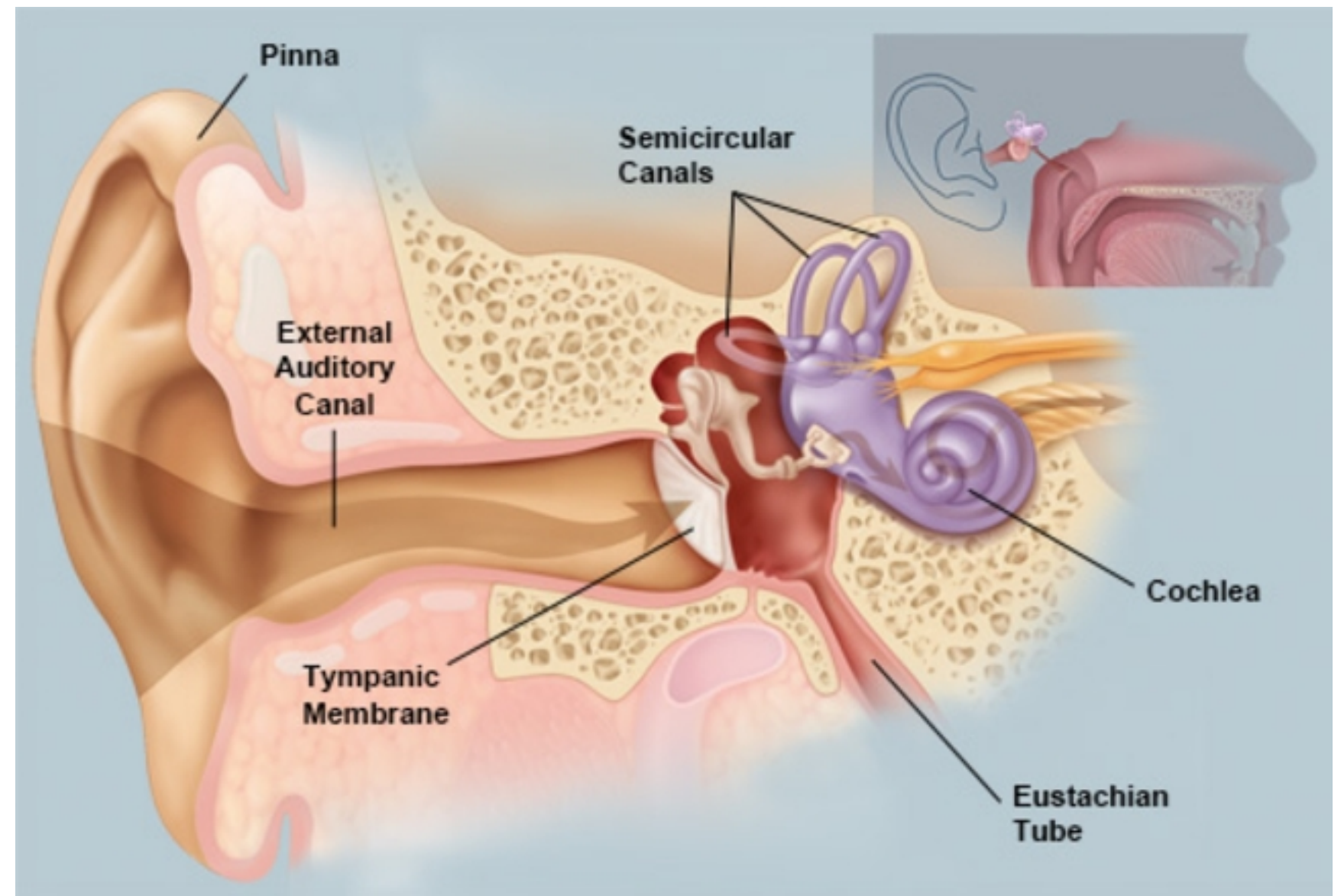
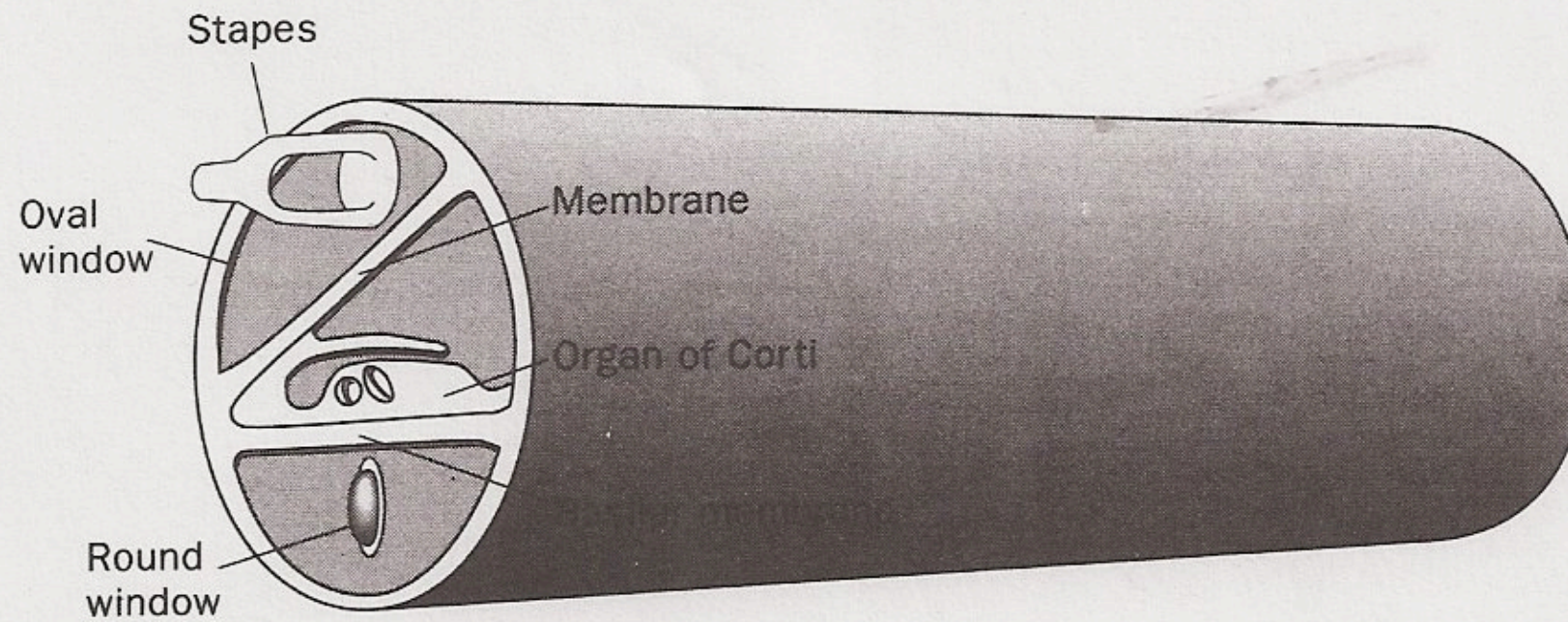
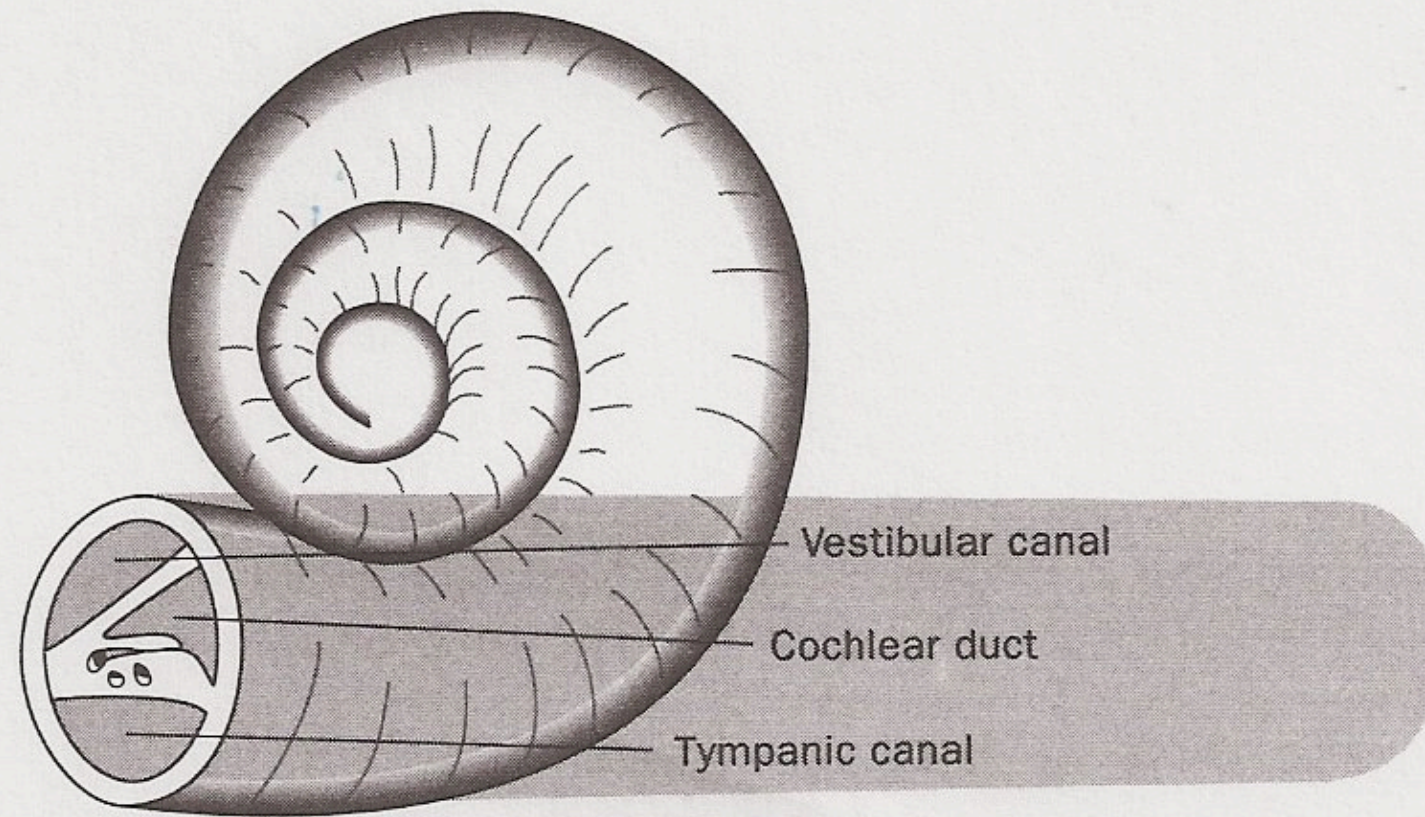


