

modulation of the call was severely compromised by propagation, the amplitude modulation of the beats produced by the two voices remained largely unchanged.

Our experiments demonstrate that the beats generated by the interaction of these two frequency bands propagate well through obstacles, being robust to sound degradation through the medium of bodies in a penguin colony, but above all that they convey information about individual identity. To test the hypothesis that the two voices may play a key role in individual recognition in the *Aptenodytes* genus we designed a series of playback experiments

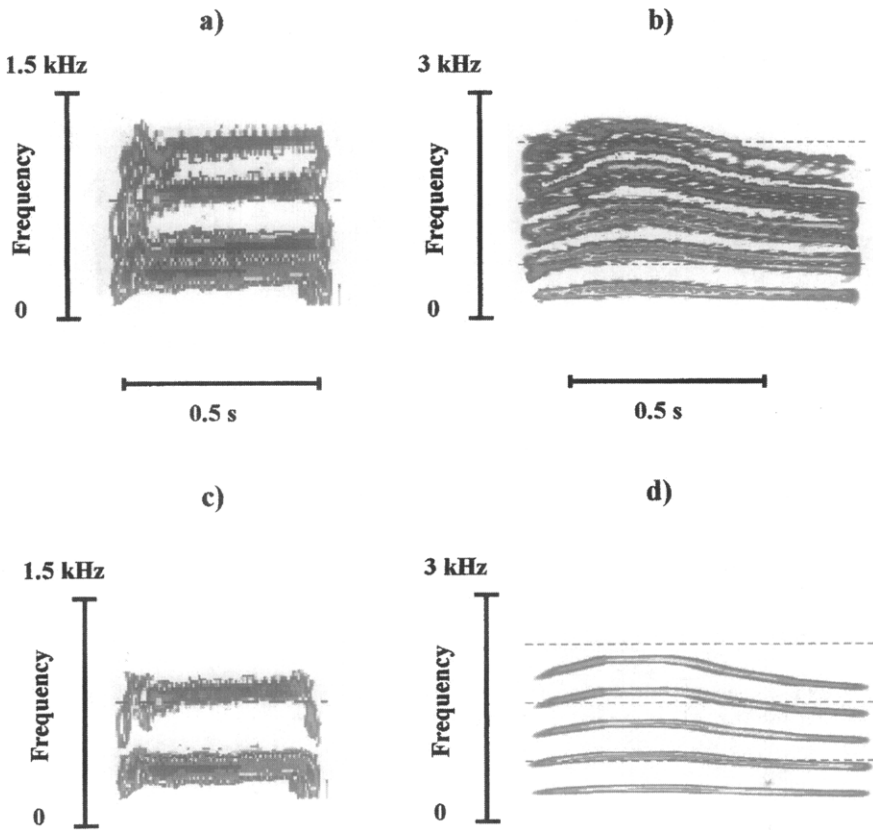


Fig. 11. Sound spectrograms (1024 points window size) of syllables of emperor (left) and king (right) penguins. (a) and (b): low-pass filtered natural syllable, with only the fundamentals and the first harmonics kept; (c): one voice removed by filtration in the emperor penguin signal; (d): synthetic signal built on the model of the low-pass filtered king penguin signal, but with only one voice. The low-pass signals with two voices are recognized but not the one-voice signals.