Journal of Comparative Psychology
1999, Vol. 113, No. 1, 96–98

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0735-7036/99/$3.00

Formal Dominance: The Emperor's New Clothes?

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I previously argued that formal dominance requires the ability to attribute knowledge to other individuals (D. Maestripieri, 1996). Formal dominance is otherwise indistinguishable from the way dominance has previously been conceptualized. For example, the notion that nonhuman primates have social relationships and that 2 individuals express their knowledge about the state of their relationship with signals of dominance and submission is intrinsic to the concept of dominance and not peculiar to formal dominance. Moreover, the claims made by formal dominance supporters that macaque signals such as the bared-teeth display are always displayed unidirectionally to other group members and never directed to predators are incorrect. If the mentalistic terms used to describe formal dominance must not be taken literally, then the interpretation of submissive signals such as the bared-teeth display from a formal dominance perspective remains unclear.

In a previous article, I argued that the concept of formal dominance, as has been used in the primatological literature, implies that nonhuman primates have the ability to attribute knowledge to other individuals (Maestripieri, 1996). As an example, I referred to the meaning of a common submissive signal, the bared-teeth display. The meaning of this signal has traditionally been interpreted as fear ("I am afraid!"), or a request not to attack ("Don't attack me!") or a combination of both. From a formal dominance perspective, at least with my interpretation of this concept, the meaning of the signal would be "I am aware of being subordinate." In this view, formal dominance is clearly differentiated from the way dominance has traditionally been conceptualized in the primatological literature in both the meaning of submissive signals and the cognitive processes underlying submissive communication. Submissive communication as interpreted from a "traditional" dominance perspective requires only zero- or first-order intentionality (Dennett, 1988), whereas submissive communication from a "formal" dominance perspective requires second-order intentionality.

Formal dominance, at least the way I interpret it, is an interesting idea that potentially has heuristic value. However, its applicability to primate behavior is contingent on the demonstration that nonhuman primates have the ability to attribute knowledge or other mental states to other individuals. If this ability were demonstrated, formal dominance would be given serious consideration when explaining dominance phenomena in nonhuman primates. Until this ability is demonstrated, however, primate behavior is best accounted for by cognitive processes that do not involve second-order intentionality.

In a response to my article, Preuschoft (1999) argued that my interpretation of the concept of formal dominance was incorrect and that formal dominance does not necessarily imply high-order cognitive processes such as attribution of knowledge or mental states. Although I am perfectly willing to admit that my interpretation of formal dominance may have been incorrect, Preuschoft's response, in my view, fails to unequivocally clarify what formal dominance really is, how it is differentiated from traditional dominance, and why one really needs it to explain primate social behavior and communication.

In her commentary, Preuschoft makes the following statement:

> The concept of formal dominance is distinguished by a proposed contrast between signals that express an acute emotional state (e.g., fear) and signals that express a sender's evaluation of a long-term dyadic relationship (e.g., subordination). Whereas ritualized agonistic signals refer to aspects of interactions, formal status signals refer to aspects of social relationships. Relationships are abstractions from previous interactions that allow probabilistic predictions about future interactions. (p. 92)

Saying that a signal expresses the evaluation of a long-term dyadic relationship is somewhat vague and does not indicate much about the specific meaning of the signal. Signals that express an underlying emotional state or a request to modify the behavior of another individual can also reflect the evaluation of a long-term dyadic relationship. For example, if individuals A and B have repeatedly met in the past, and A has consistently attacked and defeated B in each encounter, B's expression of fear upon meeting A reflects an evaluation of its relationship with A. Similarly, if upon meeting A, B displays a signal that means "Don't attack me," this signal also reflects an evaluation of the relationship with A. B would have no reason to express fear or ask not to be attacked if it did not predict, on the basis of its previous interactions with A (or with individuals sharing some characteristics with A; see below), that A may attack again.

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This work was supported by research grants from the H. F. Guggenheim Foundation and Grant R01-MH57249 from the National Institute of Mental Health. I thank Irwin Bernstein and Bernard Chapais for helpful discussion.

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The notion that nonhuman primates, as well as other animals, have social relationships and that two individuals express their knowledge (i.e., what they have learned about each other) about the state of their relationship with signals of dominance and submission is intrinsic to the concept of dominance (e.g., Bernstein and commentaries, 1981) and not peculiar to formal dominance. The finding that primates may rank not only each other but also third individuals is also entirely compatible with the explanatory framework of traditional dominance, and one does not need a new concept of dominance to accommodate it.

I agree with Preuschoft (1999) that "an established relationship between sender and receiver is not required when a display is merely a symptom of the emotion 'fear'" (p. 92). In fact, both animals and humans may display expressions of fear when exposed to novel objects, loud noises, and a number of other nonliving entities. The notion that submissive signals may express fear (or an attempt to modify the behavior of the receiver or both) does not necessarily imply that all signals of fear express submission or subordination. For example, if people scream whey they hear loud thunder, one would not think that they are expressing submission. The concepts of dominance and submission have specifically been used in relation to communication exchanges in which a signal from the sender can potentially change the behavior of the receiver, which is obviously not the case with thunder or other nonliving entities.