# Auditory coding



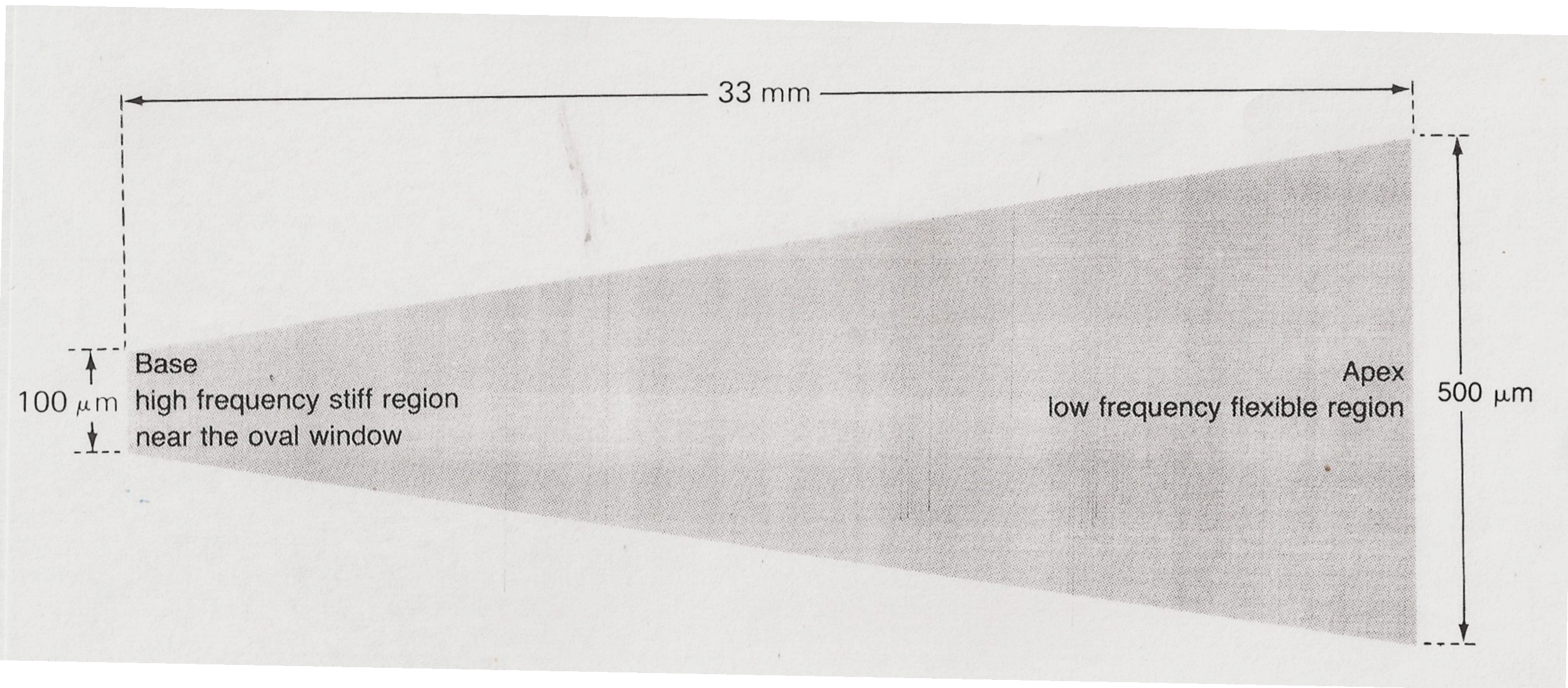




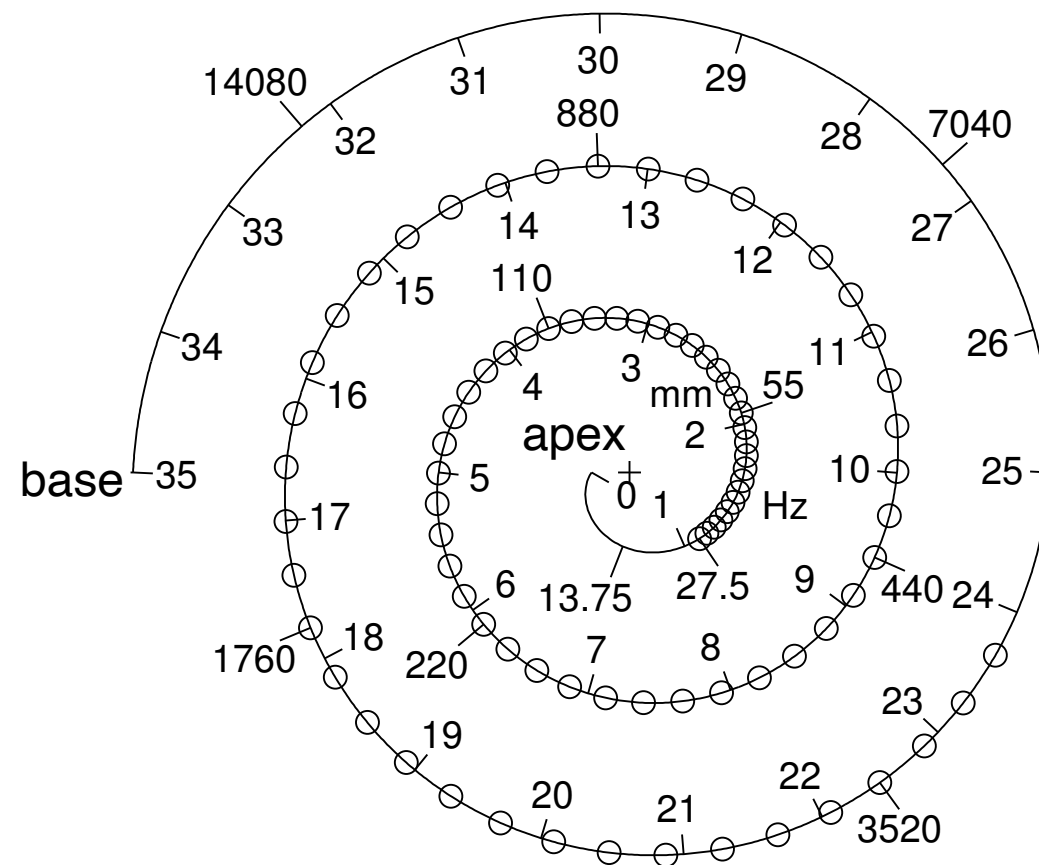
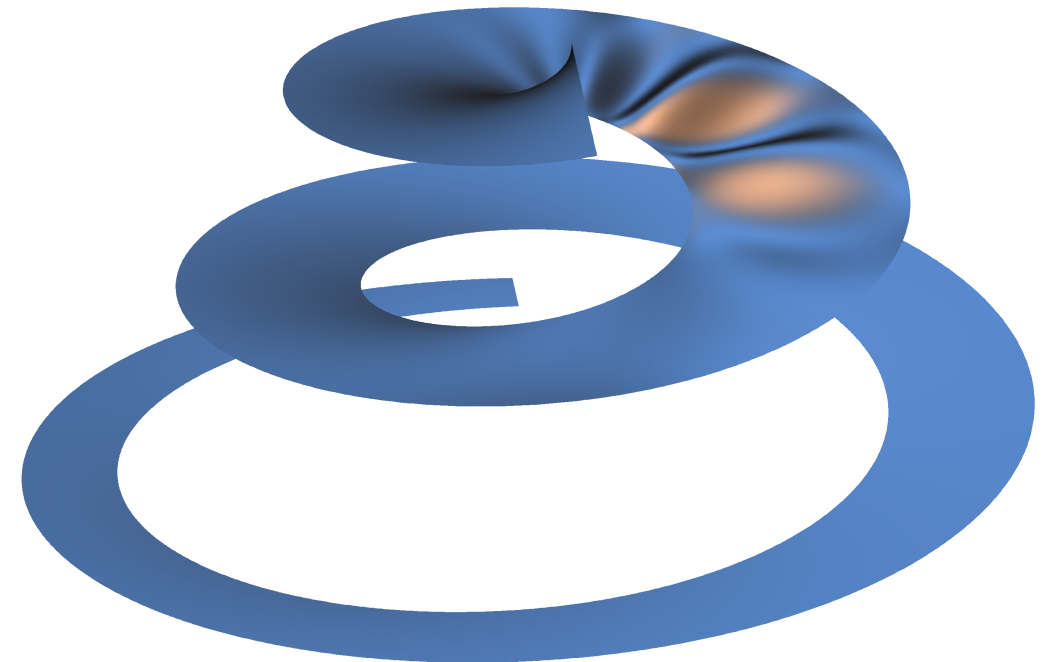
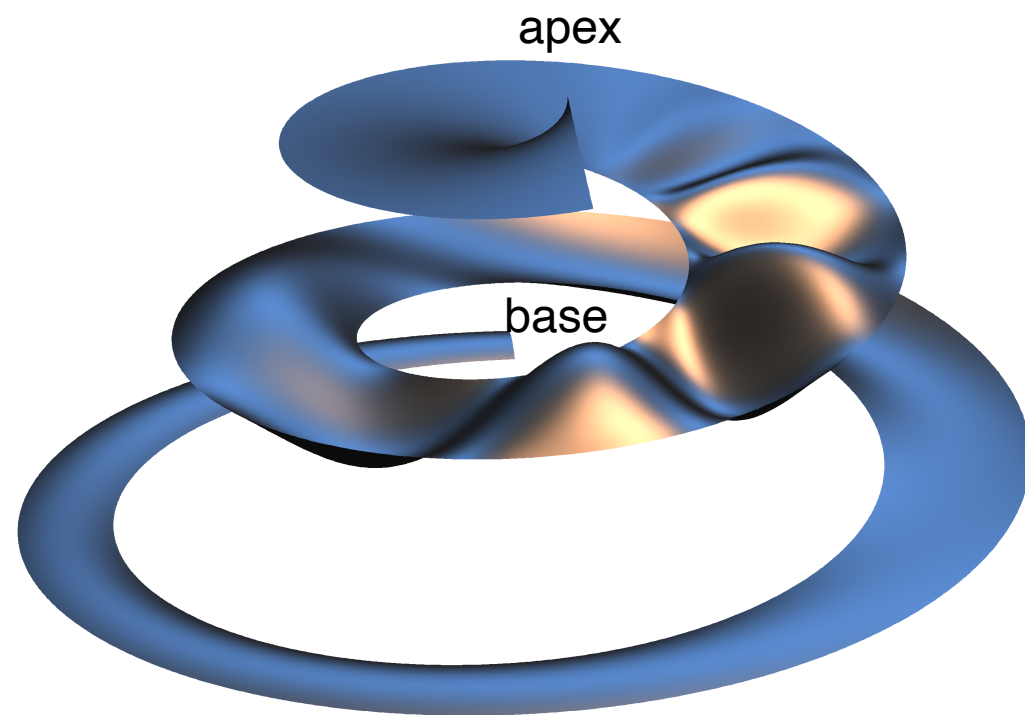
