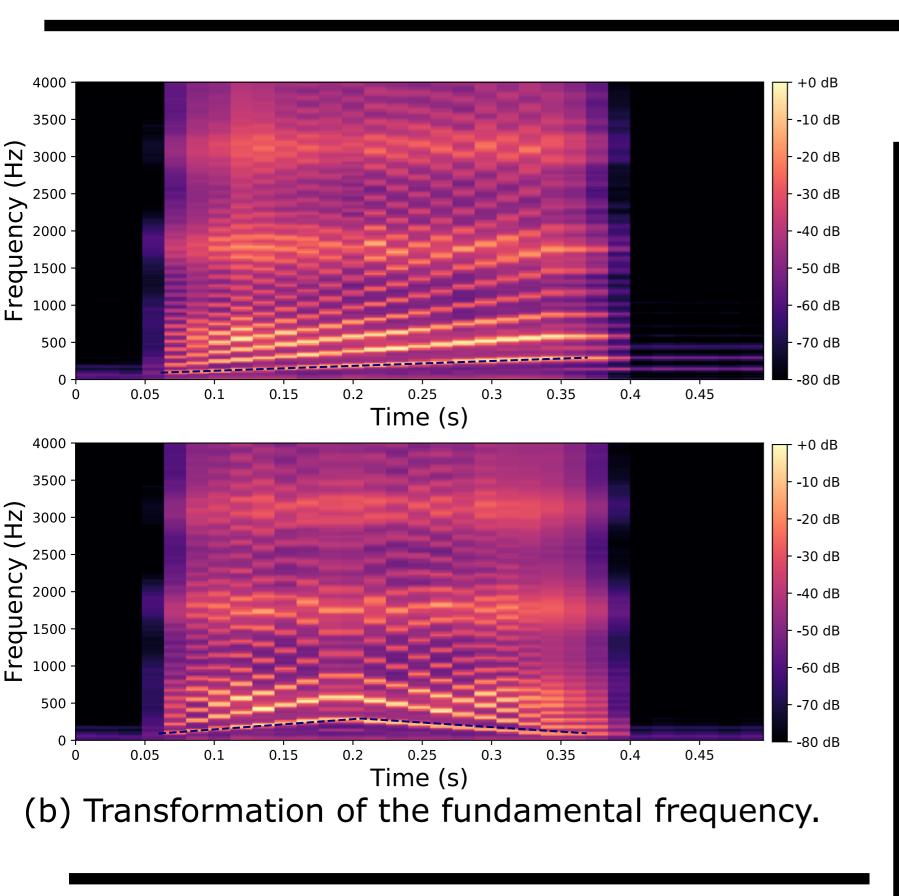
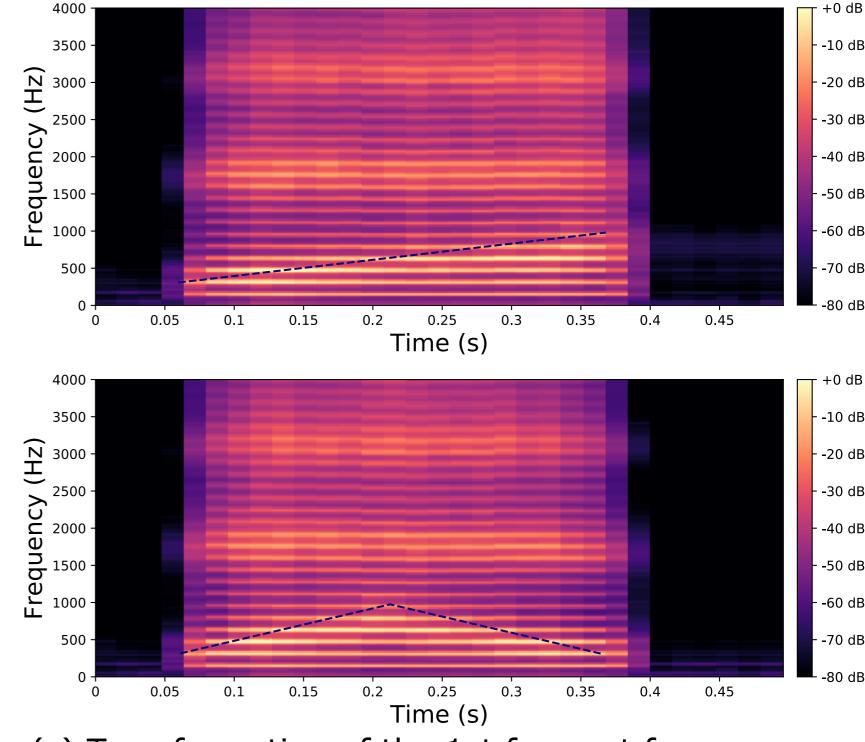


