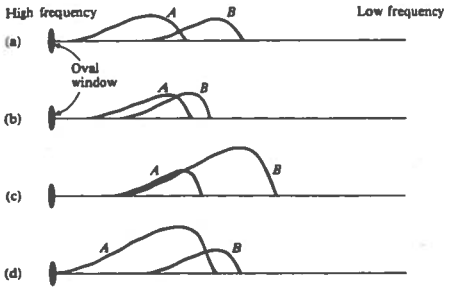
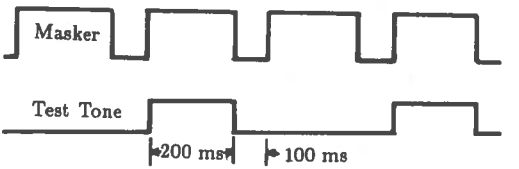
Demonstration 9. Asymmetry of Masking by Pulsed Tones (1:31)

A pure tone masks tones of higher frequency more effectively than tones of lower frequency. This may be explained by reference to the simplified response of the basilar membrane for two pure tones A and B shown in the figure below. In (a), the exitations barely overlap; little masking occurs. In (b) there is appreciable overlap; tone B masks tone A more than A masks B. In (c) the more intense tone B almost completely masks the higher-frequency tone A. In (d) the more intense tone A does not mask the lower-frequency tone B.



Simplified response of the basilar membrane (from Rossing, 1982).



Pulses used in this demonstration

This demonstration uses tones of 1200 and 2000 Hz, presented as 200-ms tone bursts separated by 100 ms (see figure above). The test tone, which appears every other pulse, decreases in 10 steps of 5 dB each, except the first step which is 15 dB.

Commentary

"A masking tone alternates with the combination of masking tone plus a stepwise-decreasing test tone. First the masker is 1200 Hz and the test tone is 2000 Hz, then the masker is 2000 Hz and the test tone is 1200 Hz. Count how many steps of the test tone can be heard in each case."

References

- G.von Bekesy (1970), "Traveling waves as frequency analyzers in the cochlea," Nature *225*, 1207-09.
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- R.Patterson and D.Green (1978), "Auditory masking," in *Handbook of Perception*, Vol. 4: *Hearing*, ed. E.Carterette and M.Friedman (Academic Press, New York) pp. 337-62.
- T.D.Rossing (1982), *The Science of Sound* (Addison-Wesley, Reading, MA). Chap. 6.
- J.J.Zwislocki (1978), "Masking: Experimental and theoretical aspects of simultaneous, forward, backward, and central masking," in *Handbook of Perception*, Vol. 4: *Hearing*, ed. E.Carterette and M.Friedman (Academic Press, New York) pp. 283-336.