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## SCANNING BEHAVIOR OF FINCHES IN MIXED-SPECIES GROUPS<sup>1</sup>

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*Key words: Vigilance; scanning; Pine Siskin; American Goldfinch; Purple Finches; mixed-species groups.*

One advantage often attributed to group living is that each individual can reduce the time it spends being vigilant without increasing its risk of predation (Pulliam et al. 1982). Individuals in a single species group have been shown to decrease the time they spend scanning as group size increases (Bertram 1980, Jennings and Evans 1980, Elcavage and Caraco 1983, Popp 1987). Effects of heterospecific individuals on vigilance rates in mixed-species feeding groups is not as well understood (Metcalfé 1984, Sullivan 1984, Beveridge and Deag 1987). Are scanning rates affected by the presence of heterospecifics in the same way as by conspecifics and is the effect the same for all species? I investigated this question in mixed-species groups of American Goldfinches (*Carduelis tristis*), Pine Siskins, (*Carduelis pinus*), and Purple Finches (*Carpodacus purpureus*) at a winter feeding station.

### METHODS

The finches were videotaped while on a feeder at Elkhart Lake, Sheboygan County, Wisconsin between 5 January and 20 March 1985. All videotaping was done between 07:00 and 11:00 CST and when weather conditions were sunny, with temperatures between 5 and -10°C and with mild winds. The feeder, stocked with

niger (thistle) (*Guizotia abyssinica*) seeds, was 1.5 m off the ground and had a 7- × 25-cm platform from which the finches could feed. The finches would arrive at the feeder in groups of up to 70 birds. While finches were seen in mixed-species groups away from the feeder, the feeder probably forced individuals of different species into closer proximity than would be normal. Feeders in the study area were, however, a major source of food for all three species (pers. observ.).

Scanning rates (scans/sec) were recorded during the first 50 visits by goldfinches to the feeder in four contexts: when alone, with a conspecific, with a Purple Finch, and with a Pine Siskin. Similar records were collected for the Pine Siskins and Purple Finches. Observations of finches in groups were included only when two birds (modal group size) were at the feeder. A visit was included only if it exceeded 30 sec (visits ranged from 30 to 291 sec). A scan was considered to have occurred when a finch lifted its head to horizontal, sometimes turning it sideways, and then returned to feeding. Scans were nearly instantaneous (i.e., 0.1 sec) in the siskins and goldfinches or slightly longer (0.2 to 0.3 sec) in the Purple Finches. There was little variation in scan duration for any of the species and scan duration was not considered in this study. Data were combined for both sexes because of the difficulty in determining the sexes from the videotapes. Mean scanning rates were compared using ANOVA and Tukey's test for pairwise comparison at a 0.05 family level of significance.

The finches were not color-banded, so it was not possible to ensure that all observations involved different individuals (i.e., that the data were independent).

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TABLE 1. Scanning rates (scans/sec) of finches when feeding alone, with a conspecific or with a heterospecific. Horizontal lines connect means that are statistically indistinguishable by Tukey's pairwise comparisons.

Scanner	Feeding partner			
	Alone	Pine Siskin	Purple Finch	American Goldfinch
American Goldfinch	1.21 <sup>a</sup> (0.16) <sup>b</sup>	0.82 (0.13)	0.67 (0.14)	0.63 (0.11)
Purple Finch	1.09 (0.10)	0.89 (0.15)	0.75 (0.09)	0.78 (0.12)
Pine Siskin	0.99 (0.14)	0.67 (0.15)	0.65 (0.15)	0.64 (0.12)

<sup>a</sup> Mean.

<sup>b</sup> Standard deviation.

Certain factors, however, suggest the data were not based on only a few individuals. First, groups at the feeder often contained large numbers of individuals and secondly, more than one group of finches was present in the study area.

## RESULTS

The scanning rates of American Goldfinches were significantly heterogeneous across social contexts ( $F = 134.01$ ;  $df = 3, 196$ ;  $P < 0.001$ ) (Table 1). In all cases, scanning rates were significantly lower when feeding with another individual than when feeding alone. Scanning rates were lowest when feeding with a conspecific or a Purple Finch, and were significantly higher when feeding with a siskin.

The pattern of scanning rates for Purple Finches was similar to that of the goldfinches. Overall, scanning rates were significantly heterogeneous ( $F = 84.36$ ;  $df = 3, 196$ ;  $P < 0.001$ ) (Table 1). Scanning rates were significantly higher when feeding alone than when with another individual. Rates were lowest when feeding with a conspecific or a goldfinch and were significantly higher when feeding with a siskin.

Scanning rates for Pine Siskins were significantly heterogeneous ( $F = 73.45$ ;  $df = 3, 196$ ;  $P < 0.001$ ) (Table 1). Rates were significantly higher when feeding alone than with another individual. Unlike the other two species, scanning rates were not significantly affected by the species with which siskins fed.

