

SOME OBSERVATIONS OF THE AGONISTIC BEHAVIOUR OF THE KEA, *Nestor notabilis* (Nestoridae), IN CAPTIVITY

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ABSTRACT

Several agonistic displays of *Nestor notabilis* (a parrot species endemic to New Zealand) are described.

INTRODUCTION

Observations were made on a total of 28 Keas in captivity. The sex and approximate ages of birds were determined by external characteristics. No nestlings were available for study. Details of cage dimensions and periods and methods of observations have been given in an earlier paper describing the comfort behaviour of this species (Potts 1976).

The term "agonistic" is used to describe behaviour involving attack and escape, or modification of these tendencies. Displays are categorised as either threat or appeasement except allopreening which involves reciprocal interactions best described *in toto*.

This paper should be viewed as a broad descriptive treatment of the agonistic behaviour of the Kea. Further observations within the context of a known social order are needed to clarify the situations in which particular displays are likely to occur.

A. THREAT DISPLAYS

(i) *Turn-toward*

The first movement involved in most threat actions is the turn-toward in which an aggressive bird faces an opponent. This in itself is often sufficient to invoke an escape response in an opponent.

(ii) *Run-rushing*

This consists of a fast walk toward another bird while the head is lowered and the body held almost parallel to the substrate; bill-gaping (*q.v.*) often accompanies it. A high intensity of aggression is indicated when the carpals are held slightly away* or straight out from the body.

* Carpal-holding *i.e.* when both wings remain essentially in the normal position close to the body but with the carpal areas slightly away is defined by some authors (*e.g.* Dilger 1960, Buckley 1968) as a discrete threat component.

(iii) *Lunging and pecking*

Lunging consists of a sharp thrust of the head toward the feet, legs, bill or head of another bird, and, as in run-rushing is usually accompanied by bill-gaping. If an opponent fails to retreat lunging may be terminated by pecking and this is usually responded to by quick fleeing.

A rasping call, indicative of a high level of aggression, is often given prior to or following lunging or run-rushing.

(iv) *Clawing*

Clawing frequently occurs when birds are perched close together. An aggressor may sidle toward an opponent, turn partially toward it, raise a claw and strike out sideways in a pushing motion. The clawed bird may respond by walking or sidling away, usually slowly. Clawing in this context probably functions to maintain individual distance.

More intensive clawing is performed in fighting. It often precedes, follows, or is used together with pecking or bill-gaping. A victim is usually confronted head-on and the claw is raised and struck out in a pushing or swiping motion.

(v) *Bill-gaping*

This action involves holding the bill open for a few seconds while turning toward another bird. It seems to indicate a readiness to bite and is often performed in association with lunging and run-rushing or in response to these actions.

(vi) *Chasing*

Chasing is less stereotyped than the run-rush and is usually performed when an opponent is fleeing. It may be accompanied by lunging and bill-gaping.

(vii) *Crouching*

The body is lowered so that the breast almost touches the ground, the legs are spread out, the head extended forward and the wings are often raised and held slightly out from the body.

Bill-gaping and pecking are commonly associated with crouching. The position is also suitable for the launching of a lunge attack. The crouching stance is commonly held by two opposing birds, neither of which appears to be dominant.

(viii) *Wing-hitting* (Fig. 1).

Wing-hitting is sometimes performed by subordinate individuals which have assumed a hunched posture (*q.v.*) in response to continuing attacks or pursuit by one or more birds. The submissive hunched posture is not always successful in completely reducing attack and so the apparently more desperate, direct counter-measure of wing-hitting is employed.

Although the wing movements involved in wing-hitting vary little, the body movements associated with it vary, depending on the relative orientations of the actors and reactors. If a sub-



FIGURE 1 (a) — Wing-hitting.



FIGURE 1 (b) — Wing-hitting.

ordinate bird is approached side-on it will suddenly flick a wing straight out from its body and strike. If it is approached from in front by an aggressor it will flick the wing (in a manner similar to that described above, but slightly forward), while simultaneously twisting its body so that the opponent is struck with a completely extended wing. In this way both the strike

range and the velocity of impact are increased compared with what would be possible if the bird remained stationary.

