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FEEDING ASSOCIATION BETWEEN FANTAILS AND SADDLEBACKS: WHO BENEFITS?

Summary: A feeding association between tWo New Zealand passerine birds, saddlebacks *(Philesturnus carunculatus,* Callaeidae), and fantails *(Rhipidura fuliginosa,* Muscicapidae) is described. Saddlebacks are poor fliers, give loud vocalisations, and feed noisily. These characteristics allow fantails to find saddlebacks and to capture insects disturbed by the saddleback's activity. Fantails follow at a distance of about 50 cm, and tend to remain behind and below the saddleback. Fantails use different feeding sites when feeding in association with saddlebacks than they use when feeding alone.

Keywords: Feeding association, fantail, *Rhipidura fuliginosa*, Muscicapidae, saddleback, *Philesturnus carunculatus*, Callaeidae, feeding sites, Cuvier Island, New Zealand.

Introduction

Some birds obtain a portion of their prey by taking animals disturbed by the activities of other organisms. Examples of this use of others as "beaters" (Diamond, 1981) are cattle egrets *(Bubulcus ibis)* which follow large ungulates (Thompson, Lanyon and Thompson, 1982), and birds that follow columns of army ants (Willis and Oniki, 1978). Other examples may be found in MacDonald and Henderson (1977), Diamond (1981), and Robbins (1981). The essential characteristics of beaters are that they move slowly and cause considerable disturbance to surrounding vegetation. Except when flocking, passerine birds do not usually show these characteristics, presumably because of their small size and the possibility of attracting predators. There are no detailed accounts available of a feeding association in which a non-flocking passerine acts as the beater.

The saddleback, *(Philesturnus carunculatus),* a member of the endemic New Zealand family Callaeidae, exhibits the two main characteristics of beaters. It is a medium-sized (60-90 g; Jenkins, 1976; Williams, 1976) bird easily located by its noisy feeding habits and loud vocalisations which are given throughout the day Uenkins, 1978). Most food is obtained by breaking away rotting wood and bark to obtain invenebrates living underneath. The fantail *(Rhipidura fuliginosa:* Muscicapidae) is a small (6.8-9.6 g; McLean and Jenkins, 1980) flycatcher which feeds primarily by hawking for flying invenebrates. It follows saddlebacks and captures invenebrates disturbed by the saddleback's activities.

My aims were to describe quantitatively, the feeding association between these two species and to ask: did fantails modify their use of the forest when feeding in association with a saddleback? This question was studied on a 60 ha area of Cuvier Island (36°26'S, 175°64'E) during two weeks in each of May, August, November, and December 1973, and May 1981. Saddlebacks became extinct on the island in the late nineteenth century, but 29 individuals were released there in 1968. Approximately 100 were present on the study area in 1973, and 350 in 1981 (C. R. Veitch, unpubl. data). Numbers of fantails remained at about 40 during the two study periods.

Methods

I took instantaneous samples (Altmann, 1974) when I encountered fantails or saddlebacks feeding either alone or in association as I moved through the predominantly pohutukawa *(Metrosideros excelsa)* forest. In 1973 I recorded the height and perch (ground, trunk, branch, twig, leaf) where a fantail was first sighted, and I noted if the fantail was with a saddleback. In 1981 I distinguished branches as large or small, and recorded the height and perches used by both species, the distance between the two birds, and the orientation of the fantail to the saddleback (above, below, to the side). In 1973 I sampled only when the fantail was initially sighted. In 1981 I recorded a maximum of five samples from each individual(s) at 30 sec (fantails alone) or 60 sec (saddlebacks alone, fantails and saddle backs in association) intervals. The different data-gathering techniques preclude statistical comparisons between years.

The 30 and 60 sec time intervals represent a compromise between the amount of time in which I could reasonably hope to keep the birds in continuous sight, and obtaining fully independent data. I greatly increased the sample size by taking several samples each time birds were encountered. However, because successive samples taken from the same individual violate the assumption of

statistical independence, I only consider statistical probabilities less than 0.01 to be significant.

I obtained the maximum five samples from 46 of 110 (41 %) encounters with fantails feeding alone, 106 of 170 (62%) encounters with saddlebacks feeding alone, and 27 of 63 (43%) encounters with fantails and saddlebacks in association.

Results and Discussion

Most fantails feeding in association occurred 40 to 60 em below the saddleback (Fig. 1). This preferred orientation may have been because prey items disturbed by saddlebacks flew or fell downwards, and were silhouetted against the sky for a fantail perched below. This conclusion is reinforced by the observation that fantails seldom fed with saddle backs on the ground (Fig. 2), and on all seven occasions that saddlebacks moved to the ground, the fantail left. Saddlebacks did occur on the ground: 34.5% of 468 observations of adults and 78% of 216 observations of juvenile saddlebacks feeding alone were of birds on the ground. Fantails may have abandoned saddlebacks on the ground because prey items were difficult to see in the low light levels at ground level, and without the advantage of backlighting from the sky.

