

Nest-site requirements of buzzard pairs (*Buteo buteo*)

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ABSTRACT. *Nest-site requirements of buzzard pairs (Buteo buteo).*— Many studies have dealt with nest-site requirements in raptors, showing a great variability within a species or within a population. This paper gives data on nest-site requirements within pairs, in a species classified as versatile in its nesting habits: the buzzard. Physiological features were noted at buzzard nests and buzzard territories were determined. Analysis illustrates that nests within the same territory are very similar compared to nests of different territories for the considered parameters: tree species, height from the ground, distance to the nearest woodland edge and relative height of the nest within the tree. Even if a species is versatile in its nest-site, this paper shows that pairs have strong requirements to build nests of the same physiognomy. This leads to think that the buzzard could have a searching mental image of a certain physiognomy of nest.

KEY WORDS. Nest-site physiognomy, *Buteo buteo*, Nest-site requirements of pairs, Mental image

Introduction

The uniqueness of birds with respect to habitat choice was discussed by Hilden (1965) who distinguished between the ultimate and the proximate factors involved in this choice. These factors are still invoked when studying habitat selection (Cody, 1985), but although they explain the presence of a species in a habitat, they do not take into account the significance of such a choice for the bird (Klopfer & Ganzhorn, 1985). The aim of the paper is to understand which choices are involved in nest-site selection in a raptor species: the common buzzard *Buteo buteo*. The question is: what motivates the buzzard in its choice of nest site? The underlying assumption advocates nest-site requirements specific to each pair. This hypothesis is quite new because nest-site requirements are most often considered within a species or within a population (Janes, 1985). The buzzard was chosen because of the apparently low requirements to select a nest-site over a whole population (Brown, 1976).

Material and Methods

Three areas were chosen:

- a) Forest of Bouconne (2300 ha, close to Toulouse, France): the vegetation is composed mainly of big oaks *Quercus pedunculata*, *Q. sessiliflora* and *Q. lanuginosa* and pines *Pinus sylvestris*, *P. pinaster*, mixed with hornbeam *Carpinus betulus*, chestnut *Castanea sativa*, ash *Fraxinus excelsior*, maple *Acer campestre*, lime *Tilia platyphyllos* and wild service tree *Sorbus aria*. Undergrowth is composed of hawthorn *Crataegus* spp., blackthorn *Prunus spinosa*, broom *Sarothamnus scoparius* and heather *Erica* spp. The forest is subject to logging so some areas are unsuitable for nesting buzzards.
- b) Woods surrounding the forest of Bouconne: the woods were to the east of the forest and never exceed 80 ha. The vegetation is mainly composed of the same species but *Q. pedunculata* is more abundant and pines are almost completely absent. Even if the choice of the tree species is reduced by the absence of pines, it does not influence the other characteristics involved in nest-site selection.

c) Hornachuelos Natural Park (near Córdoba, Spain): mediterranean xerophytic woods presenting abundant ground vegetation of grass pastures and bushes. *Q. ilex*, *Q. suber* and *Q. pedunculata* formed mixed woods, of varying density, scattered, sometimes pastured with an undergrowth of Cistaceae, Terebinthaceae.

Buzzard nests were identified in the forest of Bouconne and in the surrounding woods in 1989 and 1990 by systematic prospection on foot in winter, when the trees had no leaves. Frequent visits were made to each nest to see if they had been relined and maintained and if any buzzards were defending it.

Behavioural observations of buzzard pairs (territorial flights and high perches, as described in Picozzi & Weir, 1975) were used to determine the approximate buzzard pair territory and to estimate how many nests were present in each territory. There were usually 1-5 nests in one territory (Bayle & De Ruffray, 1980) the nests being about 100 m apart within a given territory of about 200 ha for the forest of Bouconne (Hubert, 1989).

The territory is defined as "the space in which the owners are opposed by certain behaviour or signals to the intrusion of other individuals" (Richard, 1970).

Only territories having more than one nest were considered here, in order to examine nest-site requirements in each pair.

At each nest, tree species, height from the ground, distance to the nearest woodland edges and relative height of the nest within the tree, were noted.

At Hornachuelos Natural Park, some nests were known to be occupied at least once by a buzzard pair. Considering the very close distance between some nests (<50 m), groups of nests were assumed to be on the same territory. The same parameters were noted for each buzzard nest, except the distance to edges which cannot be considered as meaningful because of scattering of the forest patches.

