importance, since it directly affects the interactions upon which society is based. With regard to emotions, it is indeed true that it is not so much what is said, but how it is said.

Emotional communication is not, however, the only thing with which we are here concerned. Because of our language ability, we have the power to pass on knowledge, both simple and highly complex, from one generation to another, and thus build on and increase the totality of man's knowledge. In this way, man has been able to construct the complex societies we know today and, it is hoped, will be able to solve the problems which have arisen in those societies.

Human communication is, therefore, an amalgam of verbal and non-verbal messages, expressing both content and mood of the message sender. Although both functions could be handled with language alone, the primate patterns in non-verbal communication have remained.
ANALYSIS AND INTERPRETATION

* * *

In the foregoing sections of this paper we have presented a number of examples of innate behavior patterns, in both human and non-human primates. This has been done to provide a data base from which we can move to a discussion of the advantages of such patterns, and also to address ourselves to the question of why these behaviors persist in man. We must, however, first establish that they do in fact exist in man.

From the material already presented, it is hoped that one will already have accepted the fact that much of our basic social patterns and behaviors are genetically controlled; however, to infer this position or to accept it intuitively is not sufficient. The primary focus of this section will be to set forth in logical form, and logical procedures, the case for man's innate behaviors. There is, of course, a flaw inherent in the method we are here adopting; that is, that a logical progression, no matter how sound and valid, is such only as long as all parties involved accept the same definitions and premises as valid and can agree on them. Taking this factor into account, we will nonetheless utilize the aforementioned method as the best available to us. It would obviously be more desirable to deal in terms of quantifiable data and statistical analysis, but, sadly, these are unavailable for much of what we have put forth, or are such as to not lend themselves to our purpose. With this cautionary note in mind, we will begin by defining our major terms and go on from there to present our case in logical, ordered sequence.

* * *

38

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
AGGRESSIVE OR ACONISTIC BEHAVIOR ANALYZED

We will begin with a definition of innate or non-learned behavior patterns. Our definition has been derived from Bibl-ßesfeldt (1975, 16), although we have sought to operationalize it somewhat so as to facilitate its application to man.

The category of innate or non-learned behavior patterns will include those behaviors which, for some genera and species, have been labelled fixed action patterns, which by their morphological constancy seem to preclude acquisition via some form of learning. Among the criteria for classifying a particular behavior as innate are form constancy; that is, the behavior always occurs in the same form or pattern, and similarity of releasing situation, meaning that the behavior is emitted in the presence of the same releasing stimulus at all times.

It is important to note that we have omitted any mention of possible behaviors elicited as a result of some innate behavior pattern. This is due to the fact that we are dealing with human subjects. Very often the results of some fixed human pattern will vary, the potential consequences being, at best, more than one possible response. For this reason we have chosen to exclude form constancy of response from our definition, although if we were dealing with some lower form of organism, we would, in all probability, have to include that category in our definition.

The category of learned behavior will include all the behavioral patterns which are acquired by the organism via some external process,

39
those behaviors which are not a part of the organism biologically.

There are a number of ways by which an animal may acquire some pattern, including imprinting, imitation, conditioning and trial and error methods. While some of these rely on an external factor, such as the presentation of an imprinting stimulus during the critical period (Hess 1962, 255) or a model for imitation (Eibl-Ebesfeldt 1975, 255), not all learning processes do so. Learning may occur by trial and error means during solitary play or object manipulation. There is also the category of insight learning, very prevalent in humans, which has also been demonstrated as occurring in other primates, such as baboons. (Beck, personal communication)

A hallmark of all learned behavior, however, is its degree of variation in achieving a similar goal. This is demonstrated among the Japanese macaques (Macaca fuscata) on Koshima Island in their sweet potato washing. Not all the animals who wash their potatoes do so in the same manner, yet the end results, the eradication of sand from the potato and the seasoning of it with salt water are the same. (Beck, personal communication)

Thus we can already see that a dichotomy has been established between innate and learned behaviors. We will now proceed to elucidate some types of behavioral patterns which we will later examine for potential inclusion in one or both of the two classes we have established.

The first behavioral pattern we will define is aggression or aggressive behavioral systems. These can be quite complex and consist of far more than mere fighting; in fact, fighting makes up but a small portion of the aggressive system especially in the higher primates and
man. The aggressive system does not occur in a vacuum—it is only brought into play when one animal comes into physical contact with another (Scott 1962, 167), although in man this may be debated to some extent. Aggressive systems are a combination of postures, gestures and vocalizations which arise when two (or more) animals come into conflict over some desired object, such as food, a preferred resting place or a particular female, to name but a few examples. (Scott 1974, 419) An integral part of the aggressive or agonistic system is avoidance behavior on the part of the animal to which the aggression is directed. (Ibid. 419) This avoidance behavior can be seen in similar form throughout the primate order, including man, especially in the types of submissive postures and gestures which are utilized.

We have also included predation in our category of agonistic behavioral systems since it can be seen as a type of inter-specific aggression, often exhibiting the same postures and movements found in intra-specific aggression. It should, however, be kept in mind that man is the principal exponent of predatory aggression among the primates and that, for man, predatory behavior is deeply entwined within a socio-cultural mystique too involved to be studied within the scope of this paper.