**FIGURE 9.11** A section of an uncoiled cochlea.



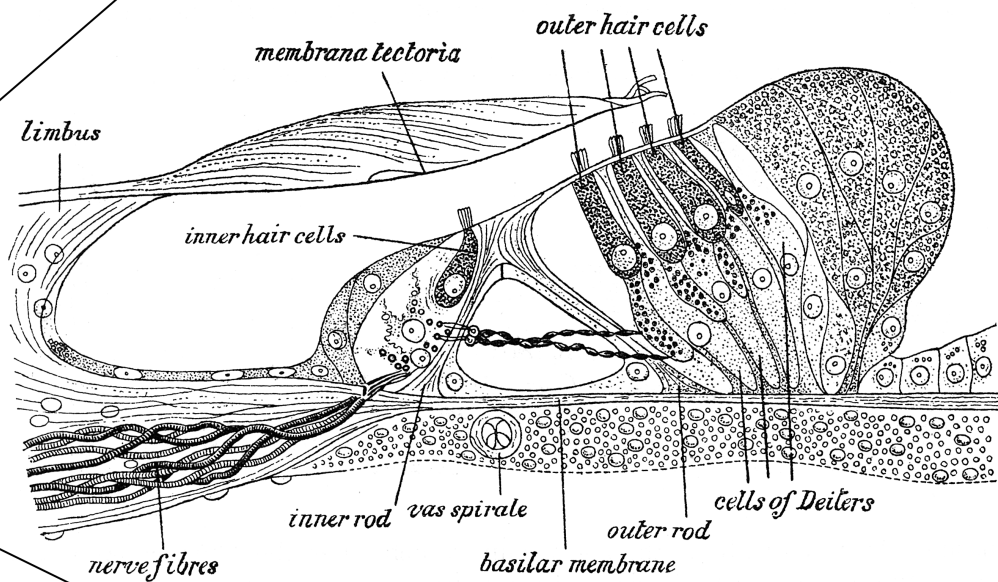
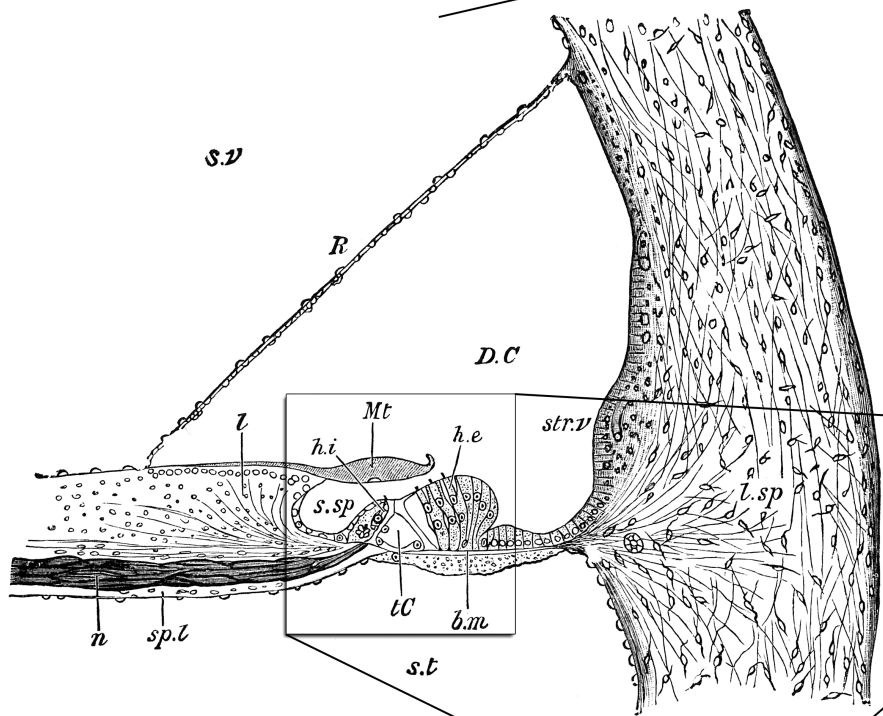
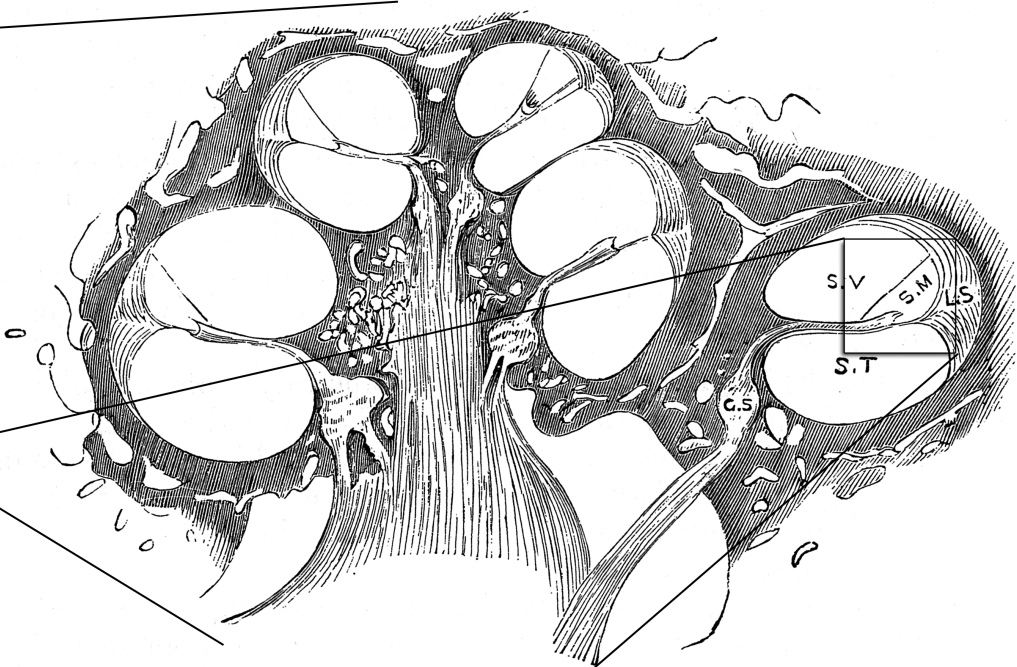
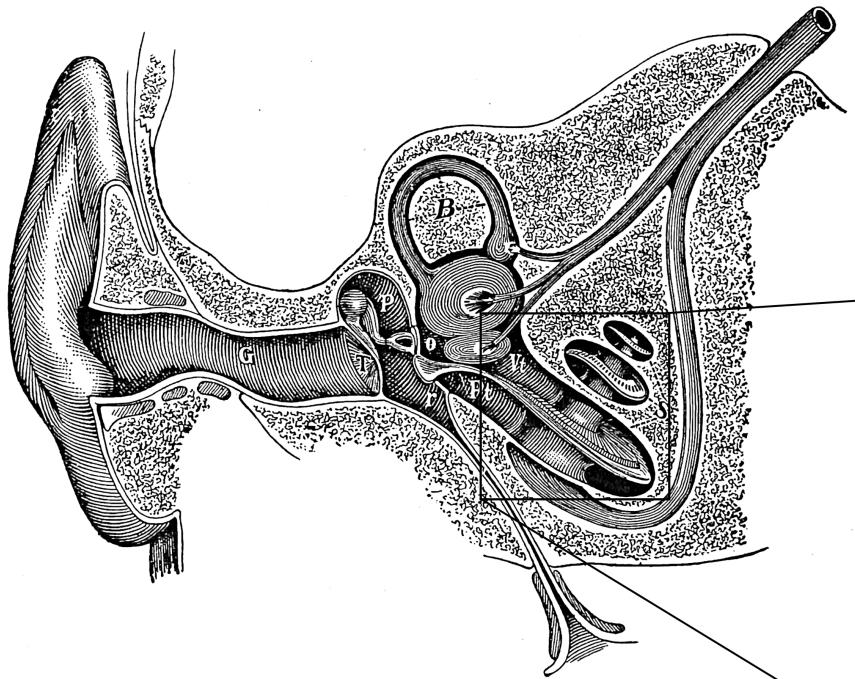
# Basilar membrane





