

THE EFFECT OF NOISE ON DIRECTIONAL BANDS

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1 Context of the study

In a recent study on the effect of disturbing noise on the localization of pure tones in the median plane, an attraction of tones toward the actual position of noises was discovered [1]. The experiments reported here are part of a general study on this attraction effect.

2 Experimental procedure

Pure tones of 0.5, 1, 4 and 8 kHz (300 ms, 60 phons) were emitted from a loudspeaker facing the subject (S). Broadband noise (0.1-16 kHz, 500 ms, starting 100 ms before the tones, 60 dB SPL) emanated from one of three loudspeakers placed at the loci front (0°), top (90°) or rear (180°). Two experiments were conducted where four Ss had to localize the pure tones presented with or without noise.

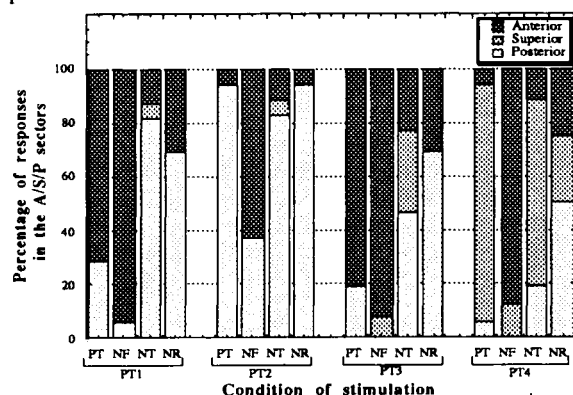


Figure 1. Percentage of responses in the A/S/P sectors for pure tones of 0.5 (PT1), 1 (PT2), 4 (PT3) and 8 kHz (PT4) presented alone (PT, 8 trials per frequency), or with broadband noise coming from the front (NF), the top (NT) or the rear (NR) (4 trials per condition).

3 Results and discussion

The data were clustered in three sectors of the median plane (Blauert [2]): A (anterior, -45° to $+45^\circ$), S (superior, $+45^\circ$ to $+135^\circ$) and P (posterior $+135^\circ$ to $+225^\circ$). Figure 1 represents the percentage of responses in each sector as a function of the frequency of the tones, with or without noise. As can be predicted by the directional bands [2], tones presented alone are localized in a sector that is determined by their frequency: A for 0.5 and 4 kHz, S for 8 kHz and P for 1 kHz. When noise is present, it can shift the apparent direction of tones toward its direction of incidence, thus changing the influence of the directional bands.

When integrating data of other experiments, it can be hypothesised that spectral cues encoded at high frequencies and conveyed by noises are responsible of the attraction effect, even of low-frequency tones. The predominant role of high frequencies upon low frequencies for the front/back and elevation perception will be discussed.

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References

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