Results

In the forest of Bouconne, 68 nests were found, but only 24 nests (35%) were defended at least once by a buzzard pair. Other nests being either defended by black kites (31%) *Milvus migrans*, accipiter (4%), booted eagle *Hieraaetus pennatus* (1%), or showed no evidence of occupation or defence by any species (28%). Pairs A, B, C, D and E (table I) are nesting in this habitat. In the woodlands, 29 nests were found: 20 nests (69%) were defended at least once by a buzzard pair. Other nests being either unoccupied (27%) or occupied by goshawk (3%) (*Accipiter gentilis*), by black kites (30% of these nests being first defended by buzzard pairs and in the same year or in the following year occupied by black kites). Pairs F, G, H, I, J (table I) are nesting in this habitat.

In Hornachuelos Natural Park, six nests were found and were known to be occupied by buzzards. Three nests were belonging to the same territory and two other nests to a second territory. Pairs K and L (table I) are nesting in this habitat but these nests were excluded from the statistical analysis because of the particular landscape, incomparable with both other areas.

Table I shows that inside the same territory (mentioned by a letter), there can be two, three or four nests. All of the nests belonging to the same pair exhibit the same characteristics for the described variables: nest tree species, height of the nest, distance to the nearest edge, relative height of the nest within the tree. In order to emphasize the great similarity existing between the nests located inside the same buzzard territory, descriptive statistics have been achieved: Correspondence Factor Analysis (CFA) was conducted on the data after complete disjunctive coding (fig.1). The five first factors accounted for a 85% of the total variability. This figure allows recognition of nests belonging to the same pairs, most of the nests of the same territory being close on the graph.

TABLE I. Location of Buzzard nests within the same territory in the study areas.
 [Localización de los nidos de ratonero común en un mismo territorio de las áreas de estudio.]

Study areas	Buzzard pairs	No of nests	Nest tree	Height (m)	Relative height within the tree	Distance to edge (m)
FOREST OF BOUCONNE	A	A1	Pine	18	3/4	100
		A2	Pine	17	3/4	150
		A3	Pine	18	3/4	150
	B	B1	Oak	12	2/3	175
		B2	Oak	11	2/3	190
		B3	Oak	11	2/3	160
		B4	Oak	12	2/3	188
	C	C1	Pine	12	1/3	100
		C2	Pine	14	1/3	100
		C3	Pine	9	1/3	100
	D	D1	Pine	16	2/3	180
		D2	Pine	17	3/4	200
E	E1	Pine	12	1/2	60	
	E2	Pine	14	1/2	70	
	E3	Pine	14	1/2	50	
WOODS AROUND THE FOREST OF BOUCONNE	F	F1	Oak	8	1/2	10
		F2	Oak	10	1/2	20
		F3	Oak	10	1/2	15
G	G1	Oak	12	1/2	25	
	G2	Oak	12	1/2	30	
H	H1	Oak	11	3/4	10	
	H2	Oak	14	3/4	4	
I	I1	Oak	16	2/3	30	
	I2	Oak	15	2/3	30	
J	J1	Oak	11	1/2	20	
	J2	Oak	9	1/2	20	
K	K1	Holm Oak	6	2nd branch	—	
	K2	Holm Oak	6	2nd branch	—	
L	L1	Cork-Oak	5	branch tip	—	
	L2	Cork-Oak	6	branch tip	—	
	L3	Cork-Oak	6	branch tip	—	

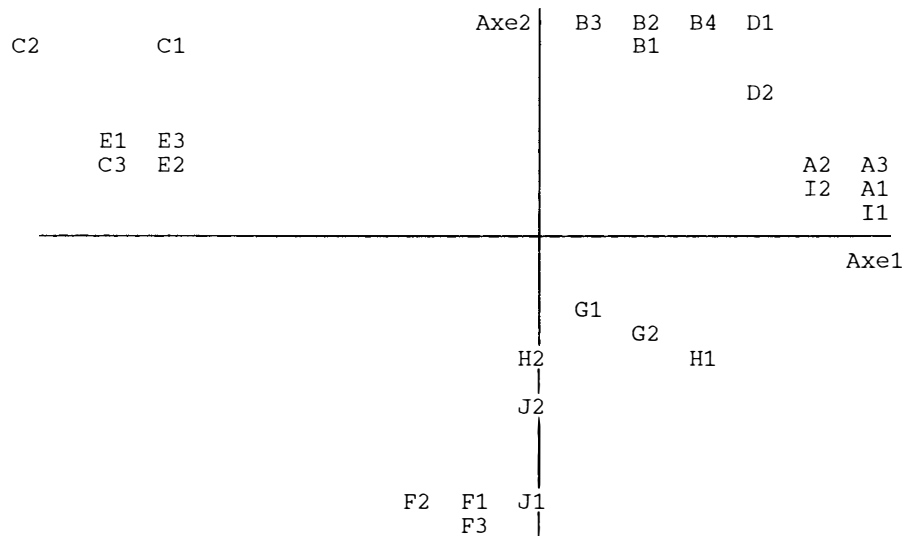


FIGURE 1. Correspondance Factor Analysis on characteristics of Buzzard nests (height, nest-tree species, relative height of the nest in the nest, and distance to the woodland edge). The nests belonging to the same pair are indicated by the same letter.

