

## "Spshing Noise": Biological Significance of Its Attraction and Nonattraction by Birds

(bird vocalizations/mixed bird flocks/Neotropics versus Old World tropics/tropical seasonality)

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**ABSTRACT** Many New World passerine birds, especially migrants which join mixed flocks of local species in the Neotropics, are attracted to a noise termed "spshing" used by humans to attract birds into view. The noise is effective because it mimics the vocalizations of certain bird species which play a central bonding role in mixed species flocks. Migrants join these flocks to gain local expertise about food sources and/or potential enemies in unfamiliar environments. Old World passerine migrants do not react to "spshing." In Africa, they do not join mixed flocks of local species because of more favorable environmental conditions negating the need to do so. In tropical Asia, many migrants join mixed flocks but the local bonding species give vocalizations unlike those of their counterparts in the Neotropics, and thus not like "spshing."

North American bird observers employ a variety of squeaks and other noises to attract birds into view. One particularly effective noise is termed "spshing."\* It is employed rather like the classical calling to a cat, "Here, kitty, spsh-spsh-spsh," a rapid overlapping series of "spshs" given until one's breath fails. The reaction of birds to this noise is quite different from that produced by squeaks and other noises. Birds drawn into view by squeaks and other noises often vocalize, have their crest feathers erected, and their wings drawn out from their bodies. Birds reacting to a "spshing noise" do not vocalize. They not only reveal themselves, but approach the sound source with their feathers smoothed down and their wings held in a normal position. They behave in a not obviously hostile, curious manner.

Not all birds are attracted to this noise. In the New World, only certain members of the passerine families Vireonidae (Vireos), Parulidae (Wood Warblers), Thraupidae (Tanagers), Icteridae (Orioles and Blackbirds), and Fringillidae (Finches) do so. Table 1 lists some of the more common migrant passerines which are attracted by "spshing" in Panama. I do not know of any nonpasserine which is attracted to "spshing." Positive attraction to "spshing" is particularly characteristic of those species in these families which wander over great distances in the nonbreeding season and those which migrate into the Neotropics and which, at least initially, join flocks of local Neotropical species. It is important to emphasize that it is a misnomer to refer to those bird species which arrive at tropical latitudes (e.g., Panama, 9°N) in September and October and which leave in April or May as "North American" or "European" migrants. They spend most of their lives in the tropics and leave only to breed in the Temperate Zone. In this paper they are called simply migrants.

\* I have never seen the word written and the spelling here is onomatopoeitic.

Neotropical resident birds, in general, are not attracted to "spshing." Some wrens (Troglodytidae) and ant-birds (Formicariidae) become very excited by "spshing," but vocalize and generally do not approach. The "spshing noise" is very similar to a number of their contact or alarm calls. Some Neotropical tanagers at times (namely Tables 3-7) approach a "spshing sound" but vocalize and display much the same behavior as other birds do to squeaks and other noises.

In the Old World neither the resident temperate species nor those which migrate into the tropics are attracted by "spshing." European bird observers simply do not employ this noise because it apparently is not effective. During the autumn migration period in Spain, I found that only tits (*Parus*) and kinglets (*Regulus*), like their New World counterparts—chickadees, titmice, and kinglets, reacted positively to "spshing." Again, the "spshing noise" closely resembled some of the contact calls used by these species which often form inter- and intraspecific flocks in the nonbreeding season.

Here I offer a hypothesis, based on observational and field experimental evidence, which attempts to explain why in the New World some birds are attracted by "spshing" and why others are not. And why almost none of the Old World passerines are attracted by the "spshing noise."

