

A study of group structure and home range size of *Crotophaga ani* and *Gira gira* in São Paulo, Brasil (Cuculiformes: Cuculidae)

Franco Leandro Souza*

Universidade Estadual Paulista, Departamento de Zoologia, Rio Claro, SP, Brasil

Recebido em 2 de junho de 1993; aceito em 5 de março de 1995

RESUMO. Um estudo sobre a estrutura de grupo e o tamanho da área de vida de *Crotophaga ani* e *Gira gira* em São Paulo, Brasil (Cuculiformes, Cuculidae). A estrutura do grupo e o tamanho da área de vida de um grupo do anu-preto, *Crotophaga ani*, e um grupo do anu-branco, *Gira gira*, foram estudados em Ribeirão Preto (21°10'S, 47°52'W), São Paulo, de julho de 1989 a julho de 1990. Uma área de vida menor e um maior distanciamento entre os membros, mantendo-se espalhados pela área durante o forrageio, foi o padrão observado para *C. ani*. Diferentemente, *G. gira* apresentou uma área de vida maior, com os membros do grupo mantendo-se sempre unidos em um único grupo ou vários subgrupos. Esses comportamentos distintos poderiam indicar diferenças na exploração do hábitat, que permitem a simpatria entre as duas espécies.

PALAVRAS-CHAVE: anus, área de vida, *Crotophaga ani*, Cuculidae, estrutura de grupo, *Gira gira*, sudeste brasileiro.

KEY WORDS: *Crotophaga ani*, cuckoos, Cuculidae, group structure, *Gira gira*, home range, southeastern Brazil.

Neotropical cuckoos (subfamily Crotophaginae: *Crotophaga sulcirostris*, *C. major*, *C. ani*, and *Gira gira*) associate in groups, whose main behavioral features are related to both communal nests (Davis 1940a, b, 1941, 1942, Vehrencamp *et al.* 1986) and gregarious life (Sick 1985). Within the subfamily, the complexity of both behaviors differs.

Common mainly in open habitats with low vegetation (grasslands, field, and gardens) and so benefiting from human presence, *C. ani* (Smooth-billed Ani) and *G. gira* (Guira Cuckoo) have been extensively observed with relation to feeding behavior (Pereyra 1927, Moojen 1942, Schubart *et al.* 1965, Wunderle 1981, Gallardo 1984, Visscher and Moratorio 1984), prey capture techniques (Moojen 1942, Willis 1983, Visscher and Moratorio 1984, Sick 1985), and nesting habits (Davis 1940a, b, 1942, Cavalcanti *et al.* 1991, Macedo 1992). However, no attention has been given to group structure and home range size. Here we present the results of a study of two ani species as a contribution to the understanding of such behavioral aspects.

STUDY AREA AND METHODS

From July 1989 to July 1990, a group of 21 *C. ani* and a group of 15 *G. gira* were observed in Ribeirão Preto city (21°10'S, 47°52'W), southeastern Brazil, at an urban area belonging to São Paulo University. Little of the natural vegetation that once covered the 580 ha area remains, mainly to the action of man (buildings and deforestation). Despite attempts at reforestation with both native (*Piptadenia* sp.) and exotic species (*Pinus* sp., *Eucalyptus* sp.), the area is now covered by broad gardens with grassy and ornamental plants (*Caesalpinia* spp., *Cassia* spp.), and an artificial lake. The climate is tropical, hot and humid with well defined rainy (September-March) and dry seasons (April-August). Annual rain fall is about 1,400 mm.

It was not necessary to band some individuals to ensure that the observed flocks were exactly those of the study. Although there were several flocks in the area, each group had a fixed sleeping site (pers. obs.) and hence, the daily observations were made by following them from the moment they left the roosts in the morning. Following the scan sampling method of Altman (1974), group structure (*i.e.* the spatial distribution

* Correspondence address: Rua Guatambu 626, 14040-160 Ribeirão Preto, SP, Brasil.

of the birds) was recorded at 20 minute intervals during 1 hour. For both species, 25 one hour sampling periods were realized. To estimate home range size, locations in which groups were observed were plotted on maps of the study area.

RESULTS

For both behaviors studied, differences were observed between the two species. In the *G. guira* flock, individuals kept more aggregated and associated, constituting a single group or, some times, splitting into subgroups (generally composed of two or more individuals, seldom one) that traversed the area while foraging (figure 1A). The distance between flock members was short (a few millimeters, at times in physical contact). Conversely, individuals of the *C. ani* flock remained more scattered (figure 1B), moving slowly while foraging. In this species, individual distance was larger, reaching up to 160 m.

Guira Cuckoo home range size was greater (45.4 ha) than Smooth-billed Ani's (26.0 ha), with a large overlapping zone (figure 2).