Thus, we will see that aggressive systems center around desired objects, although aggression in pursuit of dominant status cannot be overlooked and that such systems include both dominance and submission gestures and postures. Among most non-human primates most aggression is on a symbolic level and actual fighting is relatively infrequent.

We have already noted when setting forth our data on communicative
behavior that it consists of both vocal and non-vocal elements. Also, as previously noted, vocalizations can be broken down into two categories, namely, the call system and the language system. The call system, as found in all non-human primates, consists of mutually exclusive vocalizations each communicating a specific piece of information and each unmistakable from the others. (Hockett & Ascher 1974, 32)

A language does not possess this exclusivity but it does possess displacement, that is, the ability to communicate information concerning an object not immediately present. Language also possesses duality of patterning and is transmitted via learning though, as we have previously stated, the propensity for it and the drive to acquire it are probably inherent in humans. (Ibid. 521)

By far the most important means of communication among the primates other than man, and perhaps even in him, is visual contact and signalling, with all parts of the body and the facial region in particular utilized. (Shirek-Ellefson 1972, 300)

Thus we include both vocal, the language and the call system, and visual means of communication in our definition and we will omit from present consideration olfactory communication, the latter omission primarily because, as yet, little research among humans has been published and proper weighting of data would be impossible without it.

We must also remember that communicative systems are social in nature and are designed to convey information from a sender to a receiver.

We have it, therefore, that communicative behavior systems consist of interchange between at least two animals, which may be either
visual, postural/gestural or vocal, or a combination of the two and which is utilized to convey information, such as information concerning relative status, friendliness, the location of a food source or some other piece of information. The communication must be such that both sender and receiver can interpret and understand correctly what is being communicated. This latter is not to imply that they always will. It should also be pointed out here that communicative patterns are a necessary prerequisite for social behavior, especially in large social groupings as found among the primates.

The next three terms with which we will deal can be seen as a group, three areas where similarity must be present in order for us to draw behavioral analogies between species. The three are: context of behavior, form or morphology of behavior and function of behavior. A similarity must be present in all three areas before we can begin to infer that the behaviors are analogous and possibly arise from the same ancestral source.

The first area is that of context. By this is meant the social setting in which the particular behavior under consideration is emitted. Contexts will, of course, vary but one must take into account the status of each of the actors, the number of same and, if possible, the stimulus which elicited the particular behavior. Thus, for example, if one is observing threat gestures among dominant male baboons, one notes the spatial proximity troop members maintain with regard to a dominant animal, any gesture directed toward the dominant animal, any intrusion into the animal's personal space and any other factors which may have served to elicit the threat gesture observed. By comparing contexts of
behavior, one is able to deduce when and under what circumstances a particular behavior, such as the open mouth/yawn threat of the baboon, is emitted. This is part of the process of comparison of behaviors between genera and species.

The second category under consideration is form or morphology of behavior. This category is defined as comprised of the description of the movements, gestures, posturings and vocalizations which go to make up a particular behavior. Thus, if one is studying facial displays in catarrhine monkeys (Van Hooff 1969, 9), one would take note of the position of the eyelids, eyes, eyebrows, ears, mouth, mouth corners, lips, body posture and vocalizations for each particular expression categorized. (Ibid. 63) In this way an animal's behavioral repertoire may be elucidated and categorized. Each component of the behavior may be determined, thus providing a check list both for categorizing behaviors not previously observed and for comparing behaviors potentially similar between genera and species.

Of the three categories here being dealt with, the morphology is by far the easiest to utilize since it is primarily descriptive. However, it must be applied in conjunction with the other two for without them we are dealing on a simply descriptive plane, with no real understanding of the behaviors we are witnessing.

The third category with which we will deal is function of the behavior being studied. This last is considerably more difficult to handle than either of the preceding categories since it implies an understanding of the motivational state of the animal. This may leave more room for criticism than the others which relied almost exclusively on description. Nevertheless some conceptualization of the intention
underlying the behavior would seem to be a necessary concomitant of behavioral comparison.

We will rely on inferring functions for particular behaviors by observation of potential stimuli present in the animal's immediate environment directly prior to the behavior under consideration and the animal's attention to said stimuli both before and after the behavior. This can best be illustrated by an example. If, for instance, we observe that one baboon displaces another in a food tree and, furthermore, we observe the dominant baboon to then begin feeding, we can infer that the function of the behavior is to obtain food. The same process may be utilized to infer almost any behavioral function although some will require much closer attention to particular details and thorough analysis.

While the above example is admittedly simplistic, it does point up the basic aims and methods to be utilized in categorizing behavioral functions.

Thus, we have set forth three categories within which we will seek to compare behavioral systems between genera and species within the order Primates. In order for us to consider a behavior as potentially innate, we will have to demonstrate a similarity in all three categories. If this rather stringent condition is not met, considering a behavior as possibly innate would allow too much room for criticism, such as the contention that the behaviors under consideration are not, in fact, analogous.