### Methods

In Panama, the vocalizations of migrant and local bird species were recorded and played back at Summit Gardens, Canal Zone (approximately at sea level) from 20 October to 30 October 1973. The highland site in western Panama was Nueva Suiza, Chiriqui Province, at 1600 m, from 21 January to 31 January 1974. I used a Nagra III tape recorder at 15 inches/second (38.1 cm/sec) with a Sennheiser 404 microphone, and played back the vocalizations on a Nagra speaker amplifier. The standardized "spshing" noise tape was my vocalizations recorded on a continuous loop. Playback trials (Tables 3-7) were made between 0730 and 0745 each day. I intentionally went to areas where birds were present, fastened the speaker to a tree at a height of approximately 2 m, turned on the playback, and when I was hidden, I recorded which bird species were nearby and which were attracted. Birds showing attraction usually remained nearby for the entire trial but in a few cases it is possible that I counted the same individual twice. It is also possible that on succeeding days (trials), I may have been testing the same individuals. I tried to go to different areas on succeeding days, but this factor may have caused the figures of the number of individuals tested in Tables 3-7, in some cases, to be inflated.

TABLE 1. Migrant passerine bird species which are attracted to a "spshing noise" in the Republic of Panama

Family	Species
Vireonidae (Vireos)	<i>Vireo olivaceus</i>
	<i>Vireo philadelphicus</i>
	<i>Vireo flavifrons</i>
Parulidae (Wood Warblers)	<i>Mniotilta varia</i>
	<i>Protonotaria citrea</i> *
	<i>Vermivora chrysoptera</i>
	<i>Vermivora peregrina</i>
	<i>Dendroica virens</i>
	<i>Dendroica fusca</i>
	<i>Dendroica pensylvanica</i>
	<i>Dendroica castanea</i>
	<i>Setophaga ruticilla</i>
	<i>Wilsonia canadensis</i>
Icteridae (Blackbirds)	<i>Icterus spurius</i> †
	<i>Icterus galbula</i>
Thraupidae (Tanagers)	<i>Piranga rubra</i>
Fringillidae‡ (Finches)	<i>Passerina cyanea</i>
	<i>Spiza americana</i>

\* Reaction is sometimes with aggressive overtones.

† This oriole shows strong attraction only in the October–November period, and a weak or no reaction from December until its departure in April.

‡ Few migrant fringillids reach Panama but many species in this group enter mixed species flocks in the North Temperate Zone and in northern Central America. Most are known to show a positive reaction to "spshing."

I recorded and played back vocalizations of migrant and local species in India from 10 to 31 January 1971 at three localities: Corbett National Park, Uttar Pradesh; Bharatpur, Rajasthan; and at Periyar Game Sanctuary, Kerala. There I used a Sony TC50 cassette recorder with an external Sony microphone and playback was by the same machine. Playback was done whenever birds were seen.

#### Attraction and Nonattraction in the Neotropics

Despite the density of migrants and local species from September to May, Neotropical forests give the impression, at first glance, of being relatively birdless. But if one waits for a while,

TABLE 2. Migrant species not attracted to "spshing"

Family	Species
Parulidae	<i>Dendroica aestiva</i>
	<i>Oporornis formosus</i>
	<i>Oporornis philadelphia</i>
	<i>Seiurus noveboracensis</i>
	<i>Seiurus motacilla</i>
Fringillidae	<i>Wilsonia pusilla</i>
	<i>Pheucticus ludovicianus</i> *

\* This grosbeak does not winter in Panama but in South America.

Of the bird families which contain species which are attracted to the "spshing noise" (Table 1), the above migrant species in those families are not attracted to "spshing." All were tested in Panama. Most, perhaps all, of these are territorial in their wintering grounds and do not enter mixed species flocks.

TABLE 3. Reactions by migrant and local bird species in lowland central Panama to playbacks of the recorded vocalizations of the passive nuclear tanager *Tangara inornata*

Species	Status	No. of trials	No. of birds* attracted	Percent of trials in which birds* attracted occurred	
				Percent of trials in which birds* attracted occurred	Percent of trials in which birds* attracted occurred
<i>Tangara inornata</i>	PNL	10	272	91	100
<i>T. larvata</i>	L	6	13	100	100
<i>Thraupis episcopus</i>	L	10	47	87	100
<i>T. palmarum</i>	L	10	30	87	70
<i>Chlorophanes spiza</i>	L	6	12	100	100
<i>Cyanerpes cyaneus</i>	L	7	20	70	86
<i>Dacnis cayana</i>	L	4	14	64	50
<i>Vermivora peregrina</i>	M	9	73	100	100
<i>Dendroica pensylvanica</i>	M	10	29	83	100
<i>D. castanea</i>	M	6	31	74	100
<i>Piranga rubra</i>	M	6	6	67	77

PNL = Passive nuclear local species; L = local species; M = migrant species.