DISCUSSION

In general, group formation is related to risk reduction of some flock member to be attacked by predators (Powell 1974), decrease of time spent against predators (Powell 1974, Caraco 1979a, b, Barnard 1980, Monaghan and Metcalfe 1985) or increase of likelihood of finding food (Krebs *et al.* 1972). All these advantages, which depend upon the presence in the group

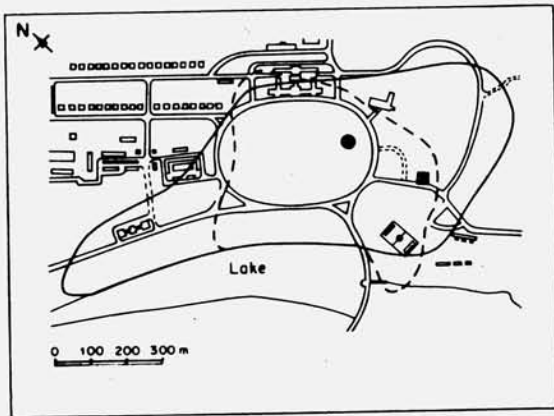


Figure 2. Home range size verified for *Guira guira* (—) and *Crotophaga ani* (---) from July 1989 to July 1990 in Ribeirão Preto city, São Paulo University campus. Symbols ■ and ● represent sleeping sites of *G. guira* and *C. ani*, respectively.

of a sentinel (Loflin 1983 *apud* Macedo 1992), would favor a longer distance between members of a *C. ani* group, and thereby avoid competition for prey.

In *G. guira*, individuals seldom searched for food alone but in a single group or subgroups. In addition to the advantages mentioned above, the presence of a hierarchy favors this behavior. Mariño (1989) observed that captive Guira Cuckoos exhibited dominance and submission relations while feeding. Thus, the subgroups could be composed of birds of different hierarchical rank (Baker 1978, Monaghan and Metcalfe 1985), which could reduce intraspecific food competition. Further observation would be necessary for an accurate proof of such relations among flock members.

The differences in *C. ani* and *G. guira* home range sizes may be related to their habitat exploitation. Vertical habitat partitioning is one of strategies exhibited by many animal communities that make possible different species coexistence (Cody 1968, Willson 1974, Whitten 1981). Souza (1990) observed that frequently *C. ani* caught insects in trees crowns and shrubs, a behavior not observed for *G. guira*. Thus, *G. guira* exploits a bidimensional habitat (*i.e.*, ground) while *C. ani* explores a tridimensional habitat (*i.e.*, ground + trees and shrubs) and therefore requires a smaller home range.

According to Willis (1983), *C. ani* generally is associated with wet environments, and during ground foraging uses its high bill to push blades upward and out of the way. Living syntopically with *G. guira*, such morphological adaptation, jointly with the behavioral differences here noticed, would permit both species to partition the available resources.

ACKNOWLEDGMENTS

The author is grateful to E. O. Willis, R. B. Cavalcanti, W. R. Silva, and an anonymous reviewer for commenting on the manuscript; to Richard Ward for revising the text, and to Marcos R. Souza for the diagrams.

REFERENCES

- Altmann, J. (1974) Observational study of behavior: sampling methods. *Behavior* 49:227-267.
 Baker, M. C. (1978) Flock and feeding in the great tit *Parus major* - an important consideration. *Am. Nat.* 112: 779-781.
 Barnard, C. (1980) Flock feeding and time budgets in the house

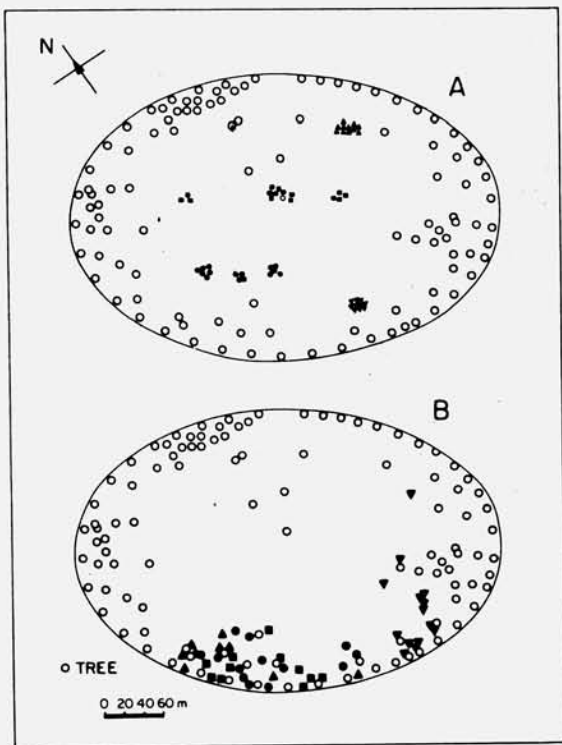


Figure 1. Spatial distribution diagrams observed for *Guira guira* (A) and *Crotophaga ani* (B). Each symbol represents a group member. Same symbols represent occupied position by each group member at the sampling moment (realized at 20 minutes intervals during a sampling period of 1 hour). Sampling moments sequence: ▼, ●, ■, ▲.