There must, of course, be some degree of flexibility in categorization, especially as regards function, such as when a particular
behavior may achieve more than one result. Keeping this multiplicity of function in mind, we must avoid falling into the trap of inferring functions indiscriminately, a la Robert Kerton's manifest and latent functions dichotomy, since doing so would lessen the precision we are attempting to bring to this analysis. (Kaplan & Manners 1972, 58)

At this point we will briefly digress to reiterate man's place in the animal realm, one of the bases for our study of the innateness of human behavior.

Our primate heritage can be traced in the fossil record to around the time of the middle Paleocene or roughly sixty million years ago. (Simons 1972, 12) These were small, prosimian-like mammals who spent their time in the trees of the northern hemisphere where they seem to have originated. The more direct ancestors of man, and the other great apes as well, appeared around the beginning of the Miocene epoch, approximately twenty five million years ago. These were the Dryopithecines, one of the most successful and widespread genera of primates seen. From an origin probably somewhere in East Central Africa, they ranged into Europe, through the Middle East and into Northern India. (Ibid. 1:)

The first ancestral hominid, according to the best evidence now available, appeared around fifteen million years ago in East Central Africa. This was Ramapithecus known only from its dentition which appears much more man like than any of the Dryopithecines at that time. (Pilbeam 1972, 95) Ramapithecus seems to have spread out of Africa, through the Middle East faunal zone and into Northern India where some of the dental evidence was first found. (Ibid. 95) Although probably
arboreal a good deal of the time, Ramapithecus seems to have been undergoing a dental adaptation to ground feeding on tough, coarse materials, indicating a trend toward a ground-foraging, terrestrial mode of life had begun. (Simons 1972, 274) In dental mechanisms Ramapithecus shows a divergence from the Dryopithecine pattern toward that exhibited by the Australopithecines which were to arise sometime later. (Ibid. 275) On this evidence, we now consider Ramapithecus a true hominid, the first break from the pongid line.

Thus, we see that man's ancestry has been predominantly primate and that the hominid line is one of rather short duration. We must also bear in mind that Ramapithecus, while exhibiting a hominid-like dental adaptation, was probably in many ways more akin to his Dryopithecine relatives than to his forthcoming Australopithecine progeny. This is put forth with the idea of providing some reference points when we talk of behaviors as being phylogenetically quite old. Primate behavioral adaptations have a long history, stretching back to the Miocene Dryopithecines and this heritage is man's also. We have been hominid for perhaps half that time, and totally hominid for perhaps twenty five percent of it. This has had, and continues today to have, profound effect on our behavior.
THE PREMISE OF INNATE AGGRESSION

In this section we will present, in systematic, logical form, an argument for the innate nature of much of man's behavior. To do so we will, of course, have to proceed with certain premises in mind. The primary one is that to which we have alluded previously, namely, that if a behavior exhibited by two differing species or two members of the same species, separated geographically so as to preclude contact, can be demonstrated similar in context, morphology and function, then we can attribute this similarity to the behavior being transmitted genetically; that is, that the behavior is innate. Although this is a rather sweeping premise, it is nonetheless reasonable, given the rigor applied to defining the categories of comparison and the fact that congruence must be displayed in all three of the categories before the assumption of innateness can be made. It is also felt that the premise is valid on the grounds that we are dealing with subjects, both man and other primates, who are closely related genetically; who have shared, as previously stated, a long evolutionary history. With these in mind, the premise would seem to be a fairly safe one to make. The first premise to command our attention is that human patterns of aggression are basically innate.

Of the three categories we have previously set forth, the first with which we will deal will be context. The overall context of aggressive behaviors, be they in humans or in non-human primates, is a social one. Aggression seems to require more than an individual animal in
order for it to be manifested. Often the social context is one marked, as previously noted, by social disorganization, a breakdown in the established order of the group. (Scott 1974, 426) This correlation is related to one function which aggressive patterns serve, that of achieving and maintaining social order. Yet another context in which aggression is seen is that of threat and defense, both inter- and intra-group. These are also found in both humans and their primate relations. We find aggression occurring in play groups also, again in both humans and other primates. Here, however, a somewhat different function may be served. More will be said of this when we deal at length with functions of aggression.

We have seen that aggressive behavior is found in a social context, that is, in the presence of another animal or group, and that this is true of both man and all other primates. Thus, it can be said that, as regards context, there is a decided contextual similarity between man and the other members of the primate order. This is not, however, the final word on context. Among humans there are many ritualized forms of aggression, such as many of our spectator sports. These do not have parallels among the non-human primates, at least as far as has presently been determined. This is because they are cultural devices concocted, some theorize, as a vicarious outlet for modern man's store of pent-up aggressiveness.

Our attention next turns to morphology or form of aggressive behavior. Here, too, we find there are striking similarities between man and other primates.
One of the most common of chimpanzee threat gestures is glaring, in which the lips are compressed and the animal emitting the behavior stares fixedly at the initiating stimulus. This is the same pattern seen in the mountain gorilla and also in man. (Van Lawick-Goodall 1972, 45) In addition, pilo erection, a raising of the body hair, occurs in primates during aggressive encounters. This can be noted especially in the chimpanzee when the animal produces the behavior categorized as the bi-pedal swagger, and also during attack behavior. (Ibid. 50) A similar pilo erection, it has been demonstrated, could occur in man, were he to retain a covering of body hair. It would be accomplished via the same physiological mechanism which now brings about the "hunching", or forward roll, of the shoulders during stress (aggressive) situations. (Ibid.-Eibl-Eibesfeldt 1975, 495) The function of this will be discussed later.