Dominance and submission signals have also been specifically used in the context of social relationships, that is, when the behavior of an individual during a social interaction is probabilistically predicted on the basis of previous interactions. These situations may also include first-time interactions with strangers if these strangers share some characteristics with individuals with whom one has had some previous experience. For example, A may show a submissive signal to B upon their first encounter because B looks or acts like C, who has attacked and defeated A in the past. In a hypothetical situation in which A has been attacked and defeated by every individual it has met in the past, A can show submissive signals to every individual it will meet in the future. Even in these extreme circumstances, it may be argued that submissive signals reflect the state of the relationship between A and the strangers, because A has made probabilistic predictions about the strangers' behavior based on extrapolations from previous interactions. The notion that nonhuman primates may categorize some individuals as "dangerous" and others as "kin" and that they may have something similar to a concept of a social relationship is very interesting, but it is also perfectly compatible with traditional concepts of dominance. If it is

Figure 1. Long-tailed macaque showing a bared-teeth display to a snake. Photo courtesy of Irwin Bernstein.

being claimed that this notion brings a new perspective to the meaning of submissive signals, then what exactly is the meaning of these signals from this new perspective?

Although Preuschoft (1999) does not unequivocally specify the meaning of the bared-teeth display from the perspective of formal dominance, she maintains that such signals should "be directed only at groupmates, not at strangers nor at predators" (p. 93). However, Figure 1 depicts a long-tailed macaque (*Macaca fascicularis*) baring its teeth to a snake. Preuschoft also claims that chimpanzees (*Pan troglodytes*) and rhesus macaques (*Macaca mulatta*) stop using bared-teeth displays during periods of rank perturbations and that reappearance of the signals coincides with the end of fighting and the reestablishment of affiliative contacts. However, studies of Japanese macaques (*Macaca fuscata*) conducted by Chapais and colleagues have shown that, during the process through which juvenile females acquire their matriline's rank, there are periods in which dominance relationships between individuals are unstable, and both aggression and bared-teeth displays are exchanged bidirectionally (Chapais, 1988; Prud'homme & Chapais, 1996; B. Chapais, personal communication, May 1998).

Preuschoft (1999) argues that formal dominance and the "double-layered hierarchy" (i.e., the notion that nonhuman primates have two dominance hierarchies, one real and one formal) were proposed to acknowledge the possibility that nonhuman primates distinguish between a present interaction and a long-term relationship. The ability to distinguish between a present interaction and a long-term relationship is a well-established fact; it is by no means limited to nonhuman primates, and one does not need formal dominance or a double-layered hierarchy to acknowledge it. All social animals with basic memory abilities have social relationships with some of their conspecifics in the sense that they can predict the conspecifics' behavior on the basis of previous experience. This predictive ability does not imply that animals behave always in the same way—like dumb robots—in each interaction with the same individual and independently from the context in which the interaction occurs. Although B can predict on the basis of previous interactions with A that A is likely to attack when they meet, in each interaction B can decide whether to run away or fight, depending on the value of the resource at stake or whether other individuals may join the fight.

Context can influence the behavior not only of subordinates but also of dominants. Although in most cases dominants gain access to food before subordinates do, in some rare cases dominants will allow subordinates (who may or may not display submissive signals) to eat first. According to Preuschoft (1999), the concept of formal dominance is intimately linked to that of "conditional reassurance" where "*conditional reassurance* means that superiors may occasionally refrain from exerting their full competitive potential and thus make room for inferiors to occasionally assert themselves—provided that the inferiors unequivocally signal their subordination" (p. 91). However, what Preuschoft calls "conditional reassurance" I would simply call "a dominant with a full belly."

The fuzziness surrounding formal dominance and related concepts may be due in part to the fact that those who use them tend to favor cognitively loaded terminology that hints at sophisticated mental processes. The extent to which this terminology is used metaphorically, as Preuschoft seems to suggest, or literally is not entirely clear. Take as an example Preuschoft's description of zero-order intentionality: "Assume there is a simple, hard-wired connection built into the brain of a rhesus or long-tailed macaque so that each time the individual meets a familiar groupmate *relative to whom it perceives itself as subordinate,* it automatically grins (zero-order intentionality)" (pp. 92–93; italics added). Reading this statement, I cannot help but wonder whether or not it is being implied that communication of subordination from a perspective of zero-order intentionality really requires possessing a sense of self. In this particular case, I can confidently answer that the terminology referring to self-perception should not be taken literally. However, if none of the mentalistic terminology used for formal dominance and related concepts should be taken literally and if these concepts cannot be adequately described without using this terminology, then this may simply be a case of old ideas dressed in new clothes.

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Received July 1, 1998
Accepted July 2, 1998 ■