

Sky-dancing as an Honest Criterion of Mate Choice in Montagu's Harrier *Circus pygargus*

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ABSTRACT

Mate choice is one of the more interesting parts of the life cycle in many species of animals. Different species have quite different signals of honest advertising at the time of pair formation. The chief object is the transfer of information about individual quality. Therefore this behaviour, or phenotypic cues, must be difficult to fake. The Montagu's Harriers observed performed special kinds of aerial displays known as sky-dancing. This is difficult to fake because males in better condition display more frequently than males in poor condition. Similarly, courtship feeding is important for pair formation in this species because better fed females start to lay eggs earlier.

The field study was performed in eastern Poland in the Chelm marshes on an individually marked population of Montagu's Harrier in two nature reserves "Bagno Serebryskie" and "Roskosz", between 1992 and 1995.

Data from this study showed that sky-dancing was the most important criterion of mate choice in Montagu's Harriers. Males in good condition were chosen first by females and their young started to fly earlier. Thus sky-dancing provided honest information to a female about a male's condition and his quality.

INTRODUCTION

Sexual selection favours costly and difficult to fake phenotypic traits which reflect the high genetic quality of the male (Kodric-Brown & Brown 1984; Veiga 1993). This hypothesis has been confirmed by many authors. Males of many species of birds advertise good condition by vigorous displays (Simmons 1988a) or specific phenotypic cues such as length of tail in widowbirds (Andersson 1982) or long rectrices in swallows (Moller 1988). Sky-dancing is observed in Montagu's Harriers *Circus pygargus* to show their good condition

(Simmons 1988; Pandolfi & Barocci 1994). This element of courtship behaviour is difficult to fake because males in better condition display more frequently than males in poor condition. Aerial displays are honest information for females about the quality of males. These displays are made by both sexes. However, males display more often and more vigorously than females. Sky-dancing is also linked to courtship feeding. These transfers of food occur in the air or on the ground (Pandolfi & Pino D'Astore 1990). Better fed females start to lay eggs earlier (Wiacek 1997). The aim of this work was to show that:

- aerial displays of harriers are an honest criterion of mate choice,
- males in good condition are chosen first by females,
- the young of the “best dancers” are able to leave the nest earlier because their feathers grow faster.

STUDY AREA AND METHODS

Montagu's Harriers were observed on calcareous marshes of the Chelme region in eastern Poland from 1992 to 1995, in two nature reserves: “Roskosz” and “Bagno Serebryskie”. The marshy landscape of the reserves is dominated by sedge *Cladietum marisci* in which the birds built their nests. Pairs of harriers were caught, ringed and individually marked. The field observations were performed near harriers' territories from distances of 100-150m, using 10x50 binoculars. Observations were conducted after arrival at breeding places until the beginning of egg laying. Every day birds were observed from 7 a.m. to sunset. In the pre-laying period of sky-dancing, the number of sequences and aerial evolutions were measured. In the incubation period nests were checked every week. Nestlings were weighed and their primaries (I and V) measured.

RESULTS

Sky-dancing was observed from the first day after arrival of the harriers at their breeding places. It has been described in the literature (Cramp & Simmons 1980; Clarke 1996). Simmons (1990) showed the general scheme of this behaviour in the harriers' pre-laying period. The most important element of displays are U-shaped evolutions performed by both sexes in long sequences. During the incubation period sky-dancing was observed only occasionally. The sequences of aerial displays were terminated by food transfer, copulation, flight play or communal soaring. In the time of this study (1992-95) marked males performed 376 sequences which included 2044 U-shaped evolutions. Their females performed only 70 sequences containing 258 evolutions. Males performed on average 5.4 evolutions per sequence. Females performed on average 3.7 evolutions per sequence. Most intensive sky-dancing was observed between 9.00 and 10.00 a.m.. I observed a big difference between males in the number of aerial displays. Most intensively displaying males were chosen first ($r = 0.68$, $p < 0.01$, $n = 22$). Female sky-dancing was behaviourally connected with courtship by their mates.

During nest checking, the first and fifth primaries of nestlings were measured. These feathers grew faster in young harriers from broods of most vigorously displaying males ($r_1 = 0.78$, $p < 0.001$, $n = 27$; $r_v = 0.92$, $p < 0.001$, $n = 27$).

DISCUSSION

Harriers, like most European birds of prey, perform many kinds of flights and aerial displays connected with pair formation. For example, similar behaviour was observed in Golden Eagles *Aquila chrysaetos* (Collopy & Edwards 1989), Black Kites *Milvus migrans* (Brown 1976) and Gyrfalcons *Falco rusticolus* (Platt 1989). Aerial displays are a characteristic form of courtship behaviour in harriers too (Simmons 1988, 1990; Pandolfi & Barocci 1994; Wiacek 1997a). Sky-dancing is the most typical behaviour for all harrier species in the world. These aerial displays are the main influence on pair formation and are a basic criterion of mate choice, apart from courtship feeding (Simmons 1988a; Pandolfi & Pino D'Astore 1990, 1994; Wiacek 1997) and aggressive behaviour of males (Pandolfi & Pino D'Astore 1992).

Montagu's Harriers displayed most intensively between 9.00 and 10.00 a.m.. The same peak of courtship activity was described by Clarke (1996). In the Italian population of this species, the peak of aerial displays was observed near noon (Pandolfi & Barocci 1994).

Sky-dancing performed vigorously by a male Montagu's Harrier reliably reflected information about his good condition and quality. Females' choice in the early stages of the breeding cycle was mainly based on male displaying. Similar conclusions were reached by Arroyo (1995) in the Spanish population and by Simmons (1990) in the African Marsh Harrier *C. ranivorus*. Sky-dancing is an honest criterion of mate choice in monogamous populations of Montagu's Harrier in Poland (Wiacek & Koziol 1997) and polygynous populations of the Hen Harrier *Circus cyaneus* in Canada (Simmons 1988a).

My data showed that primaries I and V in young harriers from nests of "good dancers" grew faster than in the young of poorly displaying males. Thus genetic offspring of good displaying fathers can start to fly earlier than other young. Especially these last data confirm that sky-dancing is honest information to a female about the genetic quality of a male.

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