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Hearing in the red-billed firefinch (Lagonosticta senegala): An estrildid finch with narrowband vocalizations

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The red-billed firefinch (Lagonosticta senegala) is a small, non-territorial estrildid finch native to Africa. As in zebra finches (Taeniopygia guttata), a member of the same family and a popular model for neuroethological studies, songs and calls are delivered by males to their mates at close range or when a pair is separated. However, there are marked differences in the acoustic characteristics of vocalizations in these two closely-related species, and they represent extremes in vocalization types within the family, and indeed across songbirds. Unlike many songbirds, zebra finches produce broadband vocalizations that are harmonically complex, making them difficult to quantify acoustically and to reconstruct synthetically. Firefinches on the other hand, like most other songbirds studied to date, produce songs that consist predominantly of pure tones.

Red-billed firefinches were tested for their general hearing abilities as a comparison with those of zebra finches. Birds were trained to detect pure tones using operant conditioning with food reward, and tested using the method of constant stimuli. Thresholds for tones at 500, 1000, 2000, 2860, 4000, 5700, and 8000 Hz were measured in the quiet and in broadband noise. The absolute thresholds and masked thresholds as a function of frequency were typical of those for most songbirds. Best audible frequencies were between 2-4 kHz, while critical ratios increased at a rate of about 3 dB/octave over most of the hearing range. Despite major differences in the types of vocalizations produced by red-billed firefinches and zebra finches, their general hearing abilities are relatively similar.

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