Gestures of submission are an integral part of a system of aggressive behaviors and, again, similarities are readily apparent. Bowing the head and even lowering the entire body can be seen as a form of submission. It is exhibited by virtually all primates and has been in evidence throughout man's history, being found in many different cultures. (Van Lawick-Goodall 1972, 57-58) Indeed, it can be said that, among humans, bowing is the universal sign of respect and submission.

It becomes clear that humans express their aggressivity in much the same way as do other primates. There is striking similarity between a world leader strongly making a point of national honor, complete with attendant facial expressions, up-raised fists to emphasize a particularly crucial point, and stern, forbidding glare, and the swagger-
of a dominant male chimpanzee with his arm movements, facial expressions and vocalizations. The same congruences are available for submissive gestures, and these may have been of even greater importance to the animal's, and the species', survival.

So far, it has been demonstrated that similarities exist in aggressive systems both in context and morphology among men and between men and other primates. We will now consider our third category for comparison, that of function.

Aggression both among human and in other primates can be said to fulfill three basic functions. These are: 1) defense, both of the individual and of the group, the latter including providing for the continuation of the group by placing a premium on protection of mother and young; 2) social control, in which the group is protected against disruption from within and stability is maintained; and 3) dominance, both individual and groups, which can be seen both as an end in itself and as a means to achieving such goals as preferred food sources, easier access to females, increased personal space, etc.

Defense is carried out, most often, by means of threat gestures which serve to elicit avoidance behavior on the part of the animal to which they are directed. This leads to increased personal space and lowers the chances of fighting between group members. (Scott 1974, 423)

The notion that aggressive systems serve to foster social control and organization may, on the surface, appear to be something of a contradiction. Such is not the case. Among terrestrial primates, such as the baboon, aggressive gestures on the part of members of the
dominant central hierarchy serve to prevent potentially disruptive conflicts from breaking out among group members. Often the mere presence of a dominant male is enough to inhibit aggressive encounters. (Hall and DeVore 1965, 57) A parallel can be drawn between this and the human experience in which the mere presence of a policeman, or patrol car, is often sufficient to inhibit much criminal and aggressive behavior on the part of the citizenry. Gestures of submission also play a large part in social control, especially among non-human primates. This does not appear to be as prevalent among humans, but this may well be due to the fact that man often assumes amicability to be the basis of social control, whereas this does not seem to be the case in all non-human primate societies.

The third function of aggression is that of achieving dominance in both an individual and a group sense. Individual dominance is the more often witnessed for it occurs in an intra-group setting and has as its end some preferred goal, be it space, food or females, to name but three. (Scott 1974, 425) These can also be seen as goals of aggression in man although quantitative data to substantiate this possibility are lacking.

It becomes clear that there is a not insignificant number of similarities in aggressive patterns between Homo sapiens and other genera and species of primates. We also know that many facial gestures and functions of aggressive behavior are culturally universal within the genus Homo. With these considerations in mind, we will now return to a consideration of our first premise. Given that man and all other primates are members of the same order, Primates, and
have shared a common biological heritage: if similarities in aggressive behavioral systems can be demonstrated in the three categories of context, morphology and function of behaviors, then we can conclude that said behavioral systems are operating under innate controls. Since we have already demonstrated the similarities found in all three categories, we can conclude that the premise is, in fact, valid.

The above conclusion notwithstanding, there are qualifications which should be noted. First, accepting the validity of the premise as presented does not mean that all aggressive patterns are innate. Exceptions occur, especially among humans with their various forms of ritualized aggression. What we may conclude is that man does not have to learn how to express aggression, nor does he need to be taught how to interpret aggressiveness in others. (Zibl-Besfeldt 1977, 448; Tinbergen 1968, 150) However, he does have to learn, sometimes rather painfully, when to be aggressive and when to be submissive. The side of appropriateness of action is, as far as aggression is concerned, man's most important lesson to learn.
Aggressive behavior patterns have been analyzed, utilizing comparison in the three categories of context, morphology and function. Similar comparisons will now be with regard to communicative behaviors, beginning with the context of such behaviors.

As is true with aggressive behavior, the context of communication patterns among both human and non-human primates is one of a social group comprised of at least two individuals. There must be both a sender and a receiver for communication to take place, the roles of course being interchangeable; but the participants do not have to be in face to face contact in all cases, e.g., the long call of the male orangutan (MacKinnon 1974, 54), the morning great calls of the gibbon and the siamang (Hillefson 1968, 107), and many instances of human communication. In all of these examples though is the assumption that another animal will be in position to respond to the communication, thus satisfying the requirements of sender and receiver.

Just as a social group can be seen as an overarching context, similarities can be found in many specific contexts. The basic contexts of human and chimpanzee greetings, for example, are strikingly similar. (Van Lawick-Goodall 1972, 18) Likewise, a total similarity of context can be seen cross-culturally in human greetings. (Kendon and Perber 1973, 593)

As our data have previously shown and, as we have reaffirmed here, there is a very high degree of contextual similarity in communicative
behavior both among humans and between humans and other primates. That context is invariably social, one in which a sender and receiver are, minimally, present. Of course, many communications occur with more than the minimum number of participants present and often, as we have already pointed out, the initiator of communication does not have any actual contact with other individuals. Nevertheless, communication is a social phenomenon and one which exists and operates in just such a social sphere.

