

## Evidence for the possible advantage of heterospecific social foraging in *Furnarius rufus* (Passeriformes: Furnariidae)

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**RESUMO.** Socialidade heteroespecífica e evidência quanto a possível vantagem na procura de alimento em *Furnarius rufus* (Passeriformes: Furnariidae). Indivíduos de *Furnarius rufus* são frequentemente observados seguindo grupos de *Mimus saturninus* quando procuram por alimento no chão. A possibilidade de *F. rufus* obter benefícios na presença de *M. saturninus* foi verificada através da eficiência na obtenção de alimento, a partir do registro do ritmo de bicadas ao forragear com e sem *M. saturninus*. Os resultados demonstram um ritmo de bicadas duas vezes maior na condição heteroespecífica. Possivelmente por explorar a socialidade e a vigilância de *M. saturninus*, *F. rufus* disponha de mais tempo para procurar por alimento. PALAVRAS-CHAVE: bandos mistos, forrageamento, *Furnarius rufus*, socialidade, vigilância.

**KEY WORDS:** foraging behavior, *Furnarius rufus*, mixed flocks, sociability, vigilance.

Many foraging birds are constrained by two different activities: efficient food searching, and scanning for predators. An element of surprise is fundamental for a successful attack (Lindström 1989), so the organization of bird mixed species flock can be interpreted as a mechanism to increase predator detection, due to better vigilance (reviewed by Powell 1985). In flocks, individuals exploit each other's vigilance periods although flock vigilance is higher and members acquire both extra protection and time to search for food (Pullian 1973).

A common heterospecific association is observed between *Mimus saturninus* and *Furnarius rufus*. Both species overlap highly in distribution, and are commonly observed foraging. The first species is social, lives in groups of two-eight birds, and sentinels perform the vigilance, while *F. rufus* is less social, and individuals interrupt foraging on the ground to scan for predators (Sick 1985, Ridgely and Tudor 1989, 1994 pers. obs.). As both species inhabit open areas, they are at high risk while foraging on the ground. So, *F. rufus* may improve its alertness by exploiting *M. saturninus* vigilance. Acquiring better protection, *F. rufus* probably can employ more time in foraging.

I evaluated *F. rufus* foraging efficiency by the pecking rate in three field situations: a) when individuals were isolated, b) in homospecific groups, or c) with *M. saturninus*. The possibility of increasing *F. rufus* pecking rate in the presence of *M. saturninus* should explain their

behavior of following *M. saturninus* when foraging on the ground.

### METHODS

I observed the birds from June to September 1996 in Brotas (São Paulo state) near Represa do Lobo (22°10'S, 47°55'W, altitude 750 m), at the edge of a small unpaved 3 Km farm road, that crosses several ranches. The vegetation in this site is represented by low grasses, used as pasture, and scattered trees. I walked randomly along the road from 07:00 to 10:00. When foraging *F. rufus* were at sight, I focused on the most accessible individual. This was done with a 8 x 30 binocullars within a minimum period of 30 s, until the bird was out of sight. The maximum observation period was of six min. I usually observed the birds for one-two min. I dictated observations in a portable recorder for later transcription. When *F. rufus* was found (isolated or in groups), efforts were made to observe each individual only once, so after one observation I immediately switched to another one, when they were in groups. During feeding *F. rufus* swallows without handling food items, therefore during the observations only pecking events against a substrate were recorded. Birds were assumed to be in a heterospecific flock if *F. rufus* followed *M. saturninus* for at least five min. Because *F. rufus* is a very tame

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species, observations within three m were possible. During the morning no more than two flocks, found in different points, were observed, to assure the independence of samples. To the data analysis, each observation of an isolated bird was taken as a replicate. For birds in groups, I used the mean pecking rate of each observed group, to avoid pseudoreplication. As this study was conducted in the dry season, observations after the scarce rains were avoided. Birds were not observed in a stripe of five m near cover. Statistical procedures followed Sokal and Rolf (1981).

## RESULTS AND DISCUSSION

Mean pecking rate for isolated *F. rufus* was  $8.8 \pm 3.6$  (N=13). For conspecific groups (2-3 individuals), it was  $8.2 \pm 3.3$  (N=22). When following *M. saturninus* (N=14), the pecking rate of *F. rufus* was higher ( $17.9 \pm 5.2$ ; Kruskal-Wallis test,  $H=24.11$ ;  $p<0.0001$ ; figure 1), being more than twice the conspecific rate, when data for *F. rufus* feeding

alone or in conspecific flocks are grouped ( $8.4 \pm 3.4$ ; N=35).

Powell (1985) pointed that the surveillance enhancement is a widely accepted hypothesis for bird mixed species flocks adaptative significance. Studies on vigilance in mixed flocks proved that each species reduces its own vigilance, lowering the scan time and/or rate (Metcalf 1984, Beveridge and Deag 1987, Popp 1988). Sullivan (1984) found in *Picoides pubescens* both a reduction in head-cocking and an enhancement in the feeding rate at the expense of *Parus atricapillus* and *P. bicolor* alertness. Carrascal and Moreno (1992) verified advantages to *Parus major* individuals in mixed flocks by the lengthening of the time spent for feeding, as a result of the conversion of vigilance time into feeding time.