## DISCUSSION

In all cases, the presence of another individual, irrespective of species, reduced the rate of scanning. For Pine Siskins, the species of the other individual had no significant effect on scanning rates, but for American Goldfinches and Purple Finches, the presence of a Pine Siskin reduced rates of scanning less than did the presence of a conspecific. Why should goldfinches and Purple Finches respond differently to Pine Siskins? If Pine Siskins had a lower scanning rate than the other species, the other species may have had to compensate for the

reduced vigilance of the siskins by raising their scanning rates (Pulliam et al. 1982, Metcalfe 1984, Beveridge and Deag 1987). The scanning rates of Pine Siskins when feeding with conspecifics were, however, similar to that of the other species. Metcalfe (1984) suggested that, among shorebirds which varied greatly in size, differences in scanning rates when feeding with different species might have been partially due to different body size-specific vulnerabilities to predation. Although Purple Finches are larger than the two other species, size differences among species are not great and individuals probably faced similar predation risks while on the feeder.

Recently, authors have suggested that vigilance may serve not only to detect predators, but also approaching conspecifics who may attempt to displace them from the feeding sites (Knight and Knight 1986; Waite 1987a, 1987b). Scanning rates may be higher for Purple Finches and American Goldfinches when feeding with Pine Siskins if the siskins pose a greater threat of displacing them from the feeder. Pine Siskins, as a group, were dominant to and much more aggressive than the other two species (Popp, unpubl. data). The greater aggressiveness of the siskins may have caused the goldfinches and Purple Finches to be more wary and scan more in the presence of the siskins.

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## NOTES FROM CLARION ISLAND<sup>1</sup>

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During the course of a fishing trip in January 1986 I was able to spend several days at Isla Clarion, the westernmost of Las Islas Revillagigedos, located about 400 nautical miles southwest of Cabo San Lucas, Baja California, Mexico. Our party was in the vicinity of the island from 16 to 18 January. The commander of the Mexican Navy garrison on the island graciously allowed me to come ashore, and for 2 days I explored much of the highland portion of the island.

The garrison was established in 1979 to support a weather station at Bahía Sulphur, on the south side of the island. The settlement consists of a building for living quarters, a nearby electric generating plant, and an approximately 500-m aircraft runway parallel to the beach east of Bahía Sulphur. The garrison consisted of 11 men.

There were numerous unoccupied burrows in several areas of the highlands, where earlier visitors had found Townsend's Shearwaters, *Puffinus auricularis* (Anthony 1900, M. E. McLellan 1926, Jehl 1982). At least 200 Masked Boobies (*Sula dactylatra*) were nesting on the ground at several sites, but I saw no eggs. Red-footed Boobies (*S. sula*) were nesting on sparse bushes in several colonies near the eastern end of the island; most nests had one egg. At least 800 active nests were counted.

I saw the endemic Clarion Wren (*Troglodytes tanneri*) most often in areas around and just east of the garrison building. Up to 20 individuals were noted. No more than 20 endemic Clarion Island Mourning Doves (*Zenaidura macroura clarionensis*) were seen during my explorations. For both endemics, this appears to be a substantial reduction in numbers from the previous characterization as "abundant" (Townsend 1890, Anthony 1898). No more than 10 Burrowing Owls (*Athene*

*cunicularia*) were seen. As recently as 1953 Brattstrom and Howell (1956) described them as "common everywhere."

The following species, previously unrecorded from Clarion (see Jehl and Parkes 1982), were observed during my stay: one Great Egret (*Casmerodius albus*), one Osprey (*Pandion haliaetus*), three American Kestrels (*Falco sparverius*), one American Coot (*Fulica americana*), one Lesser Yellowlegs (*Tringa flavipes*), and six Laughing Gulls (*Larus atricilla*).

Shortly after establishment of the weather station, domestic pigs and hares were released as a source of food; both have multiplied and now occur everywhere from the shoreline to the highest elevations. Residents estimate pig numbers at 800 to 1,000. Evidence of rooting and destruction of vegetation was widespread, especially on the western half of the island. Chickens and goats were also released, but the chickens remain in the immediate vicinity of the settlement and no live goats were seen. According to one of the residents, an extensive fire in 1984 burned the western two-thirds of the island. This may account for the low, grassy vegetation I encountered over most of the island, in contrast to the extensive dense vine-covered cactus (*Opuntia*) described by Anthony (1898) and Townsend (1890).

Harvesting by humans and predation by pigs may reduce the small population of green sea turtles (*Chelonia mydas*) which nest at Bahía Sulphur (Awbrey et al. 1984). Ground-nesting birds such as Townsend's Shearwater and Masked Booby are especially vulnerable to predation by pigs. Massive reduction of vegetation by the fire and rooting by pigs has dramatically reduced habitat for the endemic landbird fauna.

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