



CALIFORNIA STATE SCIENCE FAIR 2011 PROJECT SUMMARY

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Project Title Spectrogram Analysis of Trumpet Quality and Level of Musician	
Objectives/Goals To determine if a spectrogram can detect differences in trumpet quality (low quality vs. high quality) and the level of trumpet players (beginning vs. intermediate). Abstract Methods/Materials Informed consent was received from 8 beginning trumpet players and 8 intermediate trumpet players to participate in this study. We recorded each musician playing two different notes (C and G) for five seconds each on the low quality trumpet (a Jupiter 600). Then we recorded each musician playing two different notes (C and G) for five seconds each on the high quality trumpet (a Bach ML 360). Using the GoldWave# (v5.58) software, we created the 64 spectrograms (4 notes for 16 participants) and then carefully examined them. We identified the number of consistent harmonics for each note recorded and entered our data into Excel. Next, we performed t-tests (a statistical test) to determine if our results were statistically significant. Results The spectrogram analysis showed intermediate students produced a statistically significantly higher number of consistent harmonics than the beginning students for both notes and both trumpets. For the note G, we found intermediate trumpet players produced significantly more consistent harmonics on the high quality trumpet than the low quality trumpet, however, the beginning trumpet players produced significantly fewer consistent harmonics on the high quality trumpet than the low quality trumpet for note G. Conclusions/Discussion These results suggest spectrograms can be used to detect differences in trumpet quality and trumpet players. The results supported our first hypothesis in that intermediate trumpet players produced a statistically higher number of consistent harmonics than the beginning trumpet players on both notes and both qualities of trumpets. This suggests spectrograms could be used by musicians to improve their music skills and by adjudicators at music festival. The results partially supported our second hypothesis because intermediate trumpet players produced a higher number of consistent harmonics on the high quality trumpet for the G note. Surprisingly, beginning trumpet players produced a lower number of consistent harmonics on the high quality trumpet. This finding suggests beginning trumpet players should not invest in a high quality trumpet, for they actually produce fewer consistent harmonics, which makes for a less rich tone, when using a high quality trumpet.	
Summary Statement This project used a spectrogram to examine differences in the number of consistent harmonics between two different level of trumpet players and two different trumpet qualities.	
Help Received A parent helped set up the t-test analyses.	