How the Build of a Violin Accommodates Sound

Alicia Fuller, Elouise James, and Bianca Ramon
History of the Violin

- String instruments were first recorded in the middle ages
- 15th century - the family of violins developed
- 16th century - the modern viola and cello emerged
- This group of instruments developed in order to satisfy new ideas of sound
- The ground plan and its basic form are still used today
The Basics of Violin Acoustics

• The body of the violin acts as a resonator and an amplifier.
• The bridge transfers energy of string vibration to the body of the violin. The bridge itself is very effective at transmitting power to the body.
• The soundpost is a small post connecting the flexible belly plate of the violin to the much stiffer back plate.
• This post prevents the belly from collapsing under the vertical component of the tension in the strings, and it also couples the vibrations of the plates.
The Basics Continued...

• The length of the string determines the pitch and can be tightened or loosened at either end by either the pegs on the peg box or the fine tuners on the tail piece.

• Thicker, more massive strings vibrate more slowly creating a deeper sound as in the G and D strings. Thinner strings create a higher sound such as the A and E strings.

• The strings themselves make hardly any noise: they are thin and slip easily through the air without making much of disturbance. It is the bridge and body of the acoustic violin that transmit some of the vibration of the strings into sound in the air.
Anatomy of a Violin

Vibrations from the string pass to the bridge, to the face of the violin, to the sound post, and finally to the back of the violin. The entire body then amplifies the sound.
How Sound Waves are Transferred
Sound Propagation

544 Hz

875 Hz

3300 Hz
The Modes of a Violin

(dB with respect to 8 mN/m s⁻²)
considerations:

• Arch of the Fingerboard – swinging strings

• Height of bridge – pressure

• Bass bar – only essential part that has undergone major changes since Stradivari’s time

• Sound post placement – tone quality

• Varnish – dampening effect
Sources

- http://www.physicscentral.com/explore/action/fiddle-1.cfm
- http://woodsoundsstudio.com/setup.htm
- http://www.sprengerviolins.com/e/violin_history.htm