We will next turn our attention to the category of behavioral morphology and it is here, as would be expected, that we find a higher degree of differentiation between man and all other primates. Homo sapiens places greatest emphasis for message transmission on vocalizations, that is, language is the primary bearer of information. Non-human primates, conversely, invest visual aspects of communication—body postures, displays, facial gestures, etc.—with the primary task of information transmission. (Shirck-Ellefson 1972, 300) This is primarily due to the major differences between the call system vocalizations of monkeys and apes and the language system found among humans. The differences between these two systems have previously been set forth and it is sufficient here to recall that a language affords the opportunity for much more concise and complex transmission of information than does a call system.

Since we have seen that man and other primates differ as regards vocalizations, to find similarities in vocal communication we must look within species. One of the most obvious facts arising from linguistic studies is that all human languages are basically built to the same
pattern. This has led psychologist Eric Lenneberg to conclude that: "... the absolutely unexceptional universality of phonemes, concatenation and syntax and the absence of historical evidence for the slow cultural evolvement of these phenomena lead me to suppose that we have here the reflection of a biological matrix or anlage which forces speech to be of one and no other type." (Lenneberg 1974, 340) Empirical evidence for the similarity of human languages can be derived from the fact that it is relatively easy, if often somewhat time-consuming, for speakers of one language to acquire fluency in another, or even in several other languages.

If we are to search for similarities between man and other primates, we must turn to the area of non-verbal communication. In man, non-verbal patterns, gestures, postures and expressions serve as modifiers of the auditory message. They also serve to communicate information directly. This will be further examined when dealing with function. Our more immediate concern will be with the forms of non-verbal communications.

With regard to particular instances, it has been noted by Van Lawick-Goodall that the patterns seen in greeting behavior of both chimpanzees and man are remarkably similar, a finding which the Kendon and Ferber study of human greetings bears out. (Kendon & Ferber 1973, 592) We have already, in our comparison of agonistic behaviors, drawn attention to the many similarities in aggressive display behavior between man and other primates, as well as the correspondence in submissive gestures. The fact that such gestures, as seen in primates, can be readily interpreted by even the uninitiated human, would seem to point to a similarity in form stemming from an innate foundation.
There are also many similarities in form among humans cross-culturally. Again, greeting behaviors among human groups are noted possessing such constant components as the eyebrow flash upon recognition and gaze aversion during approach. (Ibid. 631) There also exists an almost total congruence in flirting behavior among members of different cultures, such components as the initial smile, eyebrow flash and head turn being present in examples from all cultures studied. (Zibl-Ebesfeldt 1975, 356)

These examples, and others provided earlier, lead to a somewhat complex conclusion as regards communicative morphology: while human and non-human primates differ in their methods of principal communication, there are many similarities in patterns of non-verbal communication. In addition, there are even more similarities in communicatory patterns among humans as a species, especially with regard to the foundations of language. These overall congruences would seem to indicate a conclusion that communicatory patterns are innate in man as well as in the members of the primate order. However, before venturing forth such a conclusion we must examine communication patterns in light of our third category, that of function.

We know that communication's basic function is that of information transmission and we have seen how similarities exist in both context and morphology of such patterns among men and between man and other primates. But do such similarities function to the same end? To answer this question, we will deal with a few examples.

In studies of aggressive systems among non-human primates we find that submission gestures play an important role in conveying one animal's
acceptance of another's dominant status. We know that this is accomplished in such species by crouching and/or lowering the head, bowing if you will. Bowing is also a universal sign of respect and deference among humans and can be seen as homologous to the pattern found among other primates. (Ibid. 475) There are also a great number of similarities in the aggressive displays of apes and men, all of which seem to function as indicators of the internal state of the displaying animal. (Ibid. 476)

The behavioral similarities in greeting, again both among men and between man and his primate relations, seem to function toward the same end. Orienting the body toward the person, the rapid smile, eyebrow flash and gaze aversion all serve to express contact readiness, and in the case of gaze aversion, to facilitate such contact. (Kendon & Ferber 1972, 632) Conversely, such patterns as gaze avoidance and turning the body away from another function as indicators of contact avoidance in both man and other primates. (Eibl-Eibesfeldt 1975, 434)

There are, of course, other examples which could apply here, but the basic picture has already been drawn. Suffice it to say that non-verbal communications among all primates, including man, seem to function in the same manner to indicate relative dominance, social status, acceptance or rejection of contact, degree of familiarity and liking, and also particular roles to be played in the particular situation. The conclusion would seem to be that the functions of morphologically and contextually similar patterns of communicatory behaviors are also similar among all primates.
Following the pattern set in dealing with systems of aggressive behavior, our analysis of communicatory patterns leads to the following premise: Given that man and all other primates are members of the same order, Primates, and have shared a common biological heritage in the evolutionary past, if similarities in communicatory systems can be demonstrated in the three categories of context, morphology and function of behaviors, then we can conclude that said behavioral systems are operating under innate control.