Alves and Cavalcanti (1996) studied the sentinel behavior of *Neothraupis fasciata* in cerrado (Brazilian savanna). In mixed flocks, the sentinels of this species watches less than when they are in conspecific groups. *Neothraupis fasciata* is also a facultative cooperative breeder, and in mixed flocks showed to be the nuclear

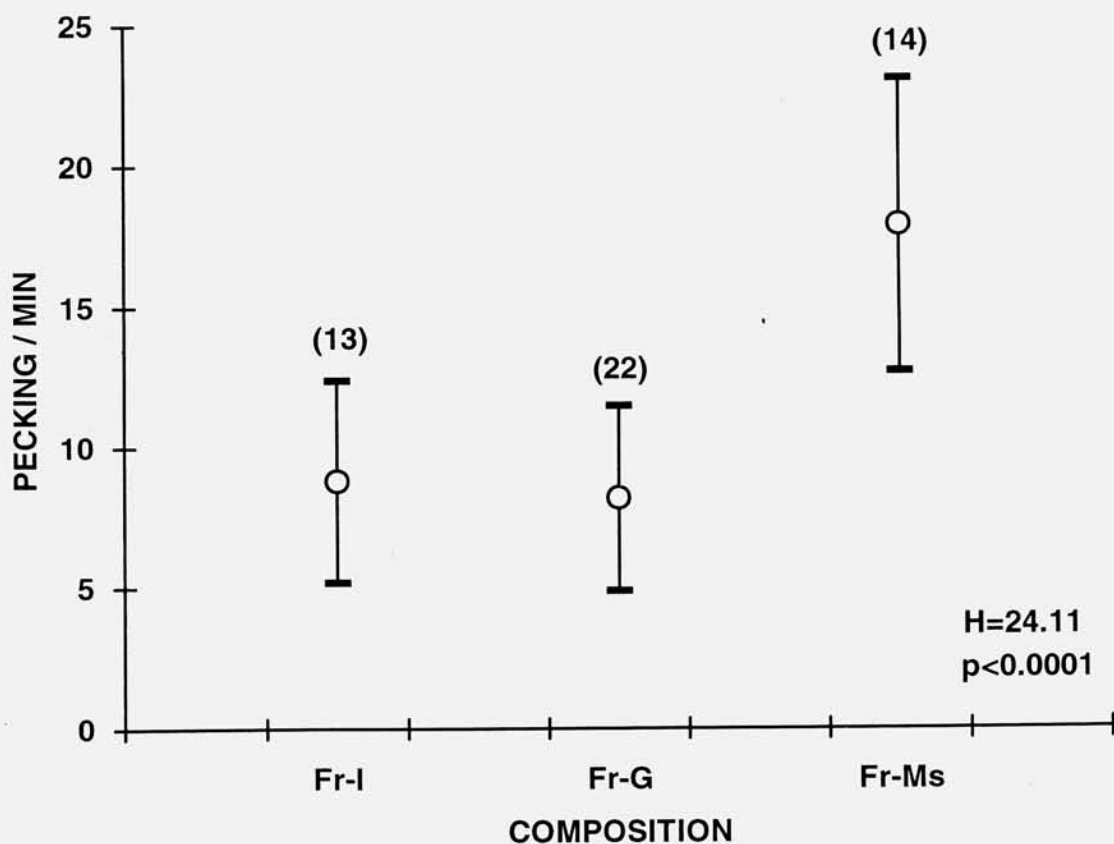


Figure 1. Mean ( $\pm$  s.d.) *Furnarius rufus* pecking rate in the three foraging situations. Sample size above each mean, H value (Kruskal-Wallis test) and probability are also given. (Fr-I: isolated *F. rufus*, Fr-G: 2-3 *F. rufus* individuals, Fr-Ms: *F. rufus* with *Mimus saturninus*).

species (Alves 1990).

In bird mixed flocks, nuclear species are usually followed, instead of following the other species (Moynihan 1962, Munn and Terborgh 1979). Nuclear species also tend to be intraspecifically gregarious, with regard to the attendant species (Powell 1985). The high sociability of nuclear species seems to attract others which exploit much of the nuclear species behavior (Moynihan 1962). In this study *F. rufus* was observed when following *M. saturninus*, a more social species with sentinel behavior. It is important to consider that *F. rufus* could be following *M. saturninus* only for foraging improvement. However, these species searched for prey some meters apart from each other. The niche diversity, the uniform use of habitat and the homogeneous food distribution are also characteristics of neotropical mixed flock ecology (Powell 1985). In this way, the chances of *F. rufus* copying *M. saturninus* feeding behavior to increase its foraging efficiency are remote. Furthermore, I never observed interspecific aggression resulting from prey competition, or *F. rufus* being attracted to a food rich patch where *M. saturninus* was intensely foraging. The absence of these behaviors reinforce *M. saturninus* alertness as a major characteristic as a nuclear species. Although only measurements of a reduction in *F. rufus* vigilance related to an increase in the pecking rate could confirm the advantage of the heterospecific foraging, the conflicting nature of activities such as scanning while foraging suggests that an increase in the pecking rate probably results from a reduction in the scan rate and/or time. So, the results of this study may at least be an evidence of the advantage of *F. rufus* attendant species behavior. This relationship is probably of high value, mainly in the dry season, when food availability probably is reduced and the days are shorter. In this period, at the study site, aerial predators such as *Falco sparverius*, *F. femoralis*, *Elanus leucurus*, *Milvago chimachima* and *Buteo magnirostris*, among others, commonly threatened these birds (pers. obs.), an event also observed in a different area with a *F. femoralis* successful attack (I. Sazima pers. com.).

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