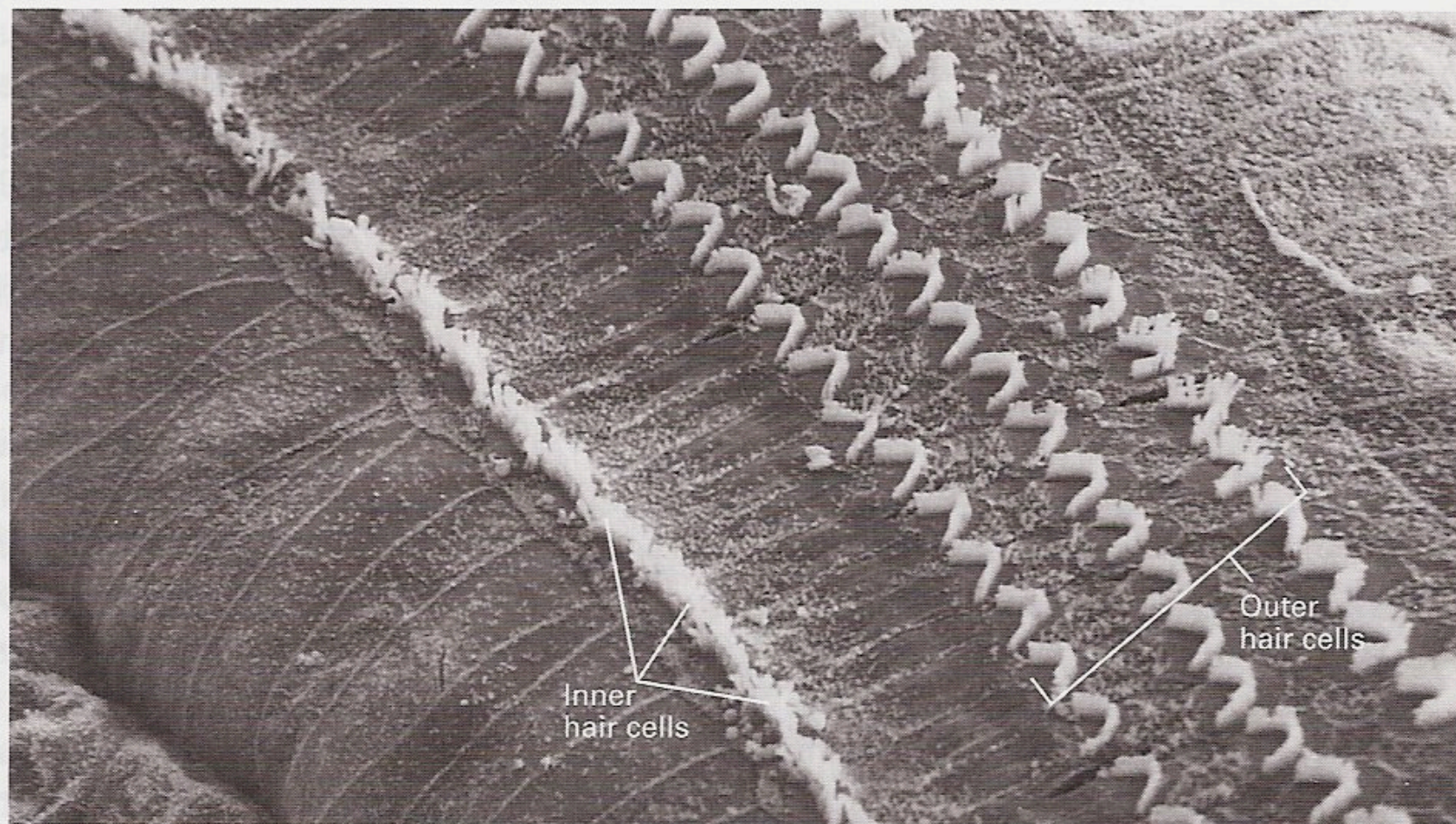




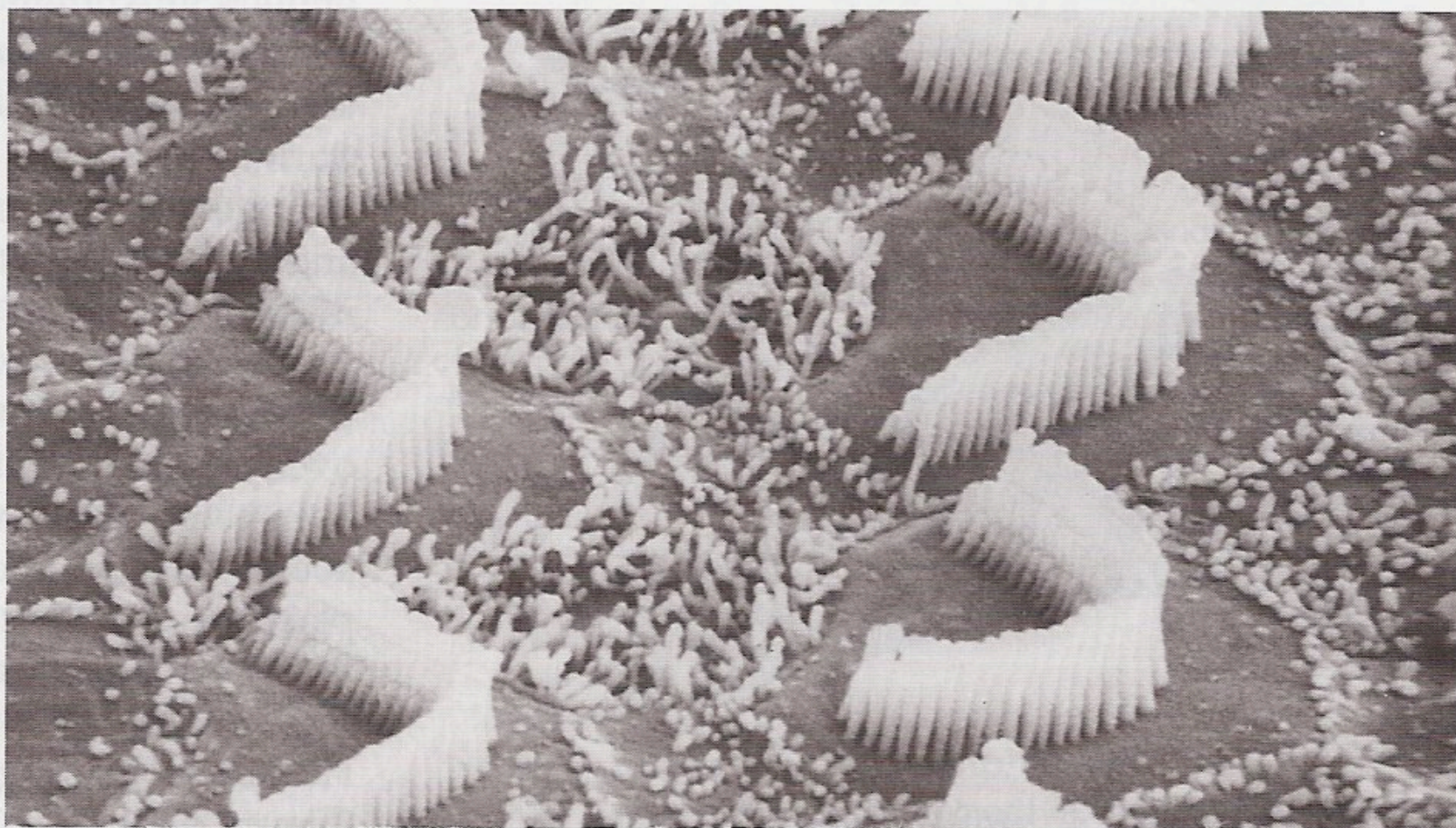




A



B





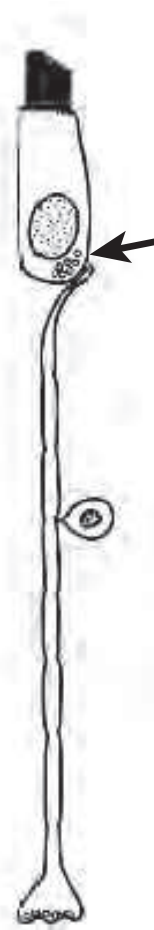
smell



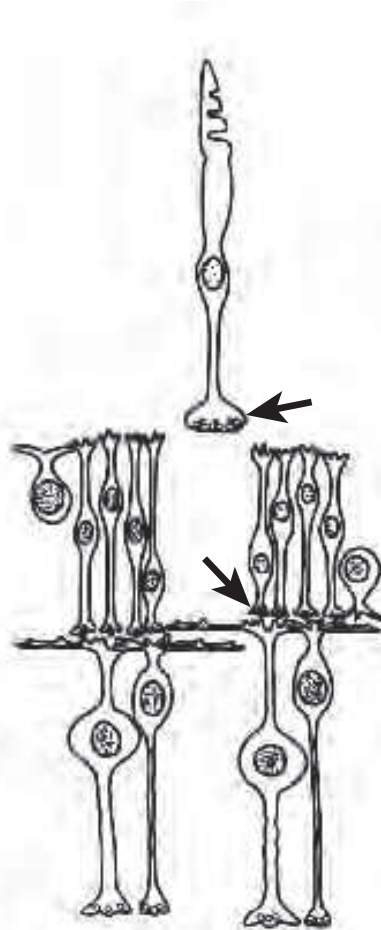