(a) Original spectrogram of the vowel /ae/ uttered by a male speaker.

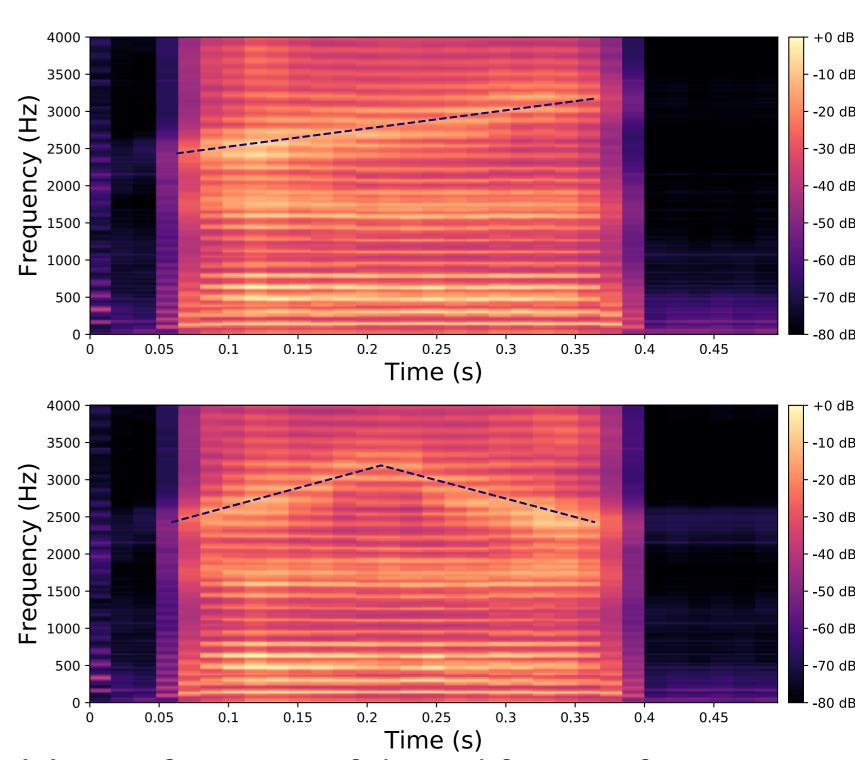


-10 dB -20 dB Evednency (- -30 dB -40 dB - -50 dB -60 dB 500 --70 dB -80 dB 0.1 0.15 0.2 0.25 0.3 0.35 0.45 0.05 0.4 Time (s) 4000 -+0 dB -10 dB 3500 -Eveduency (Hz) 2500 - 2500 - 1 -20 dB -30 dB -40 dB -50 dB -60 dB 500 --70 dB -80 dB 0 + 0.3 0.05 0.1 0.15 0.2 0.25 0.35 0.45 0.4 Time (s)

(d) Transformation of the 2nd formant frequency.



(c) Transformation of the 1st formant frequency.



(e) Transformation of the 3rd formant frequency.