

A REVIEW OF THE CONCEPT OF SOCIAL DOMINANCE AS THE BASIS  
FOR NON-HUMAN PRIMATE SOCIAL ORGANIZATION

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Due to the widespread application of the concept of dominance, it can easily be seen that many authorities differ in their definition of the concept. Not only the wide application, but also the lack of establishing a definition of dominance that fulfills the requirements of a good definition, have caused difficulty in any systematic use of the concept. Also, the lack of consistency in the application of the concept has contributed to the confusion. Nevertheless, these differences hold some interesting prospects for the explanation of non-human primate social organization, because dominance has been hypothesized by some to be the single unifying principle in such behavior.

The purpose of this paper is not to determine the correctness of any interpretation of dominance, but merely to posit some questions concerning the concept and set forth some ideas relating to dominance.

Before discussing the different definitions and correlates associated with dominance, the concept itself should be discussed. It has been assumed by many investigators, Carpenter (1950, 1954), Chance (1961, 1967), Hamburg (1968), and others that dominance is the single pervasive principle of non-human primate social organization. Dominance, according to Carpenter (1940, 1965), exists and is fundamental in all non-human primate societies. It may exist in some species at such a low level that it is imperceptible, but it does, nevertheless, exist. On the other hand, Bernstein (1970) states,

"There has been no unifying concept to explain all of primate sociality." He continues, "Studies of rhesus monkeys almost always show status hierarchies, except for Kaufman (1965) who could only show it for males...Kummer and Kurt (1963) indicate that dominance hierarchies in hamadryas baboons are poorly developed, if at all. Crook (1967) reports the same thing for gelada baboons. Poor evidence for dominance relations are reported for spider monkeys (Eisenburg and Kushn, 1966), Callicebus monkeys (Mason, 1968), although Jay (1963, 1965a, 1965b) states that it was only in female langurs a stable relationship could be found." Bernstein is fully prepared to admit that status hierarchies may not be the conceptual clothesline on which we can hang all primate societies, for he states (1966) that there exist primate societies in which there is no status hierarchy. He further states (1966) that in the primate taxa so far studied, the control animal is vital and a failure to fulfill the function will elicit responses in substitute animals; therefore, the control animal in some primate groups may not be associated with attributes of dominance, but the dominant animal does not appear to be vital to the organization of some primate societies.

The concept of dominance had its beginnings with the work of Schjelderup-Ebbe (1935) on the "peck order" of birds. He states (1935:949), "There exists among birds a definite order of precedence...founded upon certain conditions of despotism." In applying this principle to the study of non-human primates, it has been somewhat altered by a change in emphasis due to the work of C. R. Carpenter (1950, 1954). The idea of using "priority

of incentives" as a determinant of the dominance relationship in non-human primates has found acceptance with other investigators and has received widespread application. K. R. L. Hall (1964) has further modified the idea of priority of incentives and has stated that aggression may be used to maintain these priorities, and thereby become the focal point of non-human primate social organization. The idea of "priority of incentives" may be said to be one definition of the concept of dominance.

In the current literature, we are confronted with another definition of dominance. M. R. A. Chance (1961, 1967) states that dominance is directly concerned with the mechanism by which spatial equilibrium is maintained between the animals of lower rank towards those in higher positions. Chance (1961) defines dominance on the assumption that the attention-binding effect of an animal in a group is essentially the quality which puts it in a behaviorally focal position, and which also tends to place it near the group's spatial center. The dominant animal may, therefore, be said to dominate the attention of the others, if not at all times, at most times and usually without specific action.

Another major quality for defining dominance has been employed by other investigators, resulting in still other definitions of dominance. DeVore (1965) in his study of the Nairobi Park baboons employed the concept of aggression in his determination of a dominance hierarchy. He holds to the idea that the most aggressive animal toward other animals is the most dominant animal.

I. Bernstein (1968) defines the concept of dominance in still another manner. He bases his definition on the assumption that dominance exists only in a context with other social relationships. He defines dominance in terms of unilateral agonistic behavior, or the ability of one animal to punish another with impunity.

These definitions of dominance have in many ways been clouded and obscured by the fact that inadequate attention has been devoted to the separation of the definitions of dominance from the associated correlates. Without this separation, one runs the risk of defining dominance in terms of its associated correlates, not in its own specific terms. There are some interesting correlates and side issues that have long been associated with dominance that I would now like to discuss.

One of the most interesting is the correlation proposed by some investigators between high status and sexual behavior. Generally, sexual behavior can be divided into two categories, that behavior with reproductive potential and that without. Carpenter (1942), Jay (1963), and Hall and DeVore (1965) reported that reproductive success for dominant males is maximized by mating patterns. In fact, Etkin (1964) asserts that sex is the basis for determining the status hierarchy, and subsequently for non-human primate social organization.

If one examines the data concerning sexual behavior and its relationship to status, the situation is a bit unclear. No evidence for the relationship between the high status and amount of sexual behavior was seen by Simonds

(1965) in the bonnet macaques, while DeVore (1965) found this relationship in only one troop of baboons. Jay (1963), on the other hand, reports a correlation in her langur troop, but on reinvestigation, Yoshiba (1968) failed to find one.

Bernstein (1970) notes studies by Kaufman and Simonds among rhesus monkeys and bonnet macaques of mounting behavior without reproductive potential, sometimes referred to as status mounts; both found that at least one-fourth of the mountings were not in the same direction as status hierarchies. In the same paper, he notes DeVore and Hall and their correlation of mountings and status in baboons, as well as those of Itani, Kawai, and Mujadi in Japanese macaques.