touch



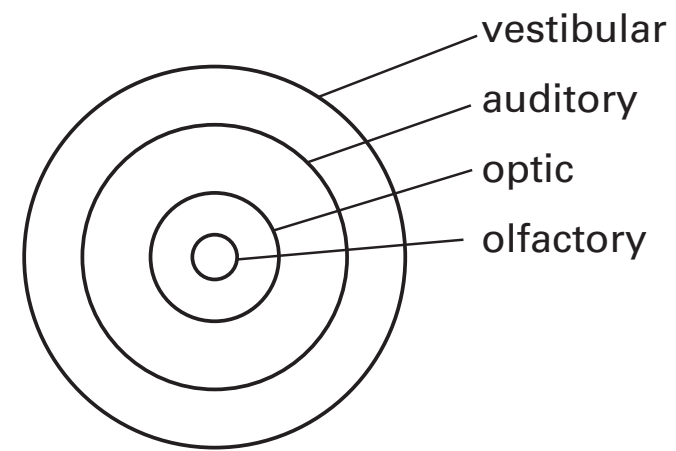
hearing



vision



axon diameter

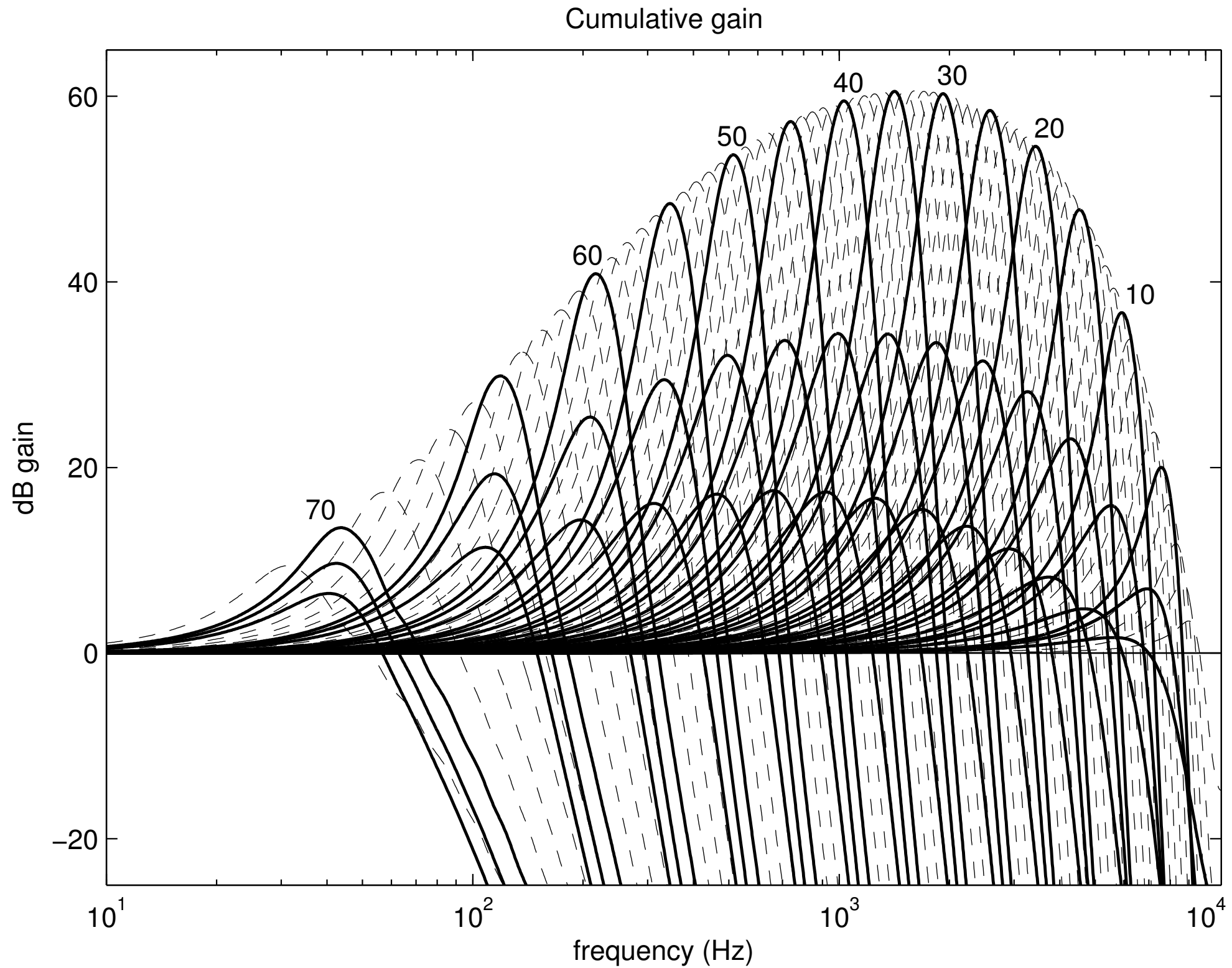


number of axons

