

DISPLAYS AND VOCALIZATIONS OF THE SPARROW HAWK

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IN the past several years I have kept eight Sparrow Hawks (*Falco sparverius*) in captivity for use in experiments in prey selection and the motivation for predatory behavior. Four of the birds were taken from nests at approximately two to three weeks of age and were hand-reared in my laboratory and four were trapped as free-flying birds. All birds were handled frequently and became quite tame. The continuous presence of the birds in my laboratory and various experimental manipulations provided an opportunity to observe closely a variety of displays and vocalizations used by this species in social behavior.

Cade (1955) performed experiments with both taxidermist's mounts and live, captive Sparrow Hawks placed in the winter territories of wild individuals of the species. Willoughby and Cade (1964) maintained breeding pairs of *F. sparverius* in captivity and carefully observed courtship and other behaviors. I report here only my observations which are new, differ from, or extend the observations of Cade and Willoughby. Displays directed to the experimenter and to my captive Broad-winged Hawks (*Buteo platyterus*) are included along with the displays performed with conspecifics.

The birds were maintained on block perches to which they were attached by leashes approximately 35 cm long. Displays between birds occasionally occurred when two perches were placed on a bench in sufficient proximity for the birds to approach each other. Some pairings of adversaries produced frequent and prolonged interactions, others none. Displays directed to the experimenter occurred when he or she, or more particularly, when the hand approached the bird on its perch. Displays in response to the captive Broad-winged Hawks occurred when the Buteo was carried to the near vicinity of the Sparrow Hawk.

DISPLAYS

Curtsey.—The body is held nearly horizontal with the legs flexed and the head and tail touching, or nearly touching, the substrate. The feathers of the back are raised, giving it an arched appearance; the rest of the plumage is neither raised nor flattened. The wings are lowered slightly and the tail spread very slightly. The bird relaxes slowly, raising head and tail, and to a much lesser extent the body, but remains in an essentially horizontal orientation, and then quickly resumes the curtsy. In lateral display, the body,

and to a greater extent the head and tail, are twisted so as to present the dorsal surface to the adversary. Cade (1955:11) may have observed and incompletely described this display.

A bout of displaying usually begins with one bird flying toward the other, landing, and displaying frontally. In the initiation of the frontal display the tail is held above the horizontal so that the dorsal surface is shown to the adversary; when the bird then switches to a lateral display, the tail is held below the horizontal. If the other hawk joins a frontally displaying bird, the birds then curtsey laterally or, rarely, perform a "confrontation" (see below). Two birds may curtsey laterally more than 30 times each in a single bout, and a bout may last for 6 or 7 minutes. The birds usually remain in place for the entire bout, oriented parallel, head to tail, about 10 cm apart. I have seen the curtsey displayed by both sexes to either sex of Sparrow Hawk, and to me by hand-reared birds. Two of my hand-reared females also curtsey to several, but not all, of my assistants. The other two hand-reared birds usually curtsey only to me and other Sparrow Hawks.

Bow.—A frontal display somewhat similar to the curtsey. The bird suddenly assumes a near horizontal position with all feathers of the body raised, particularly those of the crown, nape, and back. The wrist is abducted slightly but the remiges are not spread. The tail is usually, but not invariably, spread. The head, and to a lesser extent the body, is periodically slowly raised and then quickly lowered to the horizontal position. The *klee* call is sometimes uttered during this display. I have seen the bow only in response to humans or my captive Broad-winged Hawks and not in response to other Sparrow Hawks. The bow, rather than the curtsey, is the display I elicit from my birds that were trapped as free-flying individuals. Individual, hand-reared birds respond to some of my laboratory personnel with a curtsey, to others with a bow. These differences in response to individuals have remained quite constant for periods up to several months. If the keeper's hand persists in its approach to the bird during a bow, an attack on his hand may follow. We have noted little inhibition in the use of either talons or beak in such an attack.

Confrontation.—Two birds assume a nearly vertical stance facing each other about 10 to 15 cm apart with heads raised and necks extended. The feathers of the crown are raised slightly and those of the nape are erected considerably. The rest of the plumage is compressed. The tail may be spread, more often in subordinate birds, but occasionally in both birds. This posture may be held for a minute or slightly more and the birds may then return to their perches, begin to curtsey, or (rarely) commence fighting. I can occasionally elicit a confrontation from one of my hand-reared birds by ap-

proaching it very closely with my hand. If I then touch it, particularly if contact is made with the feet, beak, or near the beak, the bird, occasionally but rarely, will fight with my hand.

Fighting.—The birds grapple each other by the feet and legs and fence with their beaks. The dominant bird may force the subordinate on its back where it will lie with wings and tail spread. The subordinate bird often utters the *klee* vocalization after an encounter. Cade (1955:12) described this behavior, and it is worth re-emphasizing that the birds are not hurt by such encounters. On the few occasions when my hand has been attacked, I was amazed that the sharp talons caused me essentially no discomfort. The beak fencing was a little uncomfortable, but in no case did the bird break my skin.

Tail Spreading.—The spreading of the rectrices is elicited in a variety of situations, all of which suggest that this is a fear response. It is difficult for the investigator to approach a recently trapped bird without eliciting tail spreading. The behavior is rarely seen in hand-reared birds and then only in response to an unusual stimulus, such as a large dog entering the laboratory. At high intensities the wings may also be partially spread as though in an intention movement for flight, and the entire plumage erected.