\* In some cases, the same individuals may have been tested on different days (trials).

it is likely that a noisy flock will appear comprised of 30 or 40 individuals of 10 or so species. They will swirl past through the vegetation and silence will again prevail. Analysis of the complex organization of these flocks revealed that certain species, in various areas, tended to attract other species to join them and were termed "passive nuclear species" (1, 2). Passive nuclear species tend to be gregarious among themselves, dull in plumage coloration, and give vocalizations which are remarkably like "spshing," particularly those vocalizations given on short flights. Migrants often join these flocks for varying lengths of time.

During the period when migrants were present in Panama, I recorded and played back the vocalizations of the Plain-colored Tanager (*Tangara inornata*), a passive nuclear species of the lowlands of central Panama in an area where both migrants and locals were present. Playback attracted individuals of the species which normally join *T. inornata* flocks plus migrants (Table 3). When I played back a standardized "spshing" tape, I attracted, in general, only migrants (Table 4). In western Panama, *T. inornata* is replaced by other species which play the passive nuclear role in mixed flocks. There I played back the vocalizations of *T. inornata* and attracted, basically, only migrants (Table 5). The "spshing" tape had the same result (Table 6). But when I played back the vocalizations of any of the local passive nuclear species, I was able to attract in both the appropriate local species and the migrants alike (Table 7).

Many passerine migrants change their diets radically upon entering the tropics, and feed heavily on fruits and nectar (3, 4). My own observations indicate that those which remain insectivorous, set up and defend territories, and do not join mixed species flocks. These latter species do not react to "spshing" (Table 2). It is advantageous for those migrants that switch their diets and enter, most of them for the first time, into the strange tropical environment, to follow the locals around, at least initially. The probability of finding

TABLE 4. Reactions by migrant and local bird species, in lowland central Panama, to playbacks of recorded "spshing noise"

Species	Status	No. of trials	No. of birds*	Percent of trials in which attraction occurred	
				birds* attracted	of which attracted
<i>Tangara inornata</i>	PNL	10	312	2	10
<i>T. larvata</i>	L	9	36	8	11
<i>Thraupis episcopus</i>	L	10	43	0	0
<i>T. palmarum</i>	L	10	38	0	0
<i>Chlorophanes spiza</i>	L	8	18	11	13
<i>Cyanerpes cyaneus</i>	L	10	22	0	0
<i>Dacnis cayana</i>	L	7	13	23	29
<i>Vermivora peregrina</i>	M	10	66	80	100
<i>Dendroica pensylvanica</i>	M	8	36	83	100
<i>D. castanea</i>	M	10	51	100	100
<i>Piranga rubra</i>	M	6	7	71	100

PNL = Passive nuclear local species; L = local species; M = migrant species.

\* In some cases, the same individuals may have been tested on different days (trials).

suitable food is increased and they may share in the locals' knowledge of what is to be avoided. Leck (3) has noted that newly arrived migrants at Barro Colorado Island, Canal Zone, waited for several days watching the local species at a food tree before they themselves began to feed there. Another advantage to joining the locals is an antipredator one, for with the locals' knowledge of potential predators, plus the factor of additional "eyes," the mixed species association cannot help but be ad-

TABLE 5. Reactions by migrant and local species, in the western highlands of Panama, to playbacks of the vocalizations of the lowland passive nuclear tanager *Tangara inornata*\*

Species	Status	No. of trials	No. of birds†	Percent of trials in which attraction occurred	
				birds† attracted	of which attracted
<i>Chlorospingus ophthalmicus</i>	PNL	5	34	9	20
<i>Atlapetes gutturalis</i>	L	4	9	22	25
<i>Tangara icterocephala</i>	L	5	30	0	0
<i>Myioborus miniatus</i>	L	3	6	0	0
<i>Vireo leucophrys</i>	L	5	42	0	0
<i>Vireo philadelphicus</i>	M	5	17	88	100
<i>Mniotilta varia</i>	M	3	6	67	100
<i>Vermivora chrysoptera</i>	M	4	9	78	100
<i>Vermivora peregrina</i>	M	5	54	87	100
<i>Dendroica virens</i>	M	5	19	95	100

PNL = Passive nuclear local species; L = local species; M = migrant species.