Bill-gaping and sleeking of the plumage usually accompany wing-hitting.

(ix) *Wing-holding*

The wing-holding display indicates a strong motivation to attack. The wings are unfolded and held straight out from the body or over the back while facing an opponent. Some of the bright scarlet colouring of the under-wing coverts and axillaries is exposed.

Wing-holding may lead to lunging, pecking or run-rushing, and it may be associated with bill-gaping. It frequently develops into wing-flapping (*q.v.*) with or without striking an opponent.

(x) *Wing-flapping*

Powerful and rapid flapping of the wings is characteristic of high intensity aggression. It is often associated with fighting; the aggressor often pecks and beats its wings against an opponent.

Wing-flapping also appears to be an intimidatory display. The wings are opened and flapped as in flight several times, the legs are stretched and the body is held almost vertically. The bright scarlet under-wing coverts and axillaries are exposed.

(xi) *Redirected aggression*

When a bird flees from an aggressor it may in turn attack one or several others. Lunging, pecking and bill-gaping are commonly employed in these attacks.

B. APPEASEMENT DISPLAYS

(i) *Sidling*

This is a sideways walking movement and in the agonistic context often appears to be ambivalent *i.e.* the tendencies to attack and flee are in balance. I have frequently observed an approaching bird sidle away from another if it should make the slightest movement. Buckley (1968) suggested that since most attacks and threats are frontally directed, so the lateral approach used in sidling may be less provocative to the bird approached.

(ii) *Hunching* (Fig. 2)

The hunching posture is sometimes assumed by birds which have been, or are being, subjected to attack or which are being pursued. The rump feathers are fluffed and the tail is fanned out. The humeri are held slightly out and upwards from the body and the forewings are drooped. While the bird is immobile the head is directed downwards and the body is crouched (Fig. 2a); but on walking the head may be raised slightly and the body made more erect (Fig. 2b). Lowering of the head

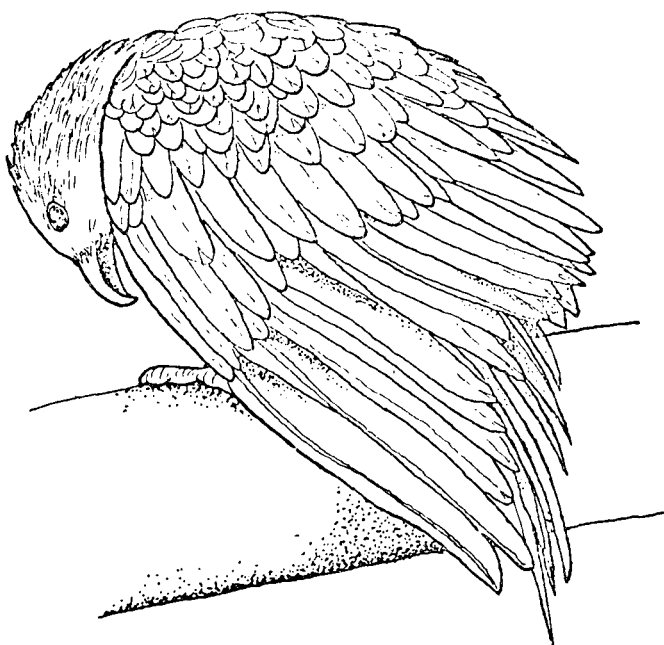


FIGURE 2 (a) — Hunching.