Tail Pumping.—A repeated raising and lowering of the tail, shown in a variety of situations suggesting conflict or indecision. I see it most frequently when a bird is about to attack a mouse in a new experimental situation. The bird pumps only for a brief interval before beginning the attack, or it pumps, leans forward as though it is about to attack, and then relaxes. The entire plumage is compressed during pumping, giving the bird a sleek appearance. This behavior is relatively unusual in familiar situations in the laboratory.

Mantling.—A pronounced spreading of the wings and tail, a lowering of the body, and an orientation with the back to the antagonist. Mantling is shown when the bird is hungry and has food in its talons, and it serves to hide food from the observer. Hand-reared birds mantle readily in response to the presence of the investigator or another Sparrow Hawk. Wild-caught birds rarely mantle and then only when very hungry. The only one of my four wild-caught birds that mantles in response to the investigator was less than one year old when taken into captivity. The other three were more than a year old when taken and only two of these mantle, but only rarely and only in response to the approach of other Sparrow Hawks. Mantling is a behavior commonly observed in nestlings, and presumably functions to hide food from siblings. The persistence of this infantile behavior in hand-reared birds probably is a result of the abnormally long feeding relationship with the keeper.

VOCALIZATIONS

Klee.—I agree completely with Willoughby and Cade (1964) that this call is indicative of generalized excitement and would add only that it probably involves a high level of arousal.

Whine.—This appears to be basically a begging call and is usually associated with food. The frequency of utterance of this call is directly proportional to the hunger of the bird. To my ear the call is indistinguishable from that used by nestlings during feeding. In my laboratory this call has been uttered only in response to the investigator and, with one exception, only by hand-reared birds. The wild-caught male taken when less than one year old would also utter this call when very hungry. My three hand-reared females also occasionally used the whine when not hungry, particularly if I stroke them. Presumably this was some form of courtship behavior similar to that seen by Willoughby and Cade (1964).

Chitter.—As indicated by Willoughby and Cade (1964), this call is associated with friendly approach and bodily contact. The chitter is used by all of my birds in response to my approach and particularly touch by my hand. It is used much more commonly by hand-reared birds and by females than by wild-caught birds or males. One of my hand-reared females usually chitters when I call her or approach within 3 or 4 m; with other individuals contact or near contact is necessary to evoke this vocalization. The chitter varies considerably from a soft call to a louder, harsher, more strident vocalization. The latter appears to be associated with some annoyance or aggression and is often followed by mild to moderately hard biting of the offending hand.

Whine-chitter.—This call is used by hand-reared birds of both sexes when extremely hungry. Again, hand-reared birds and females use it more commonly than other birds.

Klee-chitter.—A rarely observed vocalization and not described by Willoughby and Cade (1964). It is uttered by either sex when very hungry and food is taken away by the investigator.

DISCUSSION

The courtsey, confrontation, and fighting appear to be intraspecific territorial behaviors. The sequence given probably reflects the intensity of motivation involved. I believe all of these behaviors occur in nature, but it will probably take considerable careful observation during the time of the establishment of territories to observe these behaviors in non-experimental situations.

The vertical black and white stripes on the sides of the head are prominently displayed in the bow and confrontation. The spots on the back of the

head, and the markings of the back and tail are prominently displayed in the curtsy. I suggest that these prominent markings serve a signal function in the territorial displays. Clay (1953) suggested that the head markings were disruptive and deflective color patterns, serving to distract and confuse potential predators and prey. Although the head markings may serve a secondary function as a disruptive and deflective device, in the absence of direct evidence for this hypothesis I suggest that the primary, and probably the only, function of the markings is in the territorial displays of the species.

My first impression was that the bow was a distinct interspecific display. However, I sent an earlier draft of this manuscript to T. J. Cade and he has informed me that he has seen the bow used in intraspecific encounters, both between captives and between a captive bird and the holder of a territory in which it was tethered. I now feel that the bow is a variant of the curtsy involving higher levels of aggression, fear, or a conflict of motivations. It is my impression that my assistants which elicit the bow are less perceptive and empathetic with the birds than those assistants which elicit the curtsy. If this impression is valid, then the breakdown in "communication" between bird and investigator might change the motivational state of the bird and change the behavior as well. The general erection of the plumage and the spreading of the tail during the bow suggests greater fear than is evident in the curtsy. The differences in the attacks following these behaviors might suggest a higher level of aggression in the bow. The bow thus might be a curtsy produced by very high and conflicting levels of fear and aggression.

I find it most interesting that my birds apparently recognize individual humans in spite of changes in clothing. Assistants with similar appearances do not necessarily elicit similar responses. A wild-trapped bird with considerable experience with conspecifics apparently is not able to develop the ability to communicate with humans anywhere near to the extent that is possible for a younger, hand-reared bird. Alternatively the hand-reared bird may lack the level of fear (of some of my laboratory staff) which is necessary to provide the conflict which results in a bow instead of a curtsy.

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SUMMARY

I have described and interpreted a number of displays and vocalizations of the Sparrow Hawk. Most of the displays appear to function in territorial behavior and apparently have not been observed in the wild. The color patterns of the head and tail appear to

have a signal function in territorial behavior. Individual birds react differently to various humans, suggesting individual recognition.

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