\* *Tangara inornata* does not occur in the western highlands. The site was the same as in Table 6.

† In some cases, the same individuals may have been tested on different days (trials).

TABLE 6. Reactions by migrant and local species to playbacks of the "spshing noise" in the western highlands of Panama

Species	Status	No. of trials	No. of birds*	Percent of trials in which attraction occurred	
				birds* attracted	of which attracted
<i>Chlorospingus ophthalmicus</i>	PNL	5	23	13	20
<i>Atlapetes gutturalis</i>	L	3	9	0	0
<i>Tangara icterocephala</i>	L	5	27	22	80
<i>Myioborus miniatus</i>	L	3	7	29	67
<i>Vireo leucophrys</i>	L	5	20	15	60
<i>Vireo philadelphicus</i>	M	5	16	94	100
<i>Mniotilta varia</i>	M	4	8	75	100
<i>Vermivora chrysoptera</i>	M	3	9	100	100
<i>Vermivora peregrina</i>	M	5	46	89	100
<i>Dendroica virens</i>	M	5	22	100	100

PNL = Passive nuclear local species; L = local species; M = migrants.

\* In some cases, the same individuals may have been tested on different days (trials).

vantageous to both migrant and resident species alike. For example, they mob snakes and hawks together. The Lacks (5) found no interspecific flocking between migrants and locals on Jamaica, but noted that such association occurred on Puerto Rico. They inferred that the absence of accipitrine hawks on Jamaica might be a factor.

Many migrant passerines, and most of those which react to "spshing," do not "winter" at any one locale but move during the autumn in a south and somewhat eastward direction through the West Indies, Central America, and northern South America, stopping for periods of up to several weeks at

TABLE 7. Reactions by migrant and local bird species to playbacks of the recorded vocalizations of the highland passive nuclear tanager *Chlorospingus ophthalmicus* in the western highland of Panama

Species	Status	No. of trials	No. of birds*	Percent of trials in which attraction occurred	
				birds* attracted	of which attracted
<i>Chlorospingus ophthalmicus</i>	PNL	5	30	100	100
<i>Atlapetes gutturalis</i>	L	5	7	57	80
<i>Tangara icterocephala</i>	L	5	24	83	100
<i>Myioborus miniatus</i>	L	4	5	100	100
<i>Vireo leucophrys</i>	L	5	21	71	60
<i>Vireo philadelphicus</i>	M	4	15	80	75
<i>Mniotilta varia</i>	M	4	8	75	100
<i>Vermivora peregrina</i>	M	5	44	86	100
<i>Dendroica virens</i>	M	4	11	73	100

PNL = Passive nuclear local species; L = local species; M = migrant species.

\* In some cases, the same individuals may have been tested on different days (trials).

a variety of locales. A similar pattern of itinerancy has been noted for migrants in Africa (6). In lower Central America and northwestern South America, migrants are most abundant between October and December. With the onset of the northern spring, they either reverse their route or, as in the majority of species, return via a direct flight from northern South America by way of Honduras and Yucatan, or via the West Indies to continental North America (7, 8). In the course of these wanderings, they encounter many passive nuclear species and their corresponding flocks.

The attraction of the "spshing noise" to migrant passerines is the result of their generalizing to the vocalizations of a variety of passive nuclear species. The locals in any one particular area specialize on the exact vocalizations of their passive nuclear species; hence, they are too finely tuned to react to my crude imitation.

