



**CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY**

Name(s) Jeffrey Chang	Project Number S0402
Project Title Northern California Vowel Shift: English Phonological Change in Progress	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals To investigate English phonological change (California Vowel Shift) in the Bay Area in the past twenty years, and attempt to explain the causes of the sound change and possible intraspeaker variation.</p> <p>Methods/Materials 10 female adult speakers (age 35+) and 10 female adolescent speakers (age 13-18) are recorded. The subjects read a word list containing sample tokens of all vowel classes. Additionally, certain speakers record a sociolinguistic interview for conversational data in a more informal environment. All recordings are manually transcribed and then phonetically aligned with forced alignment tools. Tokens containing vowels of interest are extracted via script, and after hand-adjustment and selection, formant measurements (f1 and f2) of all acceptable tokens are measured at the midpoint of the vowel. These measurements are then normalized via a modified Watt and Fabricius procedure. Finally, a two-sample t-test is performed to compare the mean normalized vowel formant values of the two speaker groups.</p> <p>Results The majority of the vowels involved in the California Vowel Shift have a statistically significant difference between the two age groups, implying that the qualities of the vowels have indeed changed in the past 20 years. Most notable is the fronting of back vowels /u/ and /ow/ in post-coronal environments, and distinct phonological split of the /æ/ in pre-nasal environments. Other developed features, such as the low back merger, are also present, but show no differences between the age groups. Furthermore, within speakers themselves, the quality of certain vowels varies across contexts. While the vowel quality tended to remain consistent for adults between word list and conversational data, for the teens, the vowel shift was more advanced in their conversational data. In other words, social context does have an effect on extent and the quality of vowel shift, especially for more innovative speakers.</p> <p>Conclusions/Discussion The present study demonstrates a significant change in English in the Bay Area over the past 20 years, consistent with prior findings of the California Vowel Shift. It suggests that the change is socially driven, but it is the subject of future research to determine the exact mechanism.</p>	
Summary Statement The present study investigates English phonological change in the San Francisco Bay Area in the past 20 years, pinpoints how certain vowel qualities shift, and attempts to explain why language is evolving.	
Help Received Borrowed Dr. Penelope Eckert's microphone	