A side issue often associated with these findings is the fact that Altmann (1962), Carpenter (1942), DeVore and Hall (1965), and Jay (1965) reported an apparent rise in the status of the female during estrus due to temporary consort relations with high-ranking males. Bernstein (1970) states, "If 'priority of incentives' theory of dominance is employed it is seen that a female due to her physiological condition can obtain access to incentives without competition with other animals solely on abilities." This rise in status might be misconstrued, if a rise in level of agonistic behavior is interpreted as a rise in status; this might be explained by general rise in the level of activity due to her estrus condition, rather than her consort relation with a high-ranking male.

Another correlate of dominance is the relationship of grooming and high status. Subordinate rhesus monkeys have been observed to divert potential

aggressors by grooming them (Sade, 1965). It is interesting to note that, according to Hall (1962), equal frequencies of grooming exist among male and female baboons. Among the hamadryas baboons, it was reported by Kummer (1968) that males do most of the grooming; this may be a factor in the stability of their "mosaic" type social organization, consisting of a single adult male, multiple females and young. Among rhesus monkeys, according to Michael and Herbert (1963), the female does most of the grooming, particularly when she is in estrus. Among langurs, Jay (1965a) reports that the females, too, participate in most of the grooming. A relationship between status and grooming was not found at all by Simonds (1965) in bonnet macaques, nor by Rosenblum, et. al. (1964) in pigtailed. Only Kaufman (1967) in rhesus studies found a positive correlation between status and grooming.

Dominance has also been associated with body weight, state of estrus, and general health (Tokuda and Jensen, 1969; Schaller, 1963; and Nowlis, 1941). A correlation between body weight may be seen as a function of age, not a central concept in our definition of dominance. State of estrus and general health may be correlates also, but are not the real determinants of dominance. To attempt to explain social ranking as adaptability is to underestimate the importance of the manner in which the adaptation was achieved.

Both the prevailing definitions of dominance and the correlates present some problems that give rise to certain questions. If "priority of incentives" is employed as the criterion for the definition of dominance, then certain problems develop. Food acquisition is used as one of the major tests of this

criterion, as well as amount of grooming, and quantity and direction of sex behavior. If food acquisition is employed, it has been shown that there are certain problems with this test. In the work of Nowlis (1941), in a situation where a dominant/subordinate relationship existed in terms of food acquisition, the degree of satiation of the dominant animal has a definite effect on the subordinate animal's food supply. In conducting food acquisition experiments, several problems come to mind: Is it possible for one animal to be more food-motivated than another? Is it also possible that one animal may be more favorably disposed to the acceptance of food from human beings than another? It has been shown that food acquisition did not correlate perfectly with dominance measures (Hall, 1968; Warren and Maroney, 1958). While observing the Nairobi Park baboons, DeVore (1965) employed food acquisition as a measure of relative status and found it to be a poor indicator.

If we examine another definition, we find that Chance's idea on spatial equilibrium poses some problems to the investigator. One question that arises is the problem with quantification and measurement of spatial equilibrium, as well as the determination of attention span.

The use of aggressive behavior as a criterion of dominance gives rise to some interesting ideas. Kaufman (1967), in discussion of rhesus monkeys, demonstrated that the highest ranking animal in the social hierarchy is not always the most dominant animal. Bernstein (1966), in a study of the capuchin monkey, found that, "Many of the important response patterns present in dominant macaque males also are present in capuchins, despite the absence of an

apparent status hierarchy... Therefore, the control of the group is not always related to dominance." Carpenter (1935) also reports that the spider monkey males he observed defended the troop, but were not the "true leaders." To this extent, there seems to be a reasonable question as to the use of aggressive behavior as a criterion for dominance.

Along with the definitions of dominance, some of the correlates that have been associated with dominance pose some interesting questions. In the relationship of sexual behavior and high status, one wonders if more dominant males have a greater reproductive potential in terms of availability of estrus females, than subordinate males? Also, is the assumption of the male role in mounting an assertion of dominance? Does an estrus female, in fact, change her status due to association with dominant males?

Another correlate that is interesting is the relationship between grooming and high status. If being groomed is more desirable than grooming, why do not the most dominant animals compete to be groomed? Is grooming an expression of subordination to a more dominant animal? What other factors such as age, sex, genealogical relationships affect grooming?

It is easily seen that these definitions and correlates pose a multiplicity of questions to the investigator. Seemingly, the problem arises from observers not forming a definition of dominance with parameters that put it in an operational context, if in actuality, dominance is the unifying concept in non-human primate society. Any definition can be general, without being definitive; any definition may be based on one facet of that phenomenon to be



defined. To be complete, however, a definition must be comprehensive enough to differentiate between exceptions to its rule and alternate patterns of its test. Definitions of dominance have been based on such behavior patterns as priority of incentives, agonistic behavior, aggression, spatial equilibrium; each of these noted patterns has been dotted over with exceptions. Are these exceptions just that, departures from the rule, or are they part of a pattern just as important to the definition, but not yet examined?

In my opinion, if the concept of dominance is to be employed, it must be defined in a manner sufficiently precise to explain a general tendency in behavior. If a definition of dominance is an all-or-nothing proposition, then significant behavior by subordinate animals is ignored. To this extent, I feel that if the term "dominance" is employed, the definitions that are not accurately quantifiable should be eliminated, as well as those correlates and side issues not directly central to the theme of dominance. In light of this paper, though, due to the seeming morass of definitions of dominance that have been posited, in discussing an organizing principle in primate society, one should address himself to the utility and application of the concept of the control animal. Based on the research I have read, although it still may be too early to make sweeping generalizations concerning primate social organization, I do feel that the concept of the control animal should be critically evaluated in light of the place of the theory of dominance in the social organization of non-human primates.

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