CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Michael H. Chan

Project Number
J1599

Project Title
In Search of a New Bridge Material

Abstract

Objectives/Goals
My project is to research and discover whether there exists another bridge material that is stronger and makes better sound than the wood bridge that is currently used on the violin. My goal is to come up with a bridge that is more durable and has better sound quality.

Methods/Materials
I chose new materials, plastic and aluminum that have higher density than wood. In my test, I used wood as my control material. I used four bridges: one wood, one plastic and two aluminum bridges. The two aluminum bridges were of two different thicknesses. After I installed each bridge on the violin, I played the D major scale and recorded the sound into the computer. Using the CoolEdit 2000 program, I analyzed the frequency and loudness characteristics of each note and then I made comparisons among the four bridges. In addition to the sound analysis, I also played and recorded the A major scale at two different speeds and several measures of a song that used all the string with all four bridges. I then played back the tapes to professionals to survey if they could hear the differences and to rank the sound quality of each bridge. The equipments used were condenser microphone, Nakamichi tape deck, 8 mm cassette tapes, PC laptop with computer microphone, a violin and the four bridges.

Results
I found that the frequency of the notes produced by the wooden bridge is about 30 Hz lower than the others. The loudness is about the same for all four bridges. I discovered that the aluminum bridge that is half the thickness of the wooden bridge does not work because it was not stable and warped. The professionals who did the survey preferred the sound qualities of the plastic and the aluminum bridges.

Conclusions/Discussion
I concluded that aluminum and plastic bridges will produce consistent sound qualities because they are homogenous materials, where as wood is non-homogenous with the grain and is brittle. Wooden bridges can warp over time, both aluminum and plastic are stronger than wood. My experiment showed that aluminum or plastic can replace the wooden bridge on the violin and these materials will in fact be stronger and produces good sound qualities.

Summary Statement
A scientific investigation on the effect of bridge material on the sound of the violin

Help Received
Mr. Robert Borate helped make the aluminum bridges. Dad helped to download the CoolEdit 2000 software from the Internet. Dad helped with the recording equipment. Mom helped with the glueing of the pictures on the display board.