Since we have demonstrated the required similarities in all three categories, the premise would appear valid. This is not to imply that all communicatory behaviors are innate. (Languages, for example, must be learned.) Rather, we are dealing with an innate quantity when dealing with non-verbal behaviors and in man, with an innate disposition to acquire or develop a verbal language following a certain pattern, as Lenneberg has stated. (1974, 3:40)

With these analyses, we have set forth premises concerning the innateness of aggressive behavior patterns and communicative behavior patterns in man, and we have found both to be valid, with some qualifications. It is felt that the analyses, and the data serving as foundations for them, are worthy of careful consideration as they have been presented in such a way as to make acceptance of the premises the result of rigorous and careful reasoning. There may be those who would accept the validity of our premises on less rigorous analyses and our methods here may seem unduly harsh. The arguments set forth here were designed not so much for those who already see the validity of viewing many human patterns as innate, but rather for those who are either
skeptical of, or even hostile to, such a position. Thus, the rigor of our methodology is requisite if we are to put forth our position with the best chance of acceptance.
CULTURE AS ADAPTATION AND THE WHYS OF INNATE BEHAVIORS

If we wish to discover why some innate behavior patterns which we have already discussed have been maintained in Homo sapiens, we must view this question within the larger framework of man's cultural adaptations to his environment. It is only in this way that we can understand the role innately grounded behaviors have played. We will begin our analysis with a brief examination of culture as an adaptational strategy, one which hominids have employed as their primary evolutionary device for the last five million years.

We will utilize, for a working definition of culture, one derived from Yehudi Cohen which sees culture as "... the artifacts, institutions, ideologies, subjective perceptions, and total range of customary behaviors with which a society is equipped for the exploitation of the energy potentials of its particular habitat." (1974, 57) This definition is sufficiently broad in scope to serve as a starting point; it is well suited to discussion of culture as an adaptive strategy and mechanism.

With our definition in mind, we can readily see that culture was already in use, in an adaptational sense, five million years ago during what is now referred to as the Australopithecine stage of hominid evolution. (Filbeam 1972, 156) This conclusion is based on their crude stone tool assemblages which are, nonetheless, cultural artifacts and indicate that a minimal level of culture had already been obtained.
Cultural evolution had not yet superseded biological evolution. This probably did not occur until the Neanderthal stage, at which time we see the first appearance of true Homo sapiens was reached. (Ibid. 171) Morphologically, the major area of change was the brain as it became enlarged greatly from the Australopithecine to the sapiens level. There was probably internal reorganization of the brain, with attendant alteration of the neuron and the glial cells. (Ibid. 171)

The morphological transformation within the brain can be seen as working within a closed loop feedback system with cultural development which was taking place concurrently. As the brain increased in size and complexity, it was able to deal with ever greater and more complex forms of culture which, in turn, acted as a stimulus, or as selective pressure toward even more increases in size and complexity in the brain. As culture increased cumulatively, so did the need increase for the ability both to learn and transmit this increased cultural knowledge. (Hallowell 1974, 172)

While the brain has undergone long and drastic reorganization and growth, we know that man's general physiological structure has remained virtually unchanged since the time of Homo erectus one-half million years ago. Thus, by that time, and probably even earlier, hominids had lost the ability to adapt biologically to their environment and were already utilizing culture as their means of achieving a balance with their particular surroundings. (Pilbeam 1972, 82) With this in mind, we can conclude that much of man's later evolution, at least since he, post-cranially, achieved the sapiens grade, has been marked by a dual evolutionary/adaptive process. On the one hand he has been adapting
culturally to his environment, a continual process since by his adapta-
tion he alters it concurrently, and he has also been adapting morpholo-
gically to an even more complex culture, as his brain has acquired an
increasing ability to retain and transmit said culture. The feedback
system is continually at work, applying a selective pressure both to
the culture of a society and to the members of that society.

Because of this dual pressure, hominids were faced not with the
luxury of a cumulative culture but with the irresistible force of such
a phenomenon. One did not have the luxury of choice in the matter for
culture was man's one advantage and, at the same time, his only hope.
Such a system places a great deal of emphasis on learning ability
which, of course, leads to the necessity of longer maturation periods.

We have seen what happened to man in his later evolutionary de-
velopment. Now we will turn to the advantages such mechanism provides.

Since man is equipped with a wide range of artifacts and behaviors
for adaptation, traceable to culture, he possesses a greater flexibility
than any other primate in dealing with alterations in his environment.
This flexibility is due to the cumulative nature of culture and the
fact that such learning can be and is passed along from one generation
to the next. This allows succeeding generations to begin their develop-
ment at a stage of greater advantage than those which preceded it. Yet
this advantage is founded on the idea of communication via language
which also possesses the ability to conceptualize and transmit these
conceptualizations. Thus culture itself cannot be seen as innate, but
the propensity for association and the resultant communication, which
is both a function of such an association and a necessary prerequisite for it, can be seen as founded on an innate mechanism.