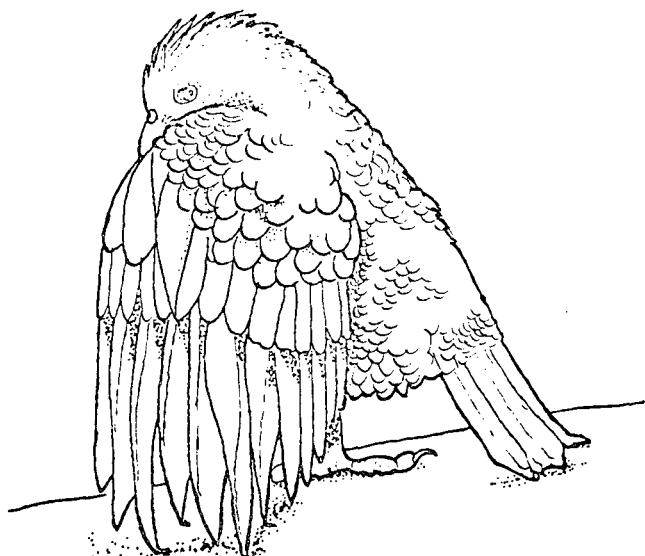


FIGURE 2 (b) — Hunching.

may serve what Chance (1962) called a "cut-off" function in that the bill, a potential weapon, is hidden from the view of an opponent and therefore does not act as a stimulus for aggression.

A hunched bird may be laterally or frontally oriented toward an aggressor. If it is pecked it may respond by raising its head to bill-gape, by slowly moving away, or both.

C. ALLOPREENING (Fig. 3).

The term allopreening was proposed by Cullen (1963) to describe the preening of one bird by another. Harrison (1965) used three additional terms to indicate the form that it may take: When one bird preens another but is not preened in return he refers to it as 'non-reciprocal allopreening.' When one bird preens another and is in turn preened during the same 'bout' he calls it 'reciprocal allopreening.' 'Simultaneous allopreening' occurs when two or more birds preen each other at the same time.

I observed non-reciprocal and reciprocal allopreening but did not see simultaneous allopreening. No quantitative record was kept of the sexes and ages of birds involved in allopreening associations. However, both male and female birds non-reciprocally allopreened although adult males were not observed being preened by female or identifiably younger birds; in most cases preening was done by adult males to adults or immature birds of either sex. Reciprocal allopreening was quite common between young birds. Jackson (1963) reported having observed 'mutual preening' in fledgling and year old Keas in the wild; but whether 'mutual preening' refers to both reciprocal and simultaneous preening is not known.

The preening of one individual by another is similar to that done by a bird to its own plumage. Most attention is directed toward the head (the crown, nape feathers around the eyes and throat receive particular attention) but the hind-neck is occasionally preened; on rare occasions I have seen the breast, rump and wing feathers preened, although this generally resulted in the recipient moving away.

The recipient often adjusts its head in a way which suggests it may be facilitating preening, but this could be interpreted as a measure to evade the bill of the preener without moving away. The latter interpretation may apply in some instances, since I have observed adult male preeners using their bills to pull sharply on the head feathers of young birds, apparently to alter the position of their heads. If the recipient did not maintain the head position imposed the preener would once again seize the head feathers and abruptly pull the head into position for preening. I saw this occur three times on one occasion before the imposed head position was maintained. A young bird would not normally attempt to simultaneously or reciprocally preen an adult male; if it did it was immediately repulsed by a sharp peck, usually to the head.

