CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
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Project Number
S1902

Project Title
Marco Polo: A Study of Interaural Time Delay and Amplitude Perception

Abstract

Objectives/Goals
To determine if when the time delay and volume of sound reaching the ears is changed, then the perception of the source of the sound will change.

Methods/Materials
Two microphones were set 10 cm apart on anechoic foam. In test A, a beeping sound was played every fifteen degrees on a semicircle with a one foot radius around the mics. In test B, the beeps were played every six inches in a direct line from the mics. The recorded sound waves were converted into graphs on a computer, which compared the left mic to the right mic.

Results
The amplitude and time delay differed when the origin of the sound changed.Test A supported that time delay can be used reliably to perceive the direction of a sound's source. However, test B did not support volume as a directional source clue because there was no pattern to which mic had a greater amplitude.

Conclusions/Discussion
Sound perception (on headphones exclusively) can be accurately manipulated in a few steps:
1.Make an exact copy of the track (track A and track B)
2.Decide what direction you want the sound to come from
3.Find the appropriate time delay
4.Play track A in one ear, wait the time delay, then play track B in the other.

Summary Statement
This project is a study of how sound is perceived and how to accurately manipulate its perception.

Help Received
Erik Barnum helped create computer program.