

String Instruments

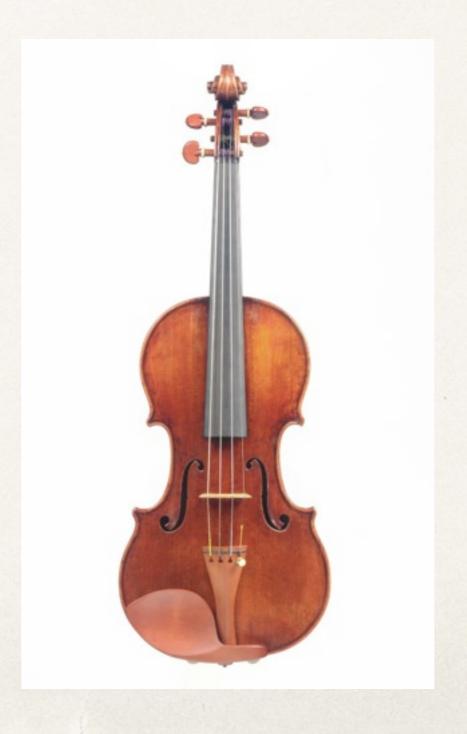
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History

- * Bowed String Instruments date back to medieval times and perhaps earlier
- * The viol family emerged first and was overthrown by the violin family in the 16th and 17th centuries
- * The Violin, Viola, Cello, and Bass of the violin family are still used widely today as the backbone of the orchestra

Viola de gamba vs. Violin





External Components of Violin

- * Four steel or gut strings tuned in fifths (except the basses who tune in 4ths)
- Ebony Fingerboard / Neck
- * Nut
- Tailpiece
- Bridge
- Top/Back/Sides (Ribs)
- Peg box/Scroll/Tuning Machines
- Endpin for Cello and Bass

Internal Components of Violin

- Sound Post
- Bass Bar
- These serve critical support roles as well as acoustic ones

Tuning of Top and Back Plates

- Violin makers will take the tops and backs of violins in progress and tap them to listen to their pitch
- The top and back act as Chladni Plates, and nodal lines can be detected

Plucked Strings

- Plucking a sting at its halfway point tends to excite modes that are odd numbered harmonics of the fundamental
- Two identical pulses propagate in opposite directions away from the center
- Modes 3,7,11,etc must be opposite in phase of 1,5, and 9 in order to give a maximum at the center
- Plucking in different areas on the string will result in different harmonics dampened/excited

Bowed Strings

- Stick and Slip
- A bowed string has a sawtooth shape; a nearly straight string with a sharp bend that propagates up and down the string. Direction of bend is determined by bow direction

Violin like a Speaker

* http://www.youtube.com/watch?v=xVguI1HvWPo

Fret Compensation in Guitars

- * Equal Temperament semitones correspond to frequency ratios of 1.05946, very near 18:17
- * The "rule of eighteen" states that frets should be placed 1/18 the remaining distance to the bridge
- * 18/17 equals 1.05882 (about .06% error), resulting in slightly flat notes
- * At the octave, the note would be 12 cents flat, which is noticeable
- * 17.817 should be used instead of 18

Fret Compensation in Guitars

- Pressing a string down against a fret causes tension, especially in the case of steel strings
- * The fretted notes will sound slightly sharper than the open notes
- * The nut to saddle length is made slightly longer than the fret length scale to compensate for this. It is usually 1 to 5 millimeters

Rolling Shutter Effect

- * http://www.youtube.com/watch?v=TKF6nFzpHBU
- http://www.youtube.com/watch?v=MoUQdcLmz5g