



Horizontal directivity patterns for the singing voice

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ABSTRACT

Singers rely on auditory feedback from reflective surfaces to regulate voice production. However, the reflected spectrum received at the singer's ear will depend, in part, on the location of the reflective surface(s) around the singer. This is because acoustic directivity patterns for human vocalizations are non-uniform with respect to direction and frequency. Using multi-channel anechoic recordings, we analyzed these radiation patterns out to 20 kHz for both singing and speech produced by trained singers. Radiation for higher frequencies tends to be more directional toward the front of a singer, whereas lower frequencies tend to radiate more omnidirectionally around the singer. Consequently, unless the singer is directly facing a reflective surface or receiving electronically reinforced feedback (e.g., in-ear monitoring), the auditory feedback received will be dominated by the lower frequencies of the voice spectrum. Although extended high frequencies (>8 kHz) in singing are audible and affect perceived voice quality, their role in auditory feedback for vocal production regulation remains unknown.

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