



**CALIFORNIA STATE SCIENCE FAIR  
2008 PROJECT SUMMARY**

<b>Name(s)</b> <b>Lisa Huang</b>	<b>Project Number</b> <b>J1916</b>
<b>Project Title</b> <b>Tone Perception and Flute Compounds: Is There a Correlation?</b>	
<b>Abstract</b> <b>Objectives/Goals</b> The objective was to determine whether there was a correlation between the type or placement of metal in a flute and the tone quality that an audience would perceive. My hypothesis was that the handmade flute with a 14k gold riser and sterling silver headjoint would outperform the other samples. <b>Methods/Materials</b> The materials included a sound recording system, several flutes with different metallic properties, survey for human subjects, sheet music, disinfectant, and a metronome/tuner. I played on and created a recording with the above flutes. Over 50 volunteers listened to the recording, completing the survey. They chose 1 from 4 different words describing the tone quality, and rated each flute's tone on a rubric from 1-4. Each tone description represented the tonal "feel" (eg., pop singer vs. opera singer). The average of every flute's score and each separate tone description's percentages were computed to determine if there was a connection to metallic properties. <b>Results</b> The highest scoring flute had a double gold-plated lip plate and the second highest had a gold riser. Between the lowest and highest scoring flute, there was a 19.92% difference. The highest-scoring flute had 42.2% of its descriptive words as "rich" compared to a nickel flute with the lowest percentage - a 17.4%. The handmade flute with the 14k gold riser had 13% of its descriptive words as "thin" compared to the same handmade flute without the gold riser where 33.3% of its words were "thin". "Rich" was defined as "warm, powerful, strong". "Thin" was "shrill, reedy, transparent". <b>Conclusions/Discussion</b> My hypothesis that the handmade flute with the 14k gold riser and sterling silver head joint would have the best tone quality of my samples was unsupported because the machine-made flute with the double gold-plated lip plate and sterling silver head joint scored highest. I found there to be a correlation between the flute materials and tone perception because of the differences in tone description percentages and tone quality averages. My experiment suggests that the presence of gold in a flute makes a difference in the audible tone quality towards an audience.	
<b>Summary Statement</b> My project tested whether there was a correlation between a flute's metallic properties and tone quality by testing a given audience with a flute recording I created.	
<b>Help Received</b> Borrowed flutes from flautists in my school band; Teachers for letting me use their students to test; Choir director Gail Barbour and band director Steve Charnow for use of recording equipment	