

## VOCAL COPYING IN LAWRENCE'S AND LESSER GOLDFINCHES

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With perhaps the exception of the Northern Mockingbird, no bird in the western United States copies the vocalizations of such a wide variety of bird species with such proficiency as the Lawrence's Goldfinch. Although this vocal "mimicry" was long ago described by Dawson (1923), subsequent workers have apparently failed to notice this striking feature of Lawrence's Goldfinch vocalizations. Linsdale (1968) cited numerous references concerning descriptions of the song, none of which mentioned imitation. Coutlee (1971) studied in detail the vocalizations of this species, yet did not realize that the elaborate song is composed primarily of notes copied from other birds' vocalizations. Concerning the vocalizations of this species, Lesser Goldfinch, and American Goldfinch, Coutlee (1971:561) stated "these...are probably among the longest and most varied of passerine songs (excluding, of course, birds which mimic other songs)." Lawrence's Goldfinch was not included in Dobkin's (1979) extensive list of birds known to copy other species.

From 1973 to 1980 we made notes on the composition of songs of individual Lawrence's and Lesser goldfinches with respect to species imitated. Our field experience has involved birds on the wintering grounds as well as breeding birds, and has spanned most of the range of Lawrence's Goldfinch and much of the northern and western range of Lesser Goldfinch. We have no tape-recordings to document our case for interspecific copying, but we feel secure in our contentions in that the imitations are very obvious to anyone familiar with the vocalizations of California birds.

The cadence, frequency and duration of Lawrence's Goldfinch song is well described by Coutlee (1971). However, most, if not all, notes comprising the song are obvious imitations of call notes of other species. In Table 1 we present a list of all bird species (plus one frog) whose calls we have recognized in Lawrence's and Lesser goldfinch songs. We are not certain if the Lawrence's Goldfinch has notes or phrases within its song that are truly its own, except for its characteristic flight call, which is frequently used as a note in the song.

Species whose vocalizations are incorporated most frequently into Lawrence's Goldfinch song are those with loud, distinctive or simple calls. These vocalizations are usually prominent sounds in goldfinch habitat. No other correlates, taxonomic or ecological, can be discerned from the list of species copied. Many of the species from Table 1 are also frequently imitated by the Northern Mockingbird and the European Starling (*Sturnus vulgaris*) (pers. obs.), the two other species in California most noted for their vocal copying.

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The quality of Lawrence's Goldfinch vocal appropriations is such that individual appropriated calls, if given by themselves, would be virtually indistinguishable from model species, although sound spectrograms of course might reveal stronger differences. The precision of imitation is such that calls of closely-related, similar-sounding species/subspecies can be clearly distinguished, e.g. "Audubon's" from "Myrtle" Warbler and Hairy from Downy Woodpecker.

Vocal copying in the Lawrence's Goldfinch falls into Dobkin's (1979) category of "vocal appropriation." We feel that it is highly unlikely that the copied vocalizations function in interspecific contexts, i.e., either "vocal mimicry" or "vocal convergence or non-divergence" (*sensu* Dobkin). Since Lawrence's Goldfinch frequently copies the flight calls of all three North American congeners, "vocal convergence" is possible but evidence is lacking.

Although we have no convincing explanation for the function of vocal appropriation in the Lawrence's Goldfinch, we argue that it almost certainly has nothing to do with negative effects on model species, i.e., exclusion of competitors, as proposed by Cody (1974:248) for vocal copying by the Northern Mockingbird and European Starling. This explanation is unsatisfactory for such cases of vocal copying for three reasons: (1) the ecological range of species copied is extremely broad, with no tendencies for favoring potential close competitors; (2) since most copied vocalizations are calls or song segments rather than complete songs, it is unclear what effect these would have on target species—attraction because of territorial aggression or "curiosity" is perhaps more likely than repulsion; and (3) European Starlings (and goldfinches) have type "B" territories used primarily for nesting rather than feeding and thus models should be limited to nest-site competitors. (They are not.) Furthermore, in the case of the goldfinches, vocal copying is prominent among non-breeding, presumably non-territorial, winter birds. Mainly for lack of plausible alternatives, we favor an explanation concerning an expansion of repertoire size as an index of fitness (Howard 1974).

