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The effect of masking noise on the discrimination of conspecific and heterospecific vocalizations in birds

Timothy Wright , Bernard Lohr , Robert Dooling

The effects of background noise on tone thresholds in birds are well known. The effects of noise on the detection and discrimination of natural communication signals are less well studied. Operant conditioning procedures were used to determine thresholds for the detection and discrimination of conspecific and heterospecific contact calls in noise by budgerigars (Melopsittacus undulatus) and zebra finches (Taeniopygia guttata). Signal-to-noise levels at detection threshold for budgerigars averaged 21.5 for budgerigar calls and 24.4 for zebra finch calls. Signal-to-noise levels at threshold for zebra finches were 25.3 for budgerigar calls and 28.8 for zebra finch calls. Discrimination testing was conducted in 50-trial blocks with a repeating background call and conspecific target calls. Broadband noise levels differed in 2 dB steps around the signal-to-noise level at the detection threshold. In discriminating calls, both zebra finches and budgerigars showed similar patterns. Budgerigar signal-to-noise ratios at discrimination threshold were 26.1 and 27.8 for budgerigar and zebra finch calls respectively, while signal-to-noise levels for zebra finches were 27.6 and 30.0 for budgerigar and zebra finch calls. As in detection experiments, budgerigars had lower thresholds (better discrimination abilities) then zebra finches for the calls of both species, and narrow bandwidth budgerigar calls resulted in lower discrimination thresholds than broadband zebra finch calls. On average, thresholds for the discrimination of calls in noise were 2.9 dB higher then thresholds for call detection. Our results show that as in human speech perception, the ability of birds to discriminate calls in a background noise requires a higher signal-to-noise ratio than simple detection of conspecific or heterospecific calls in noise.

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