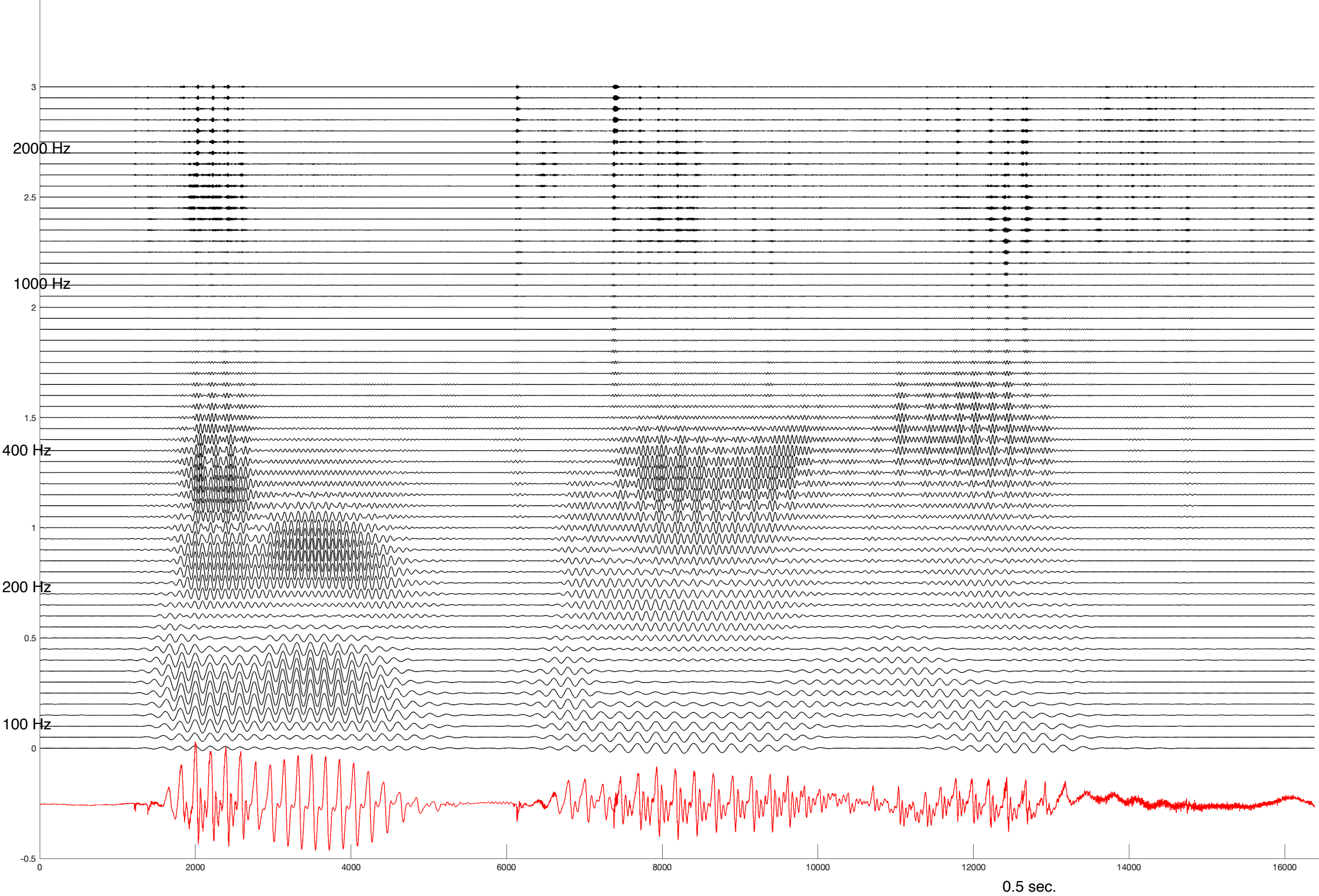
$10^4$   
 $5 \times 10^4$   
 $10^6$   
 $10^7$



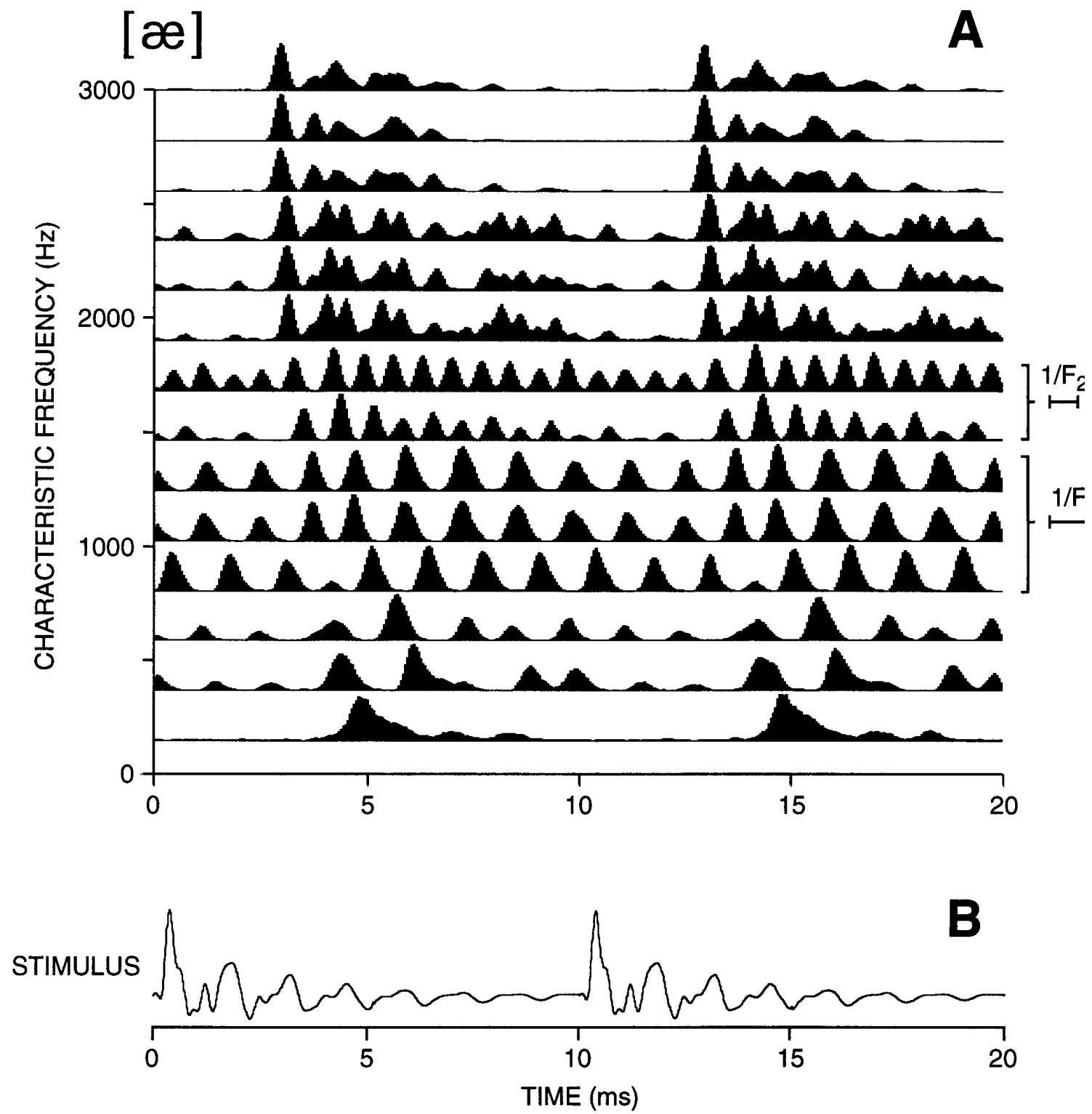
# ‘Auditory Filters’



(from Lyon 2017)