Saddlebacks appeared to be undisturbed by a fantail in close proximity, although they occasionally fell short distances and on two occasions hit fantails that were perched very close.

Two main points emerge from the data for heights and perches used by fantails (Fig. 2). First, fantails used significantly larger perches when feeding with saddlebacks (1973 and 1981). Second, fantails fed significantly higher in the middle parts of the forest when feeding with saddlebacks than when feeding alone in 1973, although the heights for fantails feeding alone and in association were similar in 1981. These data indicate that fantails used different feeding sites when in association with saddlebacks than when alone, and suggest that the availability of saddlebacks allowed fantails to feed over a broader range of sites than they used when saddlebacks were not present.

I sampled the perches and heights used by saddle backs when feeding alone and in association with fantails in 1981 (Fig. 3). No significant difference in feeding heights were found, suggesting that saddlebacks did not

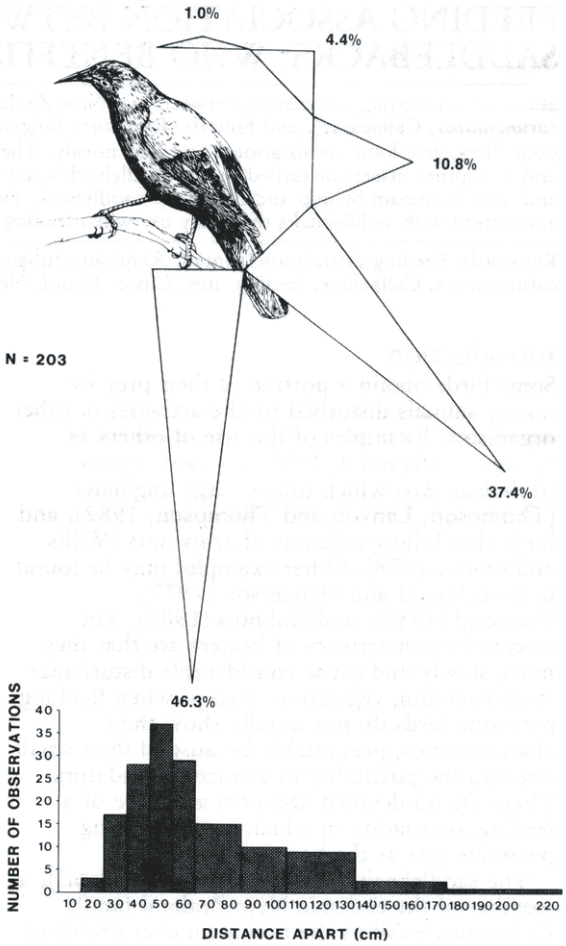

Figure 1: *Orientation of fantails to saddlebacks (above) and the distance between the two birds (below) while feeding in association, May 1981.*

respond to the presence of fantails. However, the perches used by saddlebacks feeding in association were significantly larger than for saddlebacks alone. This result is uninterpretable since I cannot distinguish between the two hypotheses that the data reflect a response of saddlebacks to the presence of fantails, or selection by fantails of saddlebacks feeding at particular sites.

Most feeding associations between fantails and saddlebacks occurred outside the breeding season (September - January for fantails, McLean and Jenkins, 1980; November - December for