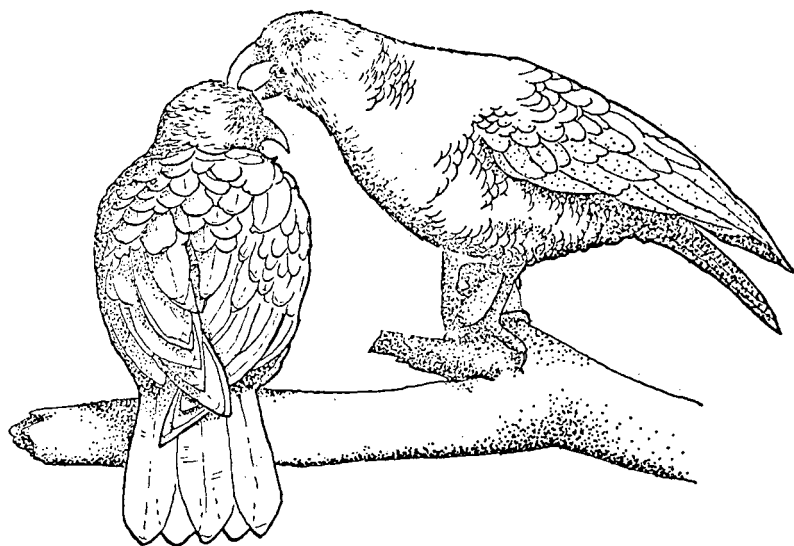


FIGURE 3 (a) — Allopreening.

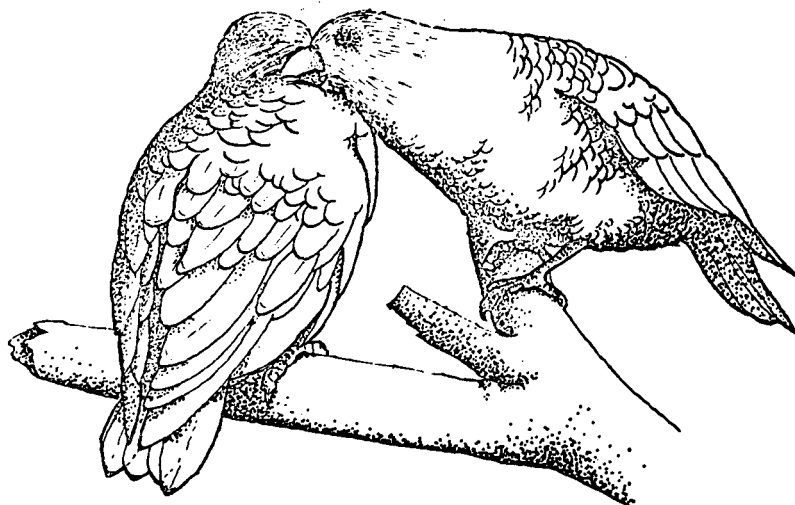


FIGURE 3 (b) — Allopreening.

Non-reciprocal allopreening may be applied continuously or intermittently for periods up to about 30 minutes. If intermittent the recipient usually remains in one place and is subjected to several preening sessions between which the preener may move away several metres and return again.

The posture assumed by a recipient of non-reciprocal allopreening is normally characterised by crouching and fluffing with the head in a downward position. This general posture has been described for many allopreening species and is commonly referred to as a 'preening invitation posture' (Harrison).

The function of allopreening has been discussed at length by Harrison. He assembled data on allopreening in 41 avian families and concluded there was little evidence that it occurred as a normal form of preening behaviour, or that it was of value as plumage maintenance since 'it occurs in only a minority of species; there is no evidence that species which lack it are at any disadvantage, and in many cases when it does occur it occupies only a brief part of the breeding period.' He found considerable evidence that allopreening is closely linked to aggressive behaviour and that its expression is associated with the enforced proximity of individuals such as occurs in clumping together in colonies and in pair formation.

Goodwin (1956, 1959, 1960) studied allopreening in waxbills and doves and showed that a bird which preens another is usually dominant or aggressive at a particular point; whereas those which submit to preening are weak or subordinate. He described allopreening as "sublimated" or inhibited aggression. Harrison confirmed Goodwin's findings and quotes studies of several other species in which overt aggression appeared to actually give way to allopreening. He states,

"If allopreening replaces aggression to differing degrees some evidence of the change can be expected. The usual form of attack is pecking at the head. From observations of captive birds it has been found that submissive postures appear to reduce attacks to light pecking, and that when allopreening species respond to attacks of individuals of other species although they were allopreening the attack is frustrated, and through habituation may decrease until it resembles allopreening. In the cowbirds preening invitation postures have induced allopreening in some species which do not normally show this behaviour. In such circumstances allopreening is considered to be the direct result of the frustration of the aggressive drive and to be a displacement behaviour having a similar initial movement."