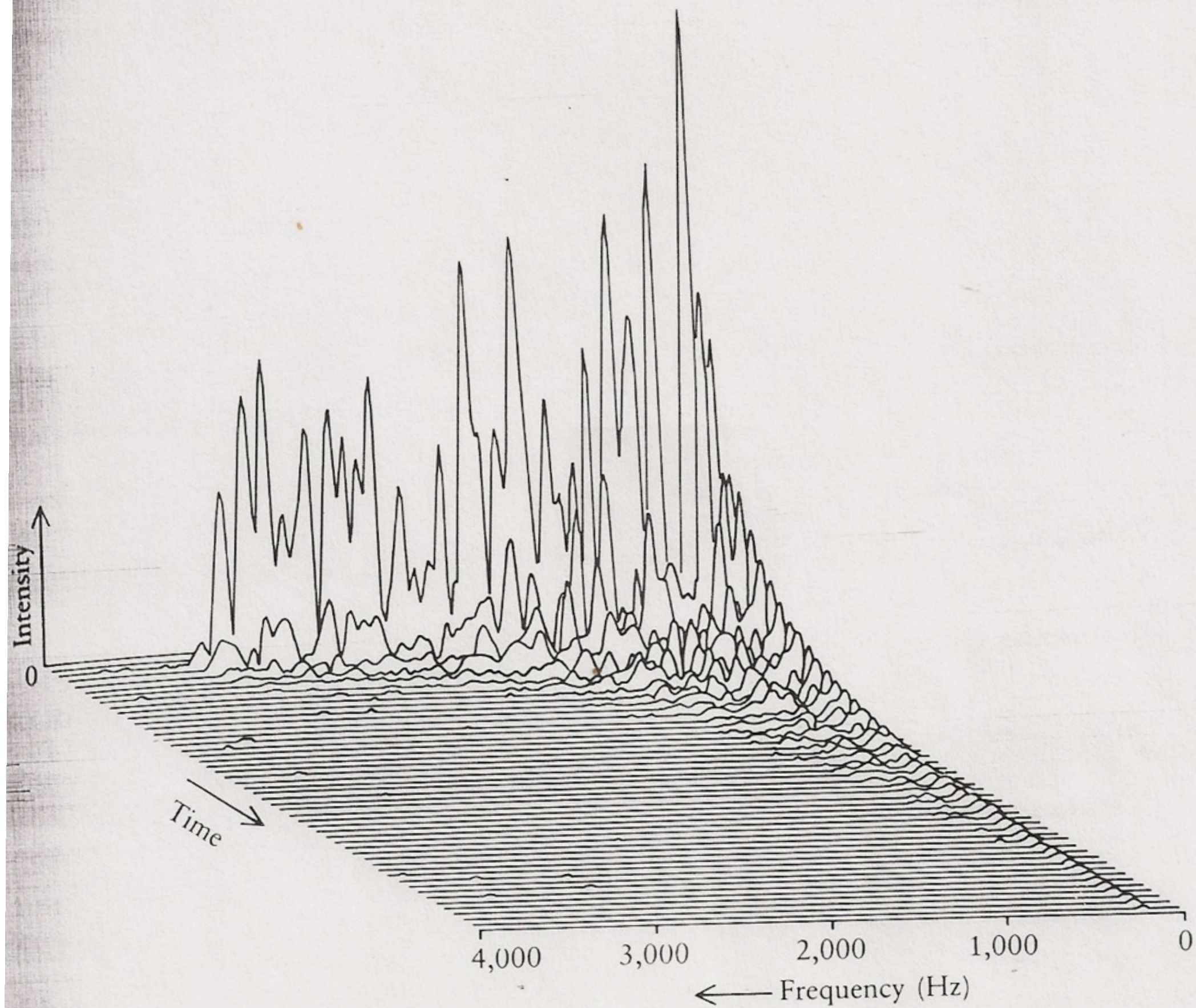


(from Delgutte 1997)

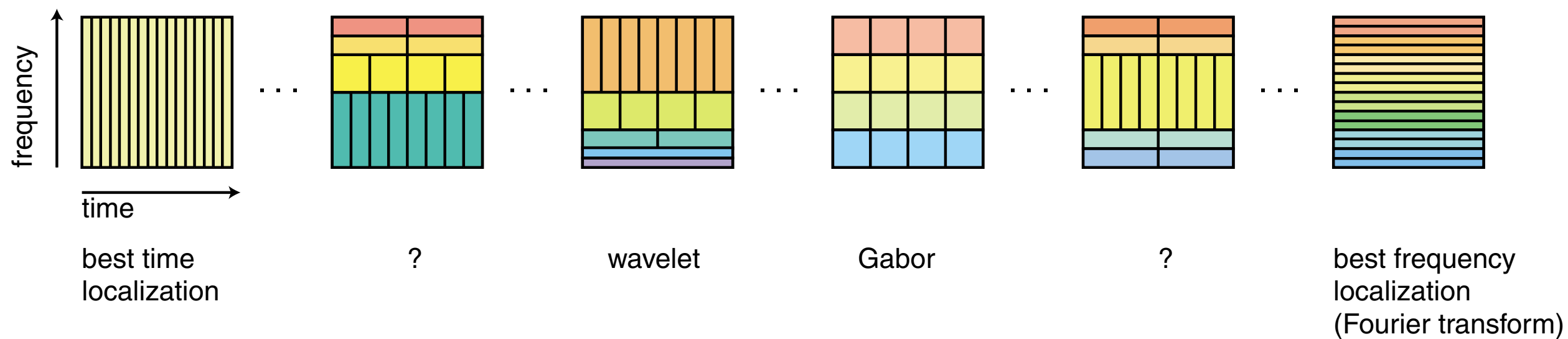


Fourier analysis  
vs.  
Time-frequency analysis









(from Olshausen & O'connor 2002)

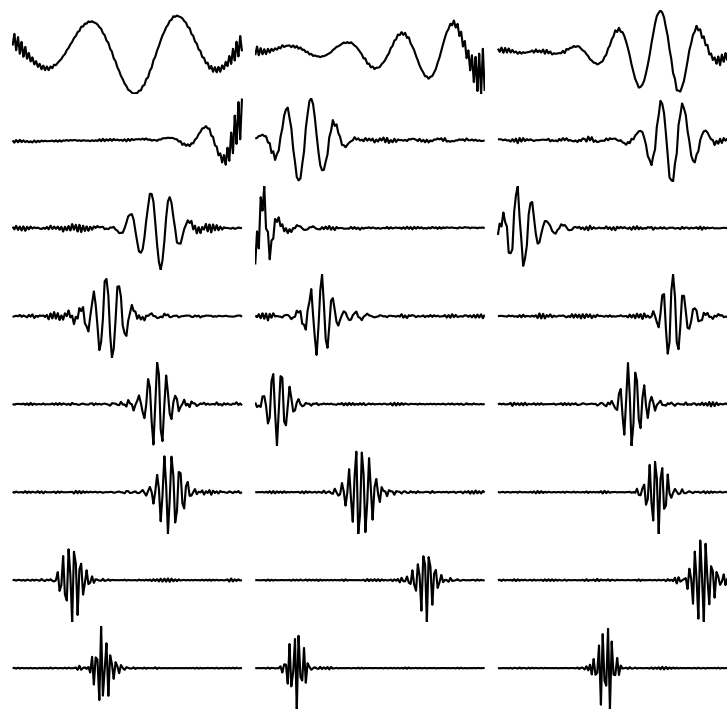
# Independent Components Analysis (ICA)



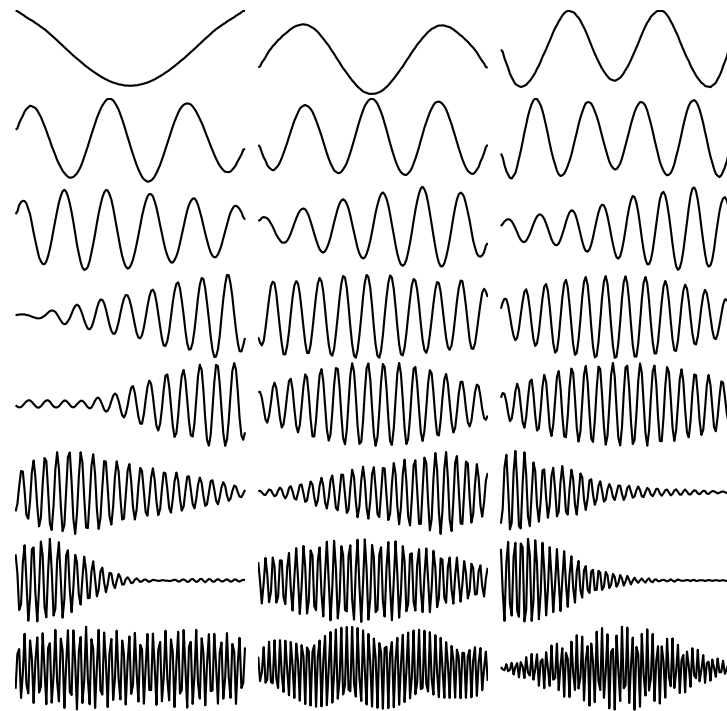
# ICA of natural sound

(Lewicki 2002)