If many migrants are attracted to "spshing" while away from their breeding grounds, how do they react in the Temperate Zone when breeding? I have been able to test only the warblers *Dendroica pensylvanica* and *Vermivora pinus* (namely, Table 1). On their breeding grounds in New York State, they still displayed strong attraction to "spshing" but with at least two differences: they vocalized and often raised their crest feathers. The behavior towards a "spshing noise" is probably altered by the hormonal levels prevailing during reproduction.

Mixed species flocks centering around passive nuclear species are not restricted to the tropics. Juncos (*Junco* spp., Fingillidae) and titmice (*Parus* spp., Paridae), among several, perform this role in the mixed species flocks which occur during the autumn and winter in North America. The species that associate with them react positively to "spshing."† To generalize, the positive attraction of many New World passerines to a "spshing-like noise" is an adaptation to unfamiliar environments.

#### Nonattraction in the Old World tropics

Why then do the Old World passerine migrants not react to "spshing"? There are some basic differences between Africa and the Neotropics as "wintering areas" for migrants. Firstly, recent estimates indicate that around 14,000 million migrant passerines enter the Neotropics every autumn, and almost all of these remain north of the equator (9, 10). The combined area of the West Indies, Central America, and South America north of the equator is around 4 million km<sup>2</sup>. Moreau (11) estimates that around 3225 million migrant passerines enter Africa each autumn, almost all of which winter south of the Sahara. The area of Africa south of the Sahara is approximately 20 million km<sup>2</sup>. Thus, in an area of only one-fifth the size of Africa south of the Sahara, the Neotropics is annually called upon to support four times as many migrants. The theoretical densities are 40 migrants per hectare in the Neotropics as compared to 3 per hectare in Africa south of the Sahara. But migrants are not uniformly distributed in either Africa or in the Neotropics. They tend to prefer disturbed situations and mid-altitudes (1000–2000 m). Censuses in Africa (11) show densities ranging from 2 to 75 migrants per

hectare. I estimated 150 migrants per hectare in coffee plantations in western Panama at 1600 m altitude.

Secondly, the migrants arrive in the Neotropics at the height of a long rainy season when food, especially insects, is definitely scarce (3, 4). In Africa it is just the reverse. When migrants arrive in the area 5° north of the equator but south of the Sahara, a *short* rainy period has just ended, and insects and seeds are abundant (11). Most migrants in Africa remain in this zone. Those migrants which go south of the equator encounter the *beginning* of a long rainy season with its corresponding flush of vegetation and insects, especially flying termites and ants which are favored by aerially feeding birds. The times of stress for tropical animals are the *ends* of long dry or wet periods. A short rainy period bestows a richness of insect and plantlife on the early part of the following dry period. Finally, although mixed species flocks occur in Africa, the migrants do not join them. Unlike their New World counterparts, the migrants in Africa, in general, do not switch to new food resources upon entering the tropics (11). As compared to the Neotropics, the much lower migrant density in Africa and the abundance of food upon the migrants' arrival negate the need for the migrants to join the local flocks. It further negates the need to evolve a system of seeking out local expertise.

Much less information is available concerning migrants in tropical Asia. I observed migrants in India during a January period. A played-back "spshing noise" was ignored by migrants and locals alike. But some migrants there did enter into mixed flocks of locals. These flocks, like those in the New World, were grouped around passive nuclear species, which in all flocks observed were White-eyes (*Zosterops palpebrosa*). The reason why the migrants did not respond to "spshing" was then clear. The *Zosterops* vocalizations did not resemble the "spshing noise" at all, but were rather jingle-like. Playback of the *Zosterops* vocalizations attracted both migrants and locals alike. This is not to infer that *Zosterops* spp. are the passive nuclear forms in all Asian mixed species flocks, or even that migrants there regularly join such flocks. But I suggest that whatever the species is that is playing the nuclear role at any locale in tropical Asia, its vocalizations will not resemble "spshing."

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† I would predict, despite the lack of enthusiasm that European bird observers have for "spshing," that birds in mixed flocks, centering around species closely related to North American counterparts (Fringillidae, subfamily Emberizinae), will upon testing, show a positive attraction to "spshing."