Much of what we say concerning vocal appropriations in the Lawrence's Goldfinch also applies to the Lesser Goldfinch. Vocal copying in the Lesser Goldfinch was also described by Dawson (1923); in Table 1 we list species whose vocalizations we have heard "appropriated" by Lesser Goldfinches. Most differences in model species between the two goldfinches are due to slight differences in their habitat preferences, with Lesser Goldfinch favoring more mesic areas. The Lesser Goldfinch occupies a rather wide geographical range, and the species copied vary with locality. An individual at Sarita, Kleberg Co., Texas, faithfully copied the "wee-bee" song segment of the Eastern Phoebe (*Sayornis phoebe*, 6 May 1980); we have never heard this species copied in California (where it is rare visitor). A Lesser Goldfinch at Patagonia, Santa Cruz Co., Arizona, incorporated the calls of the Gila Woodpecker (*Melanerpes uropygialis*, 26 June 1976) into its song; the Gila Woodpecker does not occur in most of the California range of the Lesser Goldfinch, and we have not heard it copied in that state. This geographical variation further suggests the importance of prominent environmental sounds as incorporated elements in the song of the Lesser Goldfinch. The

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Table 1. Species whose vocalizations are copied by Lawrence's and/or Lesser goldfinches.

	Lawrence's	Lesser
American Kestrel ( <i>Falco sparverius</i> )	X <sup>1</sup>	X
California Quail ( <i>Callipepla californica</i> )	X	
Gambel's Quail ( <i>Callipepla gambelii</i> )	X	
Killdeer ( <i>Charadrius vociferus</i> )	X	X
Spotted Sandpiper ( <i>Actitis macularia</i> )	X	
Greater Yellowlegs ( <i>Tringa melanoleuca</i> )	X	
Northern Flicker ( <i>Colaptes auratus</i> )	X	X <sup>1</sup>
Acorn Woodpecker ( <i>Melanerpes formicivorus</i> )	X	
Hairy Woodpecker ( <i>Picoides villosus</i> )	X <sup>3</sup>	X
Downy Woodpecker ( <i>Picoides pubescens</i> )		X
Ladder-backed Woodpecker ( <i>Picoides scalaris</i> )	X <sup>3</sup>	X
Nuttall's Woodpecker ( <i>Picoides nuttallii</i> )	X	
Western Kingbird ( <i>Tyrannus verticalis</i> )	X	
Cassin's Kingbird ( <i>Tyrannus vociferans</i> )	X	
Ash-throated Flycatcher ( <i>Myiarchus cinerascens</i> )	X	X
Black Phoebe ( <i>Sayornis nigricans</i> )	X	X
Western Wood-Pewee ( <i>Contopus sordidulus</i> )	X <sup>1</sup>	X <sup>1</sup>
Western Flycatcher ( <i>Empidonax difficilis</i> )		X
Violet-green Swallow ( <i>Tachycineta thalassina</i> )	X	X
Barn Swallow ( <i>Hirundo rustica</i> )	X	
Scrub Jay ( <i>Aphelocoma coerulescens</i> )	X	
Plain Titmouse ( <i>Parus inornatus</i> )	X <sup>2</sup>	X <sup>1,2</sup>
Verdin ( <i>Auriparus flaviceps</i> )	X <sup>2</sup>	X
White-breasted Nuthatch ( <i>Sitta carolinensis</i> )	X	X
Bewick's Wren ( <i>Thryomanes bewickii</i> )	X <sup>2</sup>	X
House Wren ( <i>Troglodytes aedon</i> )	X	X
Rock Wren ( <i>Salpinctes obsoletus</i> )	X <sup>1,2</sup>	X
Canyon Wren ( <i>Catherpes mexicanus</i> )	X	
Northern Mockingbird ( <i>Mimus polyglottos</i> )	X	
American Robin ( <i>Turdus migratorius</i> )	X <sup>1</sup>	X <sup>1</sup>
Hermit Thrush ( <i>Catharus guttatus</i> )	X	X
Western Bluebird ( <i>Sialia mexicana</i> )	X <sup>1</sup>	X <sup>1</sup>
Blue-gray Gnatcatcher ( <i>Polioptila caerulea</i> )	X	X
Ruby-crowned Kinglet ( <i>Regulus calendula</i> )	X	
Water Pipit ( <i>Anthus spinoletta</i> )	X	
Cedar Waxwing ( <i>Bombycilla cedrorum</i> )	X	
Phainopepla ( <i>Phainopepla nitens</i> )	X	X
Solitary Vireo ( <i>Vireo solitarius</i> )	X	
Yellow-rumped Warbler (Myrtle) ( <i>Dendroica c. coronata</i> )		X

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Table 1 (Cont.)