To understand fully the persistence of this innate propensity, we must appreciate the significance of the behaviors we have demonstrated as being innately founded. Basic communication patterns which primarily involve the facilitation of interpersonal interaction and which connote basic social relationships have been presented as possessing an innate character. Also, patterns of aggressive display, which can be seen as functioning in such a way as to facilitate group organization, are seen as having this innateness. Thus, both categories with which we have here dealt can be seen as working to facilitate harmonious social interaction and probably, in the case of aggression, stable group formation.

With this in mind, we must also remember that, while we are observing Homo sapiens in the twentieth century, our frame of reference must extend back to man's pre-sapiens ancestry, to a time of small group lifestyle, bands of thirty to fifty members, limited to a hunting and gathering economy. This would also be well before the Neanderthal level of man's evolution and also prior to the Homo erectus stage. At this time man's level of cultural development was not too far advanced as we can determine from two sources. On the one hand, the tool complexes they have left behind are generally crude and lacking in sophistication of design or manufacture, pointing to a relatively low level of intelligence which would not be compatible with a complex social system. The second line of evidence for low level of cultural development is the paleontological, the actual human cranial remains which, during the Australopithecine stage, were quite small. Since we know that an
increase in overall brain size is correlated with an increase in learning ability, (Dilger 1962, 45), and since we know that increased learning ability and increasing cultural development and complexity exist in positive correlation, it is logical to draw the conclusion that the Australopithecine stage was marked by a low level of cultural progress.

For the small hunting and gathering groups of the time, association and stable relations within the group were necessary for its survival. These could be maintained in two ways. On the one hand was the legacy of the hominid's terrestrial primate heritage, one of dominance hierarchies and threat gestures; in short, many of the aggressive patterns we have previously studied. These were available but were only useful in certain circumstances, as a dominance hierarchy tends to inhibit subordinate members and lessen their usefulness to the group. Association and cooperation were better means of assuring stability, with the selective use of agonistic gestures. A premium was, therefore, placed on communications which were able to facilitate interaction and which were clearly recognizable as such. This can be seen as one selective pressure toward a common language.

There was also the danger represented by other groups of hominids which would vary from time to time with fluctuations in population density. While this was never high, encounters between groups would generally prove to be traumatic and non-verbal communication was the only way to signal intent, common language being ruled out. This would have been vital even if encounters were rare since man, even then, was his own worst enemy and the greatest danger to his survival. Our analysis of human greetings has shown us that they convey much information.
regarding intent, social status and roles, as well as functioning to reduce tension inherent in approach situations. (Kendon & Ferber 1975, 592) It is not hard to see the usefulness of the above in unexpected encounters between hominid groups and, since it seems a part of the general primate biogram, it would not surprise us to see it functioning in this manner in such situations.

We can say, then, that innately grounded behaviors in man are generally those which, in our evolutionary heritage, arose out of our primate ancestry and were of significance in much the same context as they were for the primates. They are primarily behaviors which function to promote group formation and stability, and which serve to facilitate interpersonal interaction. They have persisted in man because 1) there has been a lessening of biological evolutionary forces due to the rise of cultural evolution and adaptation, and 2) they have been combined with learned behaviors as these have come about. As has been previously stated, there is no such thing as a purely innate behavior in man. (Count 1958, 1067) The innate patterns we have examined are innate, but they are mediated by culturally learned sanctions. In the case of aggressive displays, the display itself does not have to be learned and its meaning is readily discernible. However, the learning factor comes in with regard to when the display will be manifested, this timing factor being crucial. In our present society agonistic displays in one circumstance are condoned and in another would be the cause for strict sanctions being imposed on the person or group performing such behaviors. Thus, with regard to behavior, culture's primary contribution has been in establishing parameters for judging behavior as appropriate.
or inappropriate, and, vitally, for disseminating those parameters among group members and also serving to ingrain them within the mind set of both its members and the group as a whole.

Of course, our definition of culture leaves many other areas of adaptation open for examination and analysis, ones which will not be dealt with here since they do not impinge upon the areas of innately based behaviors which are the primary focus of this paper. Such areas are ideologic, and subjective perceptions offer potential for examination with regard to the influences on them of behaviors seen as innate. This would have to await further research and study.
Thus, we have come to the end of our analysis although to suggest that the final word has been printed on the subject would be both foolish and presumptuous. We have had presented a line of reasoned argument supporting each of two premises. The first was: Given that man and all other primates are members of the same order, Primates, and have shared a common biological heritage in the evolutionary past; if similarities in aggressive behavioral systems can be demonstrated in the three categories of context, morphology and function of behaviors, then we can conclude that said behavioral systems are operating under innate controls. This premise we concluded to be valid as similarities in all three of the requisite categories were demonstrated. We did, however, append a certain qualification to our conclusion. This had to do with influences of learning on the innate pattern. It was finally concluded that man does not need to be taught how to express aggression, nor does he need to be taught to interpret aggressive behaviors in other members of his species and often other species as well. Rather, he must learn when appropriate times are present for aggressive behaviors as there can exist considerable ambiguity in this regard. Attending to the appropriateness of a pattern such as aggression can be seen as vitally important to a species which places such a premium on group living and cooperative endeavors. We have also seen that aggressive behavior patterns are prevalent in times of social disorganization, this being true both in man and in other primates. Aggressive patterns, as seen in this context, are inferred as serving to bring about social stability and are thus functional.
to the group's survival. Although this function has been presented as being present in aggressive patterns among humans, it must be said that such a function is not as demanding in man as it remains among other genera and species. This is, of course, due to the fact that language, the ability of man to verbally communicate concepts and abstractions, not merely bits and pieces of information, allows man to solicit cooperation and not simply coerce such cooperative endeavors via displays of force, although this practice is certainly still manifest.

