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Frequency difference limens in budgerigars (Melopsittacus undulatus)as a function of tone duration

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Budgerigars (Melopsittacus undulatus) are small Australian parrots that show remarkable vocal plasticity and display vocal learning throughout life. Contact calls are a predominant vocalization in this species. These calls are short, frequency modulated, highly stereotyped vocalizations approximately 150-200 ms in duration with most of the spectral energy falling between 2-4 kHz. Psychoacoustic studies with this species have shown a high degree of frequency resolving power for both simple and complex sounds falling in this same spectral region. In an effort to understand the perception of short, frequency components of contact calls, we measured frequency difference limens for short tones. Previous work with humans has shown that frequency difference limens (DLs) decrease as duration increases (see, for example, Moore, J. Acoust. Soc. Am., 54(3), 1973). In this experiment, frequency DLs at 2860 Hz were measured in three budgerigars for pure tones ranging in duration from 5 to 160 ms. As with humans, frequency DLs decreased as duration increased. However, frequency DLs for a short tone embedded in a sequence of other short tones were surprisingly small - much better than predicted from DLs measured for long tones presented in isolation. These tonal patterns were constructed to approximate the duration and frequency components of natural contact calls. Taken together, these results suggest enhanced spectral resolving power for short duration pure tones in contact call-like tonal patterns. Humans tested under similar conditions show surprisingly poor frequency DLs for the same segments in these tonal patterns.

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