	Lawrence's	Lesser
Yellow-rumped Warbler (Audubon's) ( <i>D. c. auduboni</i> )	X	X
Western Meadowlark ( <i>Sturnella neglecta</i> )	X	
Northern Oriole (Bullock's) ( <i>Icterus galbula</i> )	X	
Brown-headed Cowbird ( <i>Molothrus ater</i> )	X	
House Sparrow ( <i>Passer domesticus</i> )		X <sup>1</sup>
House Finch ( <i>Carpodacus mexicanus</i> )	X <sup>2</sup>	X <sup>1,2</sup>
Pine Siskin ( <i>Carduelis pinus</i> )	X	X
American Goldfinch ( <i>Carduelis tristis</i> )	X	X <sup>1</sup>
Lesser Goldfinch ( <i>Carduelis psaltria</i> )	X <sup>1</sup>	
Lawrence's Goldfinch ( <i>Carduelis lawrencei</i> )		X
Brown Towhee ( <i>Pipilo fuscus</i> )	X	X
Rufous-crowned Sparrow ( <i>Aimophila ruficeps</i> )	X	X
Dark-eyed Junco ( <i>Junco hyemalis</i> )		X
Pacific Treefrog ( <i>Hyla regilla</i> )	X	

<sup>1</sup>Heard in over 50% of individuals

<sup>2</sup>Song segments appropriated as well as calls

<sup>3</sup>Two or more types of calls appropriated

Note: This table is based on field experience of the authors with approximately 30 individual *C. lawrencei* and 25 *C. psaltria*; about 60% of the individuals of both species were non-breeding birds on their wintering grounds. See Dawson (1923) for an additional listing of species imitated.

major difference between imitations made by Lesser and Lawrence's goldfinches is that in the Lesser Goldfinch, a lower percentage of song syllables can be readily identified as appropriated from other species, with many song sequences devoid of any appropriated material.

We have never heard the other two California members of the genus, American Goldfinch and Pine Siskin, copy other species, despite their proficiency at intraspecific imitation (Mundinger 1979). The rambling song of the Pine Siskin is quite similar in form to that of the Lawrence's and Lesser goldfinches, but appears to contain no appropriated material, containing instead a variety of Pine Siskin call notes. The form and quality of American Goldfinch vocalizations are quite distinct from those of North American congeners, and apparently do not contain appropriated material.

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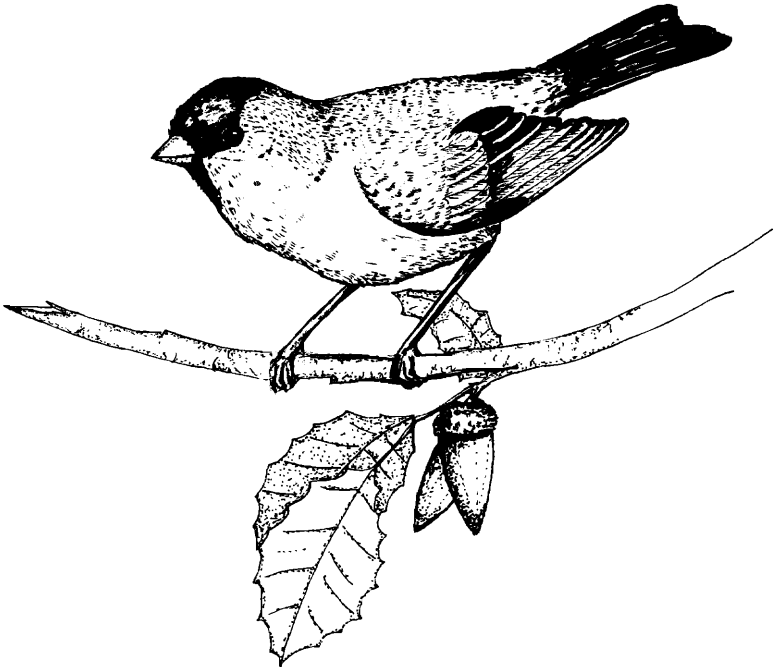
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Lawrence's Goldfinch

*Sketch by Cameron Barrows*