The nature of the fluffed, head-down preening invitation posture was further discussed by Harrison. He summarises as follows:

"Preening invitation postures are considered to be postures resulting from thwarted fleeing, appeasing, or withdrawing be-

haviour combined with head positions which initially result from attempts to protect the eyes from, or evade, the bill of the preened without moving away. These head positions could function as cut-off postures in which the aggressor ceases to be visible and the tendency to flee is reduced. Allopreening can be regarded as a form of agonistic behaviour in which the normal tendencies of attacking or fleeing, when two individuals are in close proximity, are in conflict with sexual and opposing attacking and fleeing tendencies. In the attacked bird thwarted fleeing will tend to result in a fluffed posture, while the head positions will "cut-off" the aggressor and reduce still further the fleeing tendencies. In the attacking bird the thwarting of the aggressive tendencies by the refusal of the other bird to flee, together with possible sexual and fleeing conflict, will create a situation where displacement behaviour might be expected, and where the confrontation of the aggressor with the raised feathers of the recipient will increase the likelihood of preening behaviour. This behaviour appears to have become fixed and ritualised in some species." (Harrison 1965).

General observations on the types of allopreening exhibited by Keas suggests that allopreening may indeed be related to dominance in this species. The old males were decidedly dominant in aggressive encounters with identifiably younger birds and they were never observed to be reciprocally preened by them. On the other hand, immature birds often displayed what appeared to be a more finely balanced dominance relationship in that they frequently reciprocally preened. One of the associates would preen for about only 2-8 seconds before it was itself preened, and so on; time spent preening before reciprocation varied, however, as did the total duration of the association. At any point a temporary recipient would often move about slowly or move right away without interference. No head feather pulling occurred in this context and the general impression was of a loose, unstable relationship between the birds. The formal stiffness, fluffing, crouching and head lowering associated with non-reciprocally allopreened birds was not so apparent.

It is probable that the enforced close proximity of the captive non-breeding Keas prompted a higher frequency of allopreening than would be expected from a similar age/sex grouping in the wild. Further observations on groupings of known social structure — preferably in the wild — are needed to establish situations in which allopreening is most likely to occur.

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SHORT NOTE

DIET OF NESTING LITTLE OWLS

On 18 December 1976 I found the nest of a pair of Little Owls (*Athene noctua*) containing two owlets, near Loburn, North Canterbury. The nest was 1 m above the ground in the hollow trunk of an old Willow (*Salix* sp.) which had a spreading canopy 20 m across. The owlets had pale yellow eyes and were covered in about 70% down and about 30% feathers; they flew 18 days later.

White owl droppings marked perches in *Macrocarpa* trees (*Cupressus macrocarpa*) in a radius of about 50 m around the nest. Perches were mainly about 1.5 m above the ground and several had prey remains below them.

In a small hole alongside the nest was a food cache containing 1 Song Thrush (*Turdus philomelos*), 7 fledgling Starlings (*Sturnus vulgaris*), and 1 half-grown Brown Rat (*Rattus norvegicus*); all had had their heads eaten off. Below perches near the nest were found remains of 1 Chaffinch (*Fringilla coelebs*), 1 adult Starling, 2 juvenile Starlings, 2 adult male Blackbirds (*Turdus merula*), 2 Song Thrushes, 1 adult Silvereye (*Zosterops lateralis*) and 1 young feral Pigeon (*Columba livia*). Surprisingly, no pellets could be found so I was unable to tell if the owls were also catching mice and insects.

Although the Little Owl looks smaller than the Morepork (*Ninox novaeseelandiae*), 5 specimens had a mean weight of 182 g compared to 5 Moreporks which had a mean weight of 176 g (N. C. Fox pers. comm.). This may explain why the Little Owl appears to take heavier prey than the Morepork. Also many raptors, such as the Kestrel (*Falco tinnunculus*), switch to larger prey during the nesting period.

I would like to thank other Raptor Association members for their help in identifying the 19 prey items.

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