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Is Your Guitar Too Hot to Handle?

The problem being addressed is how temperature impacts the tune of steel and nylon strings on a guitar. Most classical guitars have a wood body, neck, and head, and are strung with 3 nylon strings and 3 steel strings. According to the theory of thermal expansion, as temperature of a material increases, that material will expand. With increasing temperature, the guitars strings should expand and become looser, which would make the tune flatter.

To test this hypothesis, I used a space heater to control the temperature in a windowless room, and tuned the guitar with my digital tuner. The guitar was tuned at 70°F, and measured at four-degree intervals until the temperature of the room measured 86°F. The procedure was repeated three times.

In disagreement with my hypothesis, the main relationship shown by the data was that as temperature increased, the guitar strings became sharper. Control experiments ruled out humidity and time as variables that may have caused the unexpected results. Other variables that could have led to this outcome included age of the strings, radial thermal expansion, and thermal expansion of the guitar.

To find which variable was the main cause of why the strings went sharp, an additional control experiment was performed. The old strings were changed to new ones, and the above procedure was performed. The result was that the strings became flat, and not sharp, demonstrating that the most likely reason the strings initially became sharp was due to the age of the strings.