[Análisis factorial de correspondencias sobre las características de los nidos de ratonero común (altura, especie de árbol elegida, su situación relativa dentro del árbol y distancia a la orilla). Los nidos pertenecientes a la misma pareja se designan con la misma letra.]

A dendrogram (fig. 2) has been constructed from nests location in the space generated by the first five factors. The dendrogram allowed to recognize nests belonging to the same territories. The analysis illustrates that nests within the same territory are very similar compared to nests belonging to different territories. Then, in spite of the possible diversity of nest locations in the woodlands, we noticed a great similarity of nest physiognomy, according to the parameters considered, within the territory of a given buzzard pair.

Discussion

The buzzard is, after the kestrel *Falco tinnunculus*, the most abundant raptorial species in the Western Palearctic (Gensböl, 1984) and many nest-site preferences have been described: in Limousin (center of France, Nore, 1979) oak is the preferred species for nesting (50% of 252 nests

were on oaks); on the Saone plaine (France), oak supports 78% of the nests (Roche, 1977). In Finland, buzzards usually nest in spruce (66%) but pine (22%) and birche (10%) are also accepted (Solonen, 1982). In Snowdonia (North Wales, U.K., Dare, 1989) 37% of the total pairs used only rock sites and 53% used trees with a preference for oak (55% of tree nests being in oak). In Scotland, there are as many nests in crags as in trees (Brown, 1976). Picozzi & Weir (1974) in Scotland, Dare (1961) in Devon (U.K.) and Joenson (1968) in Denmark described a preference of buzzards for pines over deciduous trees. In Souabe Jura (Germany) Rockenbauch (1975, in Bayle & De Ruffray, 1980) shows that beech supports 70% of 378 nests. And Melde (1973) even notes buzzards nesting on pylons in Germany.

Roche (1977) observed the composition of tree species in his studied forests to determine whether the buzzard chooses one species preferentially. He showed that nest location choice is independent of