- sparrow (*Passer domesticus*). *Anim. Behav.* 28:295-309.
- Caraco, T. (1979a) Time budgeting and group size: a theory. *Ecology* 60:611-617.
- (1979b) Time budgeting and group size: a theory. *Ecology* 60:618-627.
- Cavalcanti, R. B., M. R. Lemes and R. Cintra (1991) Egg losses in communal nest of the Guira cuckoo. *J. Field. Ornithol.* 62:177-180.
- Cody, M. L. (1968) On the methods of resource division in grassland bird communities. *Am. Nat.* 102:107-147.
- Davis, D. E. (1940a) Social nesting habits of the Smooth-billed Ani. *Auk* 57:179-218.
- (1940b) Social nesting habits of *Guira guira*. *Auk* 57:472-484.
- (1941) Social nesting habits of *Crotophaga major*. *Auk* 58:179-183.
- (1942) The phylogeny of social nesting habits in the crotophaginae. *Quart. Rev. Biol.* 17:115-134.
- Gallardo, J. M. (1984) Observaciones sobre el comportamiento del pirincho (*Guira guira*), Aves: Cuculiformes. *Revista Mus. argent. Cienc. nat. Bernardino Rivadavia Inst. nac. Invest. Cienc. nat. (Zool.)* 13:167-170.
- Krebs, J. R., M. H. MacRoberts and J. M. Cullen (1972) Flocking and feeding in the great tit *Parus major*: an experimental study. *Ibis* 114:507-530.
- Macedo, R. H. (1992) Reproductive patterns and social organization of the communal Guira Cuckoo (*Guira guira*) in Central Brazil. *Auk* 109:786-799.
- Mariño, H. F. (1989) *A comunicação sonora do anu-branco. Avaliações eco-etológicas e evolutivas*. Campinas: Editora da Universidade Estadual de Campinas.
- Monaghan, P. and N. B. Metcalfe (1985) Group foraging in wild brown hares: effects of resource distribution and social status. *Anim. Behav.* 33:993-999.
- Moojen, J. (1942) Observações sobre a alimentação do anu-preto (*Crotophaga ani*, Linnaeus, Cuculidae). *Bol. Mus. Nac. Rio de Janeiro, Zool.* 4:121-125.
- Pereyra, C. B. (1927) Alimentación de la urraca o pirincho. *Hornero* 4:76.
- Powell, G. V. N. (1974) Experimental analysis of the social value of flocking by starlings (*Sturnus vulgaris*) in relation to predation and foraging. *Anim. Behav.* 22:501-505.
- Schubart, O., A. C. Aguirre and H. Sick (1965) Contribuição para o conhecimento da alimentação das aves brasileiras. *Arq. Zool. S. Paulo* 12:95-249.
- Sick, H. (1985) *Ornitologia brasileira, uma introdução*. Brasília: Editora Universidade de Brasília.
- Souza, F. L. (1990) *Coexistência entre Crotophaga ani (Linnaeus, 1758) (Aves, Cuculidae) e Guira guira (Gmelin, 1788) (Aves, Cuculidae): análise de alguns parâmetros*. Monografia não publicada (Bacharelado). Faculdade de Filosofia, Ciências e Letras de Ribeirão Preto, USP.
- Vehrencamp, R. R., B. S. Bowen and R. R. Koford (1986) Breeding roles and pairing patterns within communal groups of grooved-billed anis. *Anim. Behav.* 34:347-366.
- Visscher, M. N. and M. Moratorio (1984) Notes on the feeding behavior of the Smooth-billed Ani, *Crotophaga ani*. *Gerfaut* 74:71-74.
- Whitten, J. E. J. (1981) Ecological separation of three diurnal squirrels in tropical rainforest on Siberut Island, Indonesia. *J. Zool., Lond.* 193:405-420.
- Willis, E. O. (1983) Anis (Aves, Cuculidae) as army ant followers. *Rev. Brasil. Biol.* 43:33-44.
- Willson, M. F. (1974) Avian community organization and habitat structure. *Ecology* 55:1017-1029.
- Wunderle, J. M. (1981) Avian predation upon *Anolis* lizards on Grenada, West Indies. *Herpetologica* 37:104-108.