



**A "sound" choice: multi-criteria selection of material for instrument making from wood science viewpoint**

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Wood is the constitutive material of a wide variety of musical instruments and therefore contributes to their global behaviour, "quality" and identity, may it be acoustical, technical or aesthetical. This talk aims at synthesising the various aspects of wood science (physics-mechanics, botany, perception of wood) that can explain the traditional choice of material in instrument making, but also that can contribute to finding alternative solutions. A focus will be given to cases where wood properties are expected to contribute to the instrument's acoustical response. Different levels of variability in vibrational properties can be encountered: (i) organological families and parts/functions; (ii) cross-cultural comparisons; (iii) choice of species through makers' traditional knowledge; (iv) empirical/perceptual qualification of wood pieces within a species; (v) variability of properties within a piece or stock; (vi) effects of surrounding hygrometry on vibrational properties. For levels (i) and (ii), analysis of a worldwide relational database created by the author allow some typologies by organological functions, however a cross-cultural comparison indicates that there may not be a unique "standard" for wood choice and properties. Understanding levels (iii) and (iv) requires interdisciplinary experiments and collaboration between scientists and makers; ongoing works seek to discriminate wood characteristics most involved in maker's choice and analyse their significance in terms of vibrational properties. At level (iv), vibrational properties can vary as much within a given piece -e.g. a soundboard- as between different pieces, and (level vi) changing humidity causes transitional destabilisation in damping that can overtake natural variability. This typology is discussed in terms of methodological requirements for obtaining datasets representative of an instrument making situation.