



**CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY**

Name(s) Conner R. Bennett	Project Number 33023
Project Title Quantification of Zoo Enclosure Space Use and Nervous-Frightened Response by Endangered Chacoan peccary	
Abstract Objectives/Goals This study seeks to measure enclosure space utilization by the San Francisco Zoo's four Chacoan peccary and statistically quantify the animals nervous-frightened response to the miniature steam-powered train horn sound. Methods/Materials The modified Spread Participation Index (SPI) (Plowman, 2003) was calculated to determine the animals use of the unequal enclosure space sections. Chi-square statistic analyzed the relationship between the train horn sound and the animals nervous-frightened response. The SPI is expected to indicate imbalanced enclosure utilization while the train horn sound and Chacoan peccary back hair standing-up is not independent. Results The SPI was 0.267112. An SPI of 0.0 shows an even distribution of space use and 1.0 indicates the animals staying in one quadrant. The chi-square statistic was 271.85, DF=1; 0.05 significance level; ($p < 0.01$) and supported rejecting the null hypothesis. Conclusions/Discussion The SPI indicates the animals do not use the enclosure space equally. With 2,172 observations, quadrant 2 had the lowest utilization, 7 percent. The animal's daily range area in the wild is nearly 180 times the size of its zoo habitat. The chi-square results show an association between the train horn sound and nervous-frightened behavior. The hair stood up 36 times and 32 times (89%) were in response to the train horn sound. Adding a small water pool to quadrant 2 may produce more even space use; building a Plexiglas sound wall where the train passes the enclosure could reduce the number of hair-up responses; and, further research is needed in these areas.	
Summary Statement Chacoan