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Indirect acquisition of flutist gestures: a case study of harmonic note fingerings

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The indirect acquisition of musicians' gestures consists in retrieving information about gestures from the sound. Inspired by previous studies investigating clarinetists' gestures, we focus on the flute, which features numerous playing modes and a rich palette of sounds. Our goal is to provide musicians with guidelines for using indirect acquisition. For a variety of playing modes, we collected information about gestures, body parts involved, and effects on the acoustical signal. We then designed signal processing algorithms for recognizing which gesture is involved in a given sound; later we will quantize related movement by combining direct acquisition, indirect acquisition and motion capture.

Focusing on harmonic note fingerings, a first experiment investigated octave-related harmonic note fingerings with 1 non-expert performer (ff dynamics and normal articulation). A target F_0-guided PCA on the amplitude of the first six harmonics of $F_0/4$ from 1 semi-tone frequency bands retrieved the correct fingering with 2 principle components in all trials. A second experiment investigated octave and non-octave related harmonic note fingerings with 4 expert performers. A target F_0-guided PCA on the sum of energies around iF_0/k ($k=2,...,6$; $i=1,...,12$) provided wider clusters, making more difficult to retrieve the correct fingering in some specific cases that we will discuss.