SOME OBSERVATIONS ON THE DEVELOPMENT OF FEEDING IN CAPTIVE KEA (*Nestor notabilis*)

By H. PHILIP ZEIGLER

ABSTRACT

The feeding behaviour of three young captive Kea was studied over a period of eight weeks following their emergence from the nest. The gradual development of independent feeding over this period reflects continuing changes in the relation of the parent and young with each other and with available food objects. The development of species-typical feeding behaviour involving beak-foot co-ordination was not complete by the 19th post hatching week and appears to require a prolonged period of experience with food objects.

INTRODUCTION

With the exception of naturalistic observations on its diet (Jackson 1966; Clarke 1970) little systematic data is available on the feeding behaviour of the Kea. Through the courtesy of Mr Derek Wood, Director of the Auckland Zoo, I was able to carry out some observations on the development of feeding in three fledgling Keas, hatched at the zoo during the week of 4 August 1974. The study focussed primarily on those changes in the interaction of parrots and young which accompany the development of independent feeding. It was also possible to make some preliminary observations on the development of certain of the Keas' feeding behaviour patterns, particularly those involving the co-ordination of beak and foot which are so typical of Psittacidae (Buckley 1968).

METHOD

Birds were studied in their home cage, an enclosure 17 ft long x 6 ft wide x 9 ft high (5 x 1.8 x 2.7 m), containing a nest box mounted on a stump at one end of the cage, a large sheet metal feeder several feet above the ground at the other end, and several wooden roosts. Data were obtained in 1 hr observation sessions carried out two or three times each week over the first eight weeks after the emergence of the young from the nest box, at which time they were about 11 weeks old. The study was discontinued when the young were transferred to the Kea colony cage at 20 weeks of age. The observation periods were arranged so as to coincide with the one

daily feeding (between 11 a.m. and 1 p.m.). Food was placed at one end of the enclosure approximately six feet from the nest box and included: peanuts, maize, sunflower seeds, greens, fruit (apple, banana, orange). The data were recorded at one minute intervals by an observer outside the cage. Responses to food initiated by the young were recorded as a behaviour sequence (peck, grasp, mandibulate, swallow) in order to distinguish completed from incomplete feeding responses. Other behaviour recorded included: beak contacts between adults and young, initiated by the adults; types of food eaten by young and adults; locations of young and adults; feeding behaviour patterns of young.

RESULTS AND CONCLUSIONS

The quantitative data are summarized in Table 1. Data represent means for the two or three observation periods each week. No data were taken during weeks five and six and data for the last two weeks are combined. To simplify interpretation, all beak contacts with the young initiated by the adults are treated as instances of parental feeding because it was often difficult to decide whether food was being passed.

Table 1

Development of feeding behavior in Kea

Weeks Observ.	Feeding Responses Initiated (Mean)	Feeding Responses Completed (Per Cent)	Parental Feeding (Mean)
1	5	0	41
2	25	50	12
3	59	52	22
4	68	43	5
7+8	87	43	5

It is clear from these data that over the period of observations there was an increase in the average number of feeding acts per hour initiated by the young (without any obvious improvement in feeding efficiency) and a decrease in the feeding of the young by the parents. The gradual development of independent feeding over this period reflects continuing changes in the relation of the young and adult birds with each other and with the available food objects.

Behaviour of the parents

The parental contribution to the development of independent feeding takes at least three forms. First there is the gradual decline in direct feeding of the young by parental regurgitation. Simultaneously, there is a considerable amount of what may be called indirect parental feeding of the young. In the course of their own feeding activities the parents make relatively large quantities of food available to the young either by carrying it directly to the vicinity of the nest box or

by dropping it from perches onto the floor. These behaviour sequences are sufficiently vigorous so that within the first 15 minutes of the observation period substantial amounts of food had been transported to within a foot of the young who were huddled around the nest box. Much of this food had been broken into small pieces or macerated by the parent, making it still more accessible to the young. This indirect parental feeding behaviour declined over the first month or so. As the young became more mobile, the adults would offer bits of food to young on perches. A third contribution to the development of the young's feeding behaviour is the absence of direct adult competition (i.e. by threat or other antagonistic behaviour in the presence of food). Although such behaviour patterns were sometimes shown toward the other adult they were never directed toward the young.

Behaviour of the young

On their emergence from the nest box the fledglings spent most of their time near the box and were almost completely unresponsive to food in their immediate vicinity. The development of independent feeding involves several distinct but overlapping processes. First, there is a gradual increase in locomotion, including both walking and flying, beyond the vicinity of the nest box. In the early part of this period, food encountered en route is ignored. By the end of the 4th week of observation (15th week posthatching) all three young moved easily through all parts of the cage, joining the adults at the front of the cage when food was presented. Second, there is a gradual increase in the initiation of responses to food objects, and in the variety of foods which will elicit such responses. Finally, although it is not evident from Table 1, there is a gradual improvement in the proficiency of the young's feeding behaviour. This is obscured somewhat by the fact that they are simultaneously starting to take new types of food and must develop proficiency with each of the specific foods. (Peanuts and carrots, for example, require very different feeding behaviour).

Development of species-typical feeding behaviour patterns

Adult Kea, like other parrots, have several distinctive modes of feeding. Peanuts and sunflower seeds are husked while being held in the bill. Fruit and greens, including carrots, are impaled on the upper mandible while the tongue and lower bill are moved up and down in a rasping, scraping movement. Their most striking feeding behaviour patterns involve the coordination of beak and foot, either for holding the food down while it is being nibbled or for holding the food in one foot while bringing it into contact with the beak.

Within the 8 week period covered by these observations, none of these feeding behaviour sequences was carried out by the young with a proficiency approximating that of adults. Peanuts and sunflower seeds were usually picked up and dropped without husking. Mandibulating of larger foods held in the beak was only beginning to approximate the typical "rasping" pattern. By the eighth week two birds were making rather clumsy use of the foot to hold an

object down while the beak was brought to it. However, the lack of coordination between beak and foot was striking and the bird would sometimes keep its foot on one object while bringing its beak down to nibble at an adjacent object. Finally, even by week 8 (post hatch week 19) none of the young showed the characteristic adult pattern of holding a food object in one foot and eating it, either while on the floor or while perched on a roost. Our observations suggest that the acquisition of these species-typical feeding behaviour patterns requires a prolonged period of experience with food objects. Further data on the time course of this process would be of interest.

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Professor H. P. Zeigler,

Department of Psychology,
Hunter College (City University of New York,
& Department of Animal Behavior,
American Museum of Natural History,
New York City, N.Y. 10024, U.S.A.

Present address:

Department of Psychology,
University of Auckland,
Private Bag,
Auckland, New Zealand