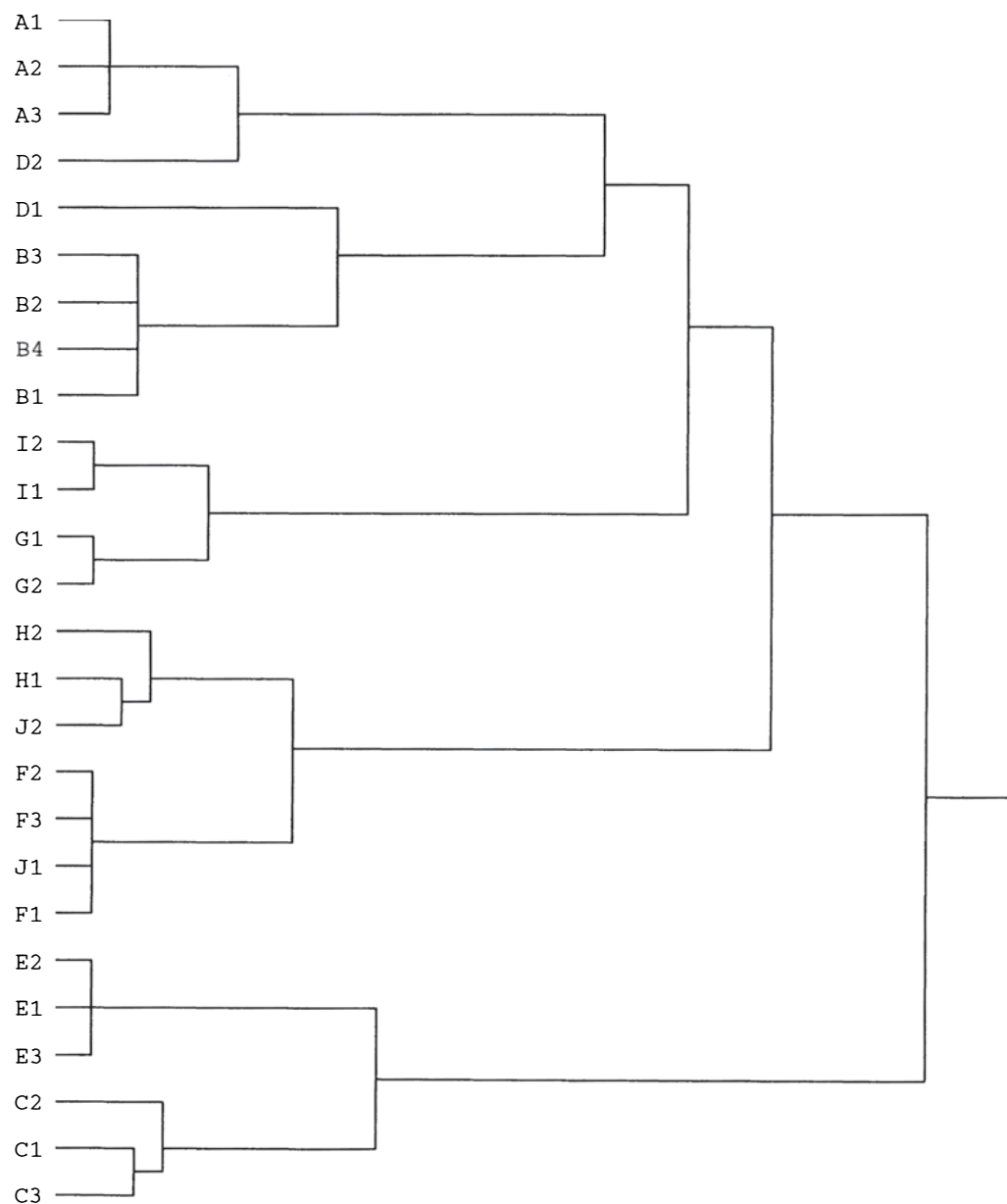


FIGURE 2. Dendrogram constructed from the CFA analysis. Nests belonging to the same pair are indicated by the same letter.
[Dendrograma construido a partir de la AFC. Los nidos pertenecientes a la misma pareja se designan con la misma letra.]

the tree species: the tree just needs to have an adequate size and shape. Solonen (1982) concluded in a same way that "the decisive factor in nest-site selection was probably simply the relative strong and safe base for the nest", and Moore (1957) summarized that "the buzzard is a generalized unspecialized species in its feeding habits and in its nesting habits".

Even if the buzzard species does not seem to require anything other than a strong and safe base to nest, it appears from our results that a buzzard pair, when building several nests, builds them all with the same physiognomical features. Furthermore, Joenson (1968) noticed in his study on buzzards that when there were 3-5 nests close together, they were very similar as to size, height above the ground, location in the tree and other characteristics. In the same way, Nore et al. (1990) noted that most buzzard pairs build, year after year, a nest similar to that of the previous spring (e.g. in a wood, at the tip of a branch, at the top of a truncate tree, at the departure of a lateral branch, covering a large surface area).

This led the thinking that the buzzard pair does not look for just any fit breeding place anywhere, but could have a searching mental image of a certain physiognomy of nest (Curio, 1976). According to the literature on imprinting (Hess, 1973), the searching image of the first breeding site could be comparable to that of the breeding site (Hess, 1964; Hilden, 1965; Herlugson, 1981) or to that of the site where the post-fledging period was spent (Catchpole, 1972; Brewer & Harrison, 1975). On the other hand, the searching image of the nth breeding site could be dependent on all the n-1 breeding attempts if we accept a certain development of the mental image (Catchpole, 1972; Herlugson, 1981; Newton & Marquiss, 1982; Thompson & Hale, 1989; Court et al., 1989).

Many studies have dealt with habitat selection in raptors, showing a great variability for nest-site requirements between species (Schipper, 1979; Titus & Mosher, 1981; Apfelbaum & Seelbach, 1983; Schmutz, 1984; Bechart et al., 1990) and among the same species (Orians & Kuhlman,

1956; Matray, 1974; Platt, 1974; Lokemoen & Dubbert, 1976; Morris et al., 1982; Tjernberg, 1983; Bohall-Wood & Collopy, 1986; Kostrzewa, 1987; Sieg & Becker, 1990; Gargett, 1990). Although nest-site selection in a population is explained by the evolutive consequences, it does not explain the variability of habitat selection when considering a population. Even if a species is versatile for its nest site, this does not mean that the individuals are too. Individual choices and previous experiences have to be taken into account to achieve a fuller comprehension of nest-site selection.

Resumen

Características del lugar del nido seleccionadas por parejas de ratonero común (Buteo buteo).

Numerosos estudios analizan los requisitos de las rapaces para la nidificación, poniendo en evidencia tanto una variabilidad intraespecífica como intrapoblacional. Se presentan datos sobre el ratonero, especie clasificada como poco exigente en la elección del lugar de nidificación. Se describen las características fisonómicas de cada nido y los territorios de las parejas que han podido ser determinados. Los análisis revelan que los nidos situados en un mismo territorio son muy similares a los de otros territorios considerando los parámetros siguientes: distancia al lindero de un bosque, altura del nido, situación relativa dentro del árbol, y especie de árbol elegida. Aún siendo esta especie versátil en cuanto al lugar de nidificación, este estudio revela que las parejas construyen siempre el mismo tipo de nido, por lo que se puede pensar que el ratonero poseería una representación mental de un nido con una fisonomía particular.

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