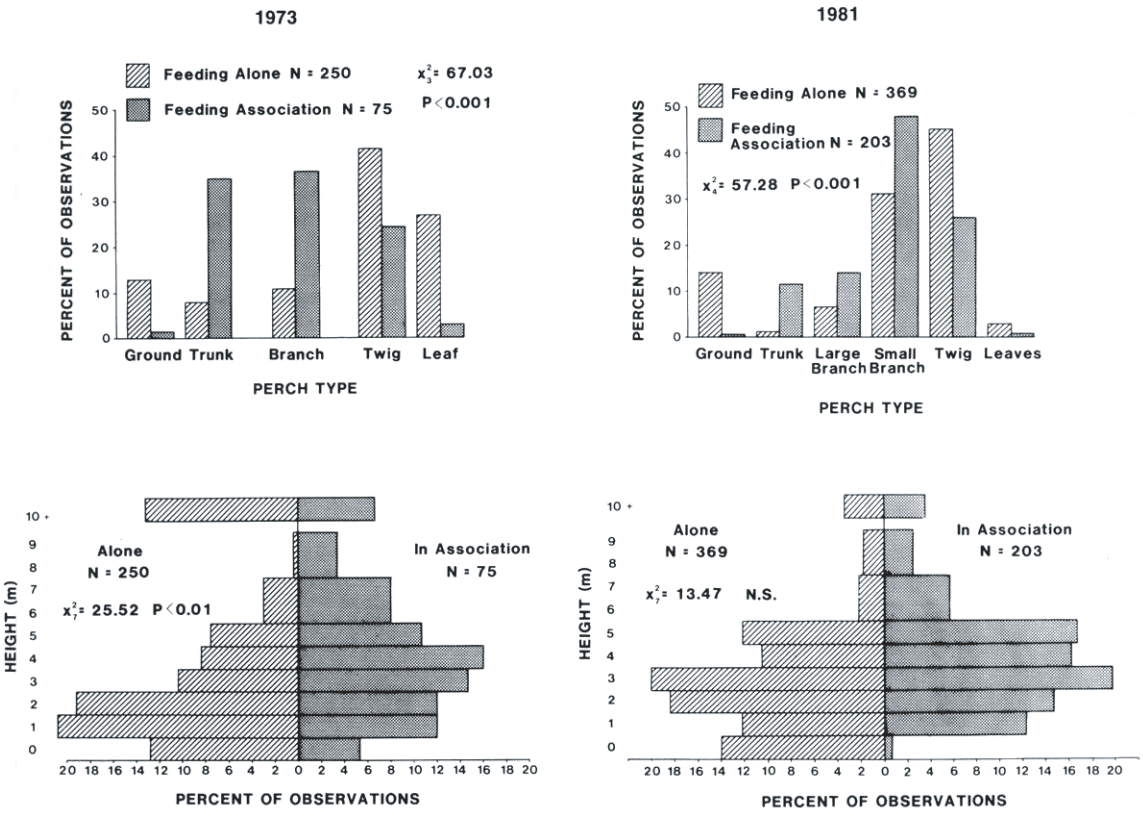

Figure 2: *Perches used by fantails (above) and heights at which fantails perched (below) while feeding alone and* in *association with saddlebacks on Cuvier Island in 1973 (left) and 1981 (right). Ground observations were excluded from statistical analyses as fantails did not feed with saddlebacks on the ground.*

saddlebacks, Jenkins, 1976). In May and August 1973, 32% of 202 initial sightings of fantails were of birds feeding with saddlebacks; in November and December this was 8% of 123 initial sightings, a highly significant difference (x^2 = 24.9, p<0.001). While breeding, fantails return continually to the nest either to incubate or to feed nestlings. Re-finding a saddleback, or locating a new saddleback, may be uneconomic under such circumstances, particularly as prey are probably generally more available during spring and early summer than at other times of year. Reduced rates of feeding associations during breeding may also result from differences in the behaviour of saddlebacks (e.g. reduced activity while breeding, or changes in vocalisation behaviour), and differences in the kinds of prey items disturbed by saddlebacks relative to the non-breeding season. Also, fantails may have specific nutritional requirements which only certain prey types fulfill. It is noteworthy that five of the 10 birds seen in a feeding association during the breeding season were not actively breeding (i.e. were between nests) at the time of the observation.

I have suggested that the feeding association described here is unusual because passerine birds are generally small and inconspicuous. The association appears to occur in this instance because of unusual features of the host bird. Saddlebacks are poor fliers, easily located, occur reliably in a small area, and cause disturbance to surrounding vegetation as they move and feed. Fantails can easily find and remain with them, and obtain flying prey disturbed by the saddleback's activities.

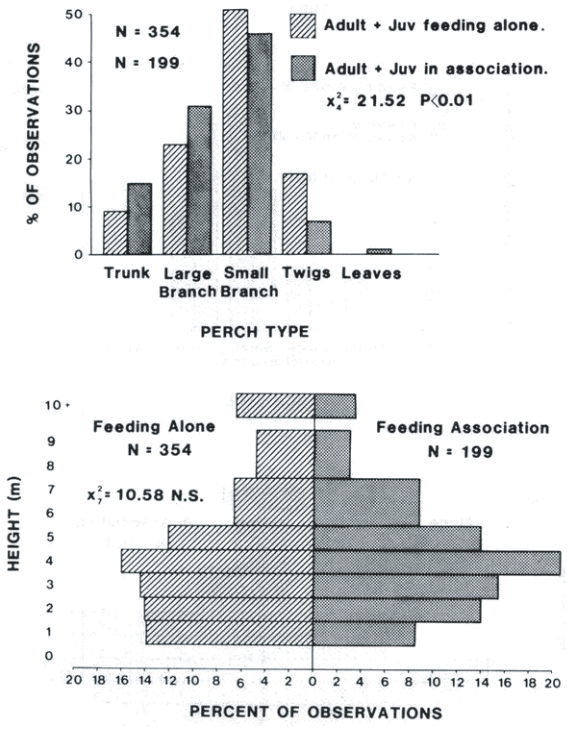

Figure 3: *Perches used by saddlebacks (above) and heights at which saddlebacks perched (below) while feeding alone and in association with fantails on Cuvier Island in 1981. Observations of birds on the ground not included (see text).*

Could saddlebacks benefit from the association? I found no evidence of any benefit. However, those characteristics which make a saddleback easy for fantails to find should also make them easy prey for a predator such as the New Zealand falcon *(Falco novaeseelandiae)*. The distributions of falcons and saddlebacks no longer overlap (Oliver, 1955; Williams, 1976), but it seems likely that some protection from this predator could be provided by a fantail scanning the sky around a saddleback.

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