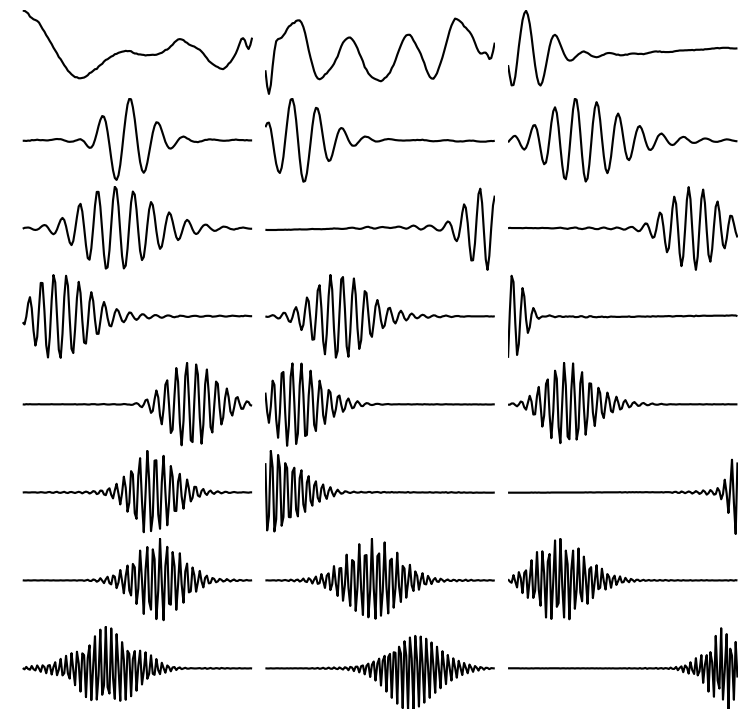
environmental sounds



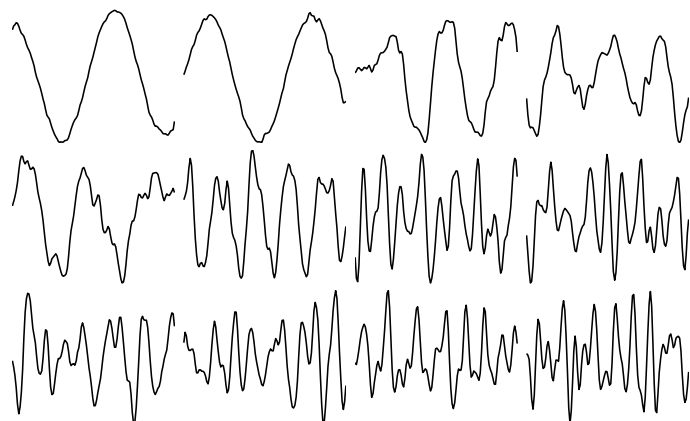
animal vocalizations



human speech



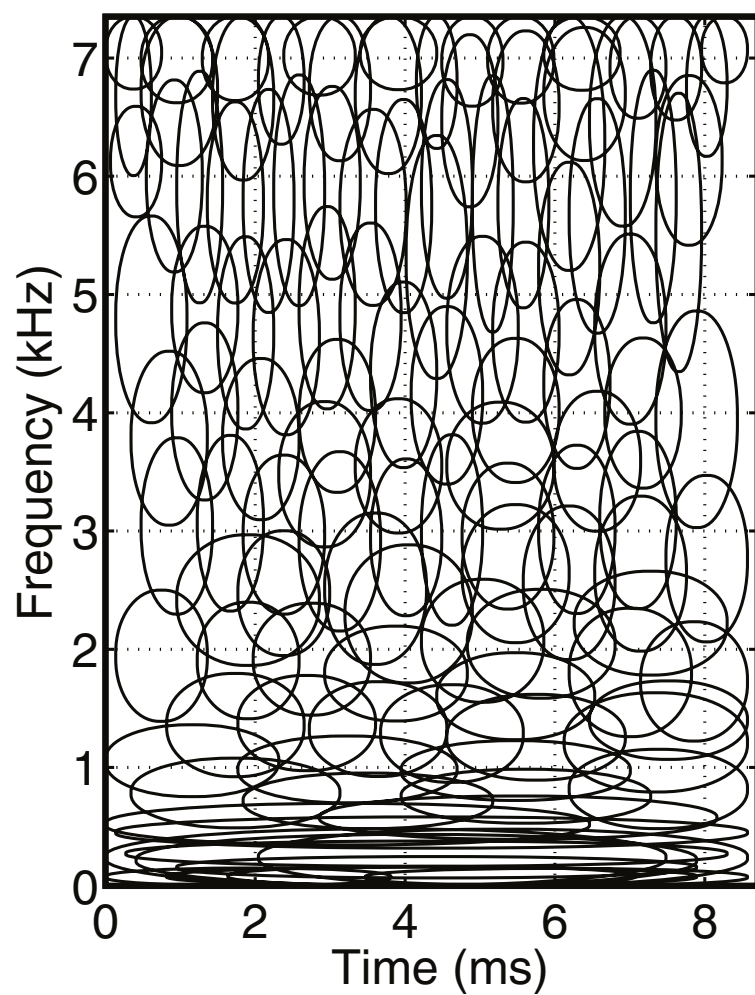
(PCA)



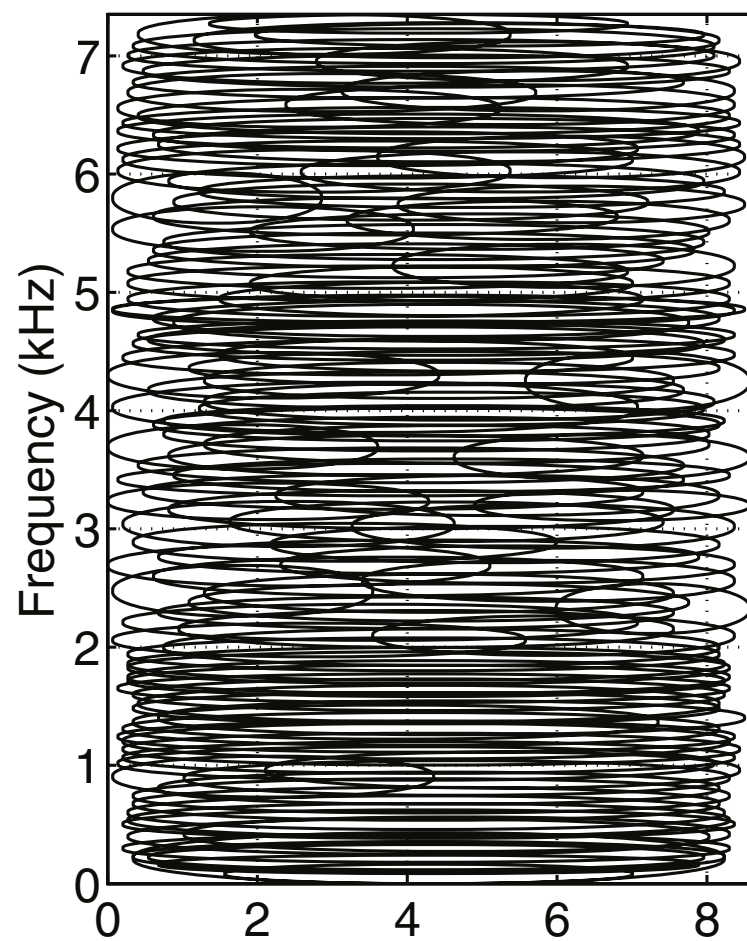
# ICA of natural sound

(Lewicki 2002)

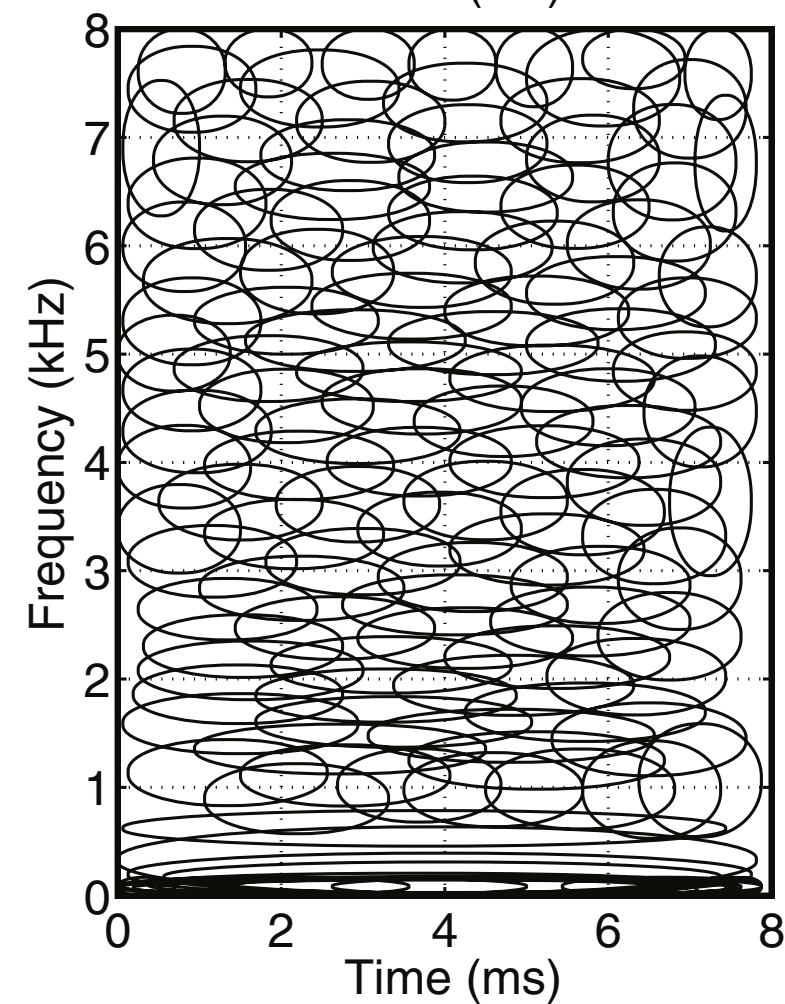
environmental sounds



animal vocalizations



human speech





# ICA of natural sound

(Lewicki 2002)