This leads us to our second premise: Given that man and all other primates are members of the same order, Primates, and have shared a common biological heritage in the evolutionary past; if similarities in communicatory systems can be demonstrated in the three categories of context, morphology and function of behaviors, then we can conclude that said behaviors are operating under innate control. Since the required similarities were found present, it was concluded that the premise was valid. The qualification to this was that we were dealing with non-verbal communications and additionally in man with the predisposition to develop or adopt a verbal language following a particular pattern. Reference was not made to any language in particular, rather to all languages as a class.

We also discussed culture as an adaptational strategy and the role or roles played in same by the behavioral systems we analyzed and found to be innate, with appropriate qualifications. We found that said role was primarily one of facilitating and/or serving to bring about social interaction, and to also maintain that interaction. This we found to be of major importance, since a group framework is a necessary prerequisite for cultural development.
We have also found that culture as an adaptive mechanism was probably first at work during the Australopithecine stage of hominid evolution and has continued to work up to, and including, the present day. We have seen how cultural and morphological evolution exist within a closed loop feedback system, whereby increasing social development stems from an increased capacity to retain and transmit cultural material and also acts as selective pressure towards even greater capacity for cultural material. We have seen that language, arising from man's innate disposition for same, has greatly facilitated cultural development, has in fact been a necessary prerequisite for it.

We have also found that culture as adaptation has given man a flexibility of response to socio-environmental pressures which is not enjoyed by other species. This has been the major advantage of such a strategy and it has allowed man to extend himself geographically further than any of his fellow primates. We have seen that his adaptation has proven so successful that it has superseded biological evolution as we know it, although we have found that this was a much longer task in chronological terms than it may have originally been felt. Finally, we have found that man, by the very success he has demonstrated, has also placed himself in something of a predicament, since the cultural development he has fostered has fostered even more socio-environmental problems which must be dealt with. Furthermore, the previous success of cultural development has been such that man has only cultural means with which to deal with these increasing problems.

What, by way of conclusion, can be said of all this? The following would seem to suggest itself. Man is a cultural primate and by the
nature of his selective adaptation he is unique. We have tried, in this thesis, to examine his adaptation, some components of it, in terms of a physical anthropologist viewing any species of successful primate, that is, the means by which the species has remained successful. We have viewed basic behavioral patterns as innate and have seen them function to facilitate both the rise of culture and its maintenance. We have always kept to the perspective that communication and maintenance of the group are primary. Although others have tried similar analysis, notably Tiger and Fox, it is felt that the position presented here has merit of its own. Our focus has been the group as the arena for cultural development and we have applied our data and findings to that context. The social unit has led man to his present condition and will lead him to his tomorrows.

This quote from the noted anthropologist Karl Count would seem a fitting close for this thesis: "There are no purely 'instinctive' acts and no purely 'learned' or conditioned acts, only one or the other is the more observable." (Count 1958, 1067)
BIBLIOGRAPHY

Ardrey, R.  
1966  
The Territorial Imperative, Atheneum, New York

Aldrich-Blake, P. P. G.  
1966  

Barlow, J. H.  
1975  
Darwinian Psychological Anthropology: A Biosocial Approach. Current Anthropology, 14, 4: 575-78

Beck, B.  
1974  
Male Intergroup Migration and Female Dominance. Personal communication

Bischof, K.  
1975  

Bolton, R.  
1975  
Aggression and Hypoglycemia Among the Tolla: A Study in Psychobiological Anthropology Ethnology, 12, 3: 227-37

Braidwood, R. J. and B. Howe  
1962  

Buirski, P. and H. Kellerman, R. Plotnik, R. Weininger and N. Buirski  
1975  
A Field Study of Emotions, Dominance and Social Behavior in a Group of Baboons (Papio anubus) Primates, 14, 1: 67-78

Carpenter, C. R.  
1974  

Count, B. W.  
1958  
The Biological Basis of Human Sociality. American Anthropologist, 60: 1049-1067

Davis, B. B.  
1962  

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
<table>
<thead>
<tr>
<th>Author</th>
<th>Title</th>
<th>Year</th>
<th>Publisher</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Author</td>
<td>Year</td>
<td>Title</td>
<td>In:</td>
<td>Publisher</td>
</tr>
<tr>
<td>------------------------</td>
<td>------</td>
<td>----------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>and R. Ascher</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>and A. Ferber</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Author</td>
<td>Year</td>
<td>Title and Details</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------------</td>
<td>------</td>
<td>-----------------------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sundick, R. I.</td>
<td>1973</td>
<td>Genetic Determinants of Criminal Behavior. Personal communication</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
<table>
<thead>
<tr>
<th>Author</th>
<th>Title</th>
<th>Pages</th>
</tr>
</thead>
</table>