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Exploration of timbre variations in music performance

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Timbre has seen during the twentieth century a growing attention from both musicians and scientists, the former to expand a traditional music system until now governed by the structures of pitches, the latter to better understand how timbre is produced and how it is processed by the perceptive and cognitive systems. In the music performance context, many studies deal with the role of timing and dynamics, but much fewer are dedicated to the one of timbre. The works presented here aim at showing the importance of timbre variations from two points of view: the production of sounds and their perception. The relations between the control parameters (mouth pressure and reed aperture) of a simplified physics-based clarinet synthesis model and the generated timbres have been investigated. Experiments have further been done to measure the within-individual consistency of timbre variations of a clarinet player repeating several instances of a musical excerpt from a Bach piece while keeping the same musical intention. Brightness variations characterized by the time-varying Spectral Centroid showed a strong consistency across the repetitions. The influence of such brightness variations on the perceived musical quality of a performance was then assessed thanks to an analysis-transformation-synthesis paradigm.