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Vocal tract interactions in saxophone performance

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Although acousticians have debated the importance of the vocal tract in reed instrument performance, expert saxophonists report adjusting their vocal tract for advanced techniques including *altissimo* playing, subtone playing, bugling and multiphonics. Using a novel method [1], we incorporated an acoustic impedance head within a saxophone mouthpiece to study the vocal tract directly during playing.
For fingerings above the first register, the operating peak in the saxophone's input impedance decreases with increasing pitch, falling to below 20 MPa.s.m^{-3} after 2.7 octaves, thus ending the standard range that is readily available to amateurs. Above this, in the *altissimo*, professional saxophonists produce peaks in the impedance of their tracts of about 20 to 40 MPa.s.m^{-3}, which they tune to select the desired note. The crossover of the relative magnitudes of saxophone and tract impedance peaks coincides with the transition from standard to *altissimo* register.
While professionals use the vocal tract thus for other extended effects, inexperienced players do not tune their tract resonances and are unable to produce advanced effects.
[1] Chen, JM. Smith, J. and Wolfe, J., (2008) "Experienced saxophonists learn to tune their vocal tracts". Science, (in press).