



**CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY**

Name(s) Miriam C. Glicksberg	Project Number J0311
Project Title What Causes Absence of Relative Pitch?	
Abstract Objectives/Goals Last year, I defined five singing phenotypes and discovered that impaired relative pitch (not knowing intervals between notes) in a singing test is likely to be inherited as an autosomal recessive trait. This year's project is aimed at determining what causes these differences in relative pitch abilities. I hypothesized that subjects with Lost-Key or Atonal phenotypes will have a measurable defect either in hearing or in encoding/retrieving relative pitch intervals (memory). Methods/Materials I devised tests to measure hearing (single notes) and relative pitch memory (three-note tunes) using a CD record of notes I played on an accordion. Thirty-five consenting individuals participated by listening to the single and triple note sequences and playing them back on an electronic keyboard. I measured sixty-nine notes per person on a chromatic tuner and converted these letter scores into number values, so I could tabulate the data and graph the results. Results Lost-Key subjects performed worse in the memory test than in the hearing test, and had more trouble with larger pitch intervals. Atonal subjects had the greatest memory defects compared to all other singing phenotypes. Interestingly, those participants with music lessons had better hearing than others in their group, which indicates that the sense of hearing might be trainable. Conclusions/Discussion While Atonal individuals have decreased ability to recognize single notes, their relative pitch memory impairment is much more prominent in causing their inability to sing.	
Summary Statement Inability to sing correlates with poor relative pitch memory, as assessed in a simple tune playback test.	
Help Received My mother drove me to the subjects' houses, bought me the equipment, and gave me tips in using Excel.	