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Relationships among subjective assessments and measured
physical properties in the didjeridu

John Smith, Guillaume Rey and Joe Wolfe
University of New South Wales, Music Acoustics, School of Physics, NSW 2052 Sydney, Australia

Traditional didgeridus are unusual and ancient lip-valve instruments with an irregular bore that is largely constructed by termites eating the interiors of small eucalypt trees. This produces instruments with a broad range of bore geometries with many details not immediately apparent to a player. They are therefore well-suited for examining relationships between subjective assessments by players and their measured physical properties. In this study, seven experienced players assessed 38 didgeridus that spanned a wide range of quality, pitch and geometry. A control group of 11 plastic cylindrical pipes were also studied. Eight subjective parameters (backpressure, clarity, resonance, loudness, overtones, vocals, speed, and overall quality) were assessed and the ranking of each instrument correlated with measurements of their geometry and acoustic input impedance spectrum. A strong result of these experiments was the finding that the ranked quality of a didgeridu correlated negatively with the magnitude of its acoustic input impedance, particularly in the frequency range from 1 to 2 kHz. Maxima in the impedance of the player's vocal tract would have a greater effect on instruments with a low impedance, thus favouring the production of the varying spectral peaks or formants in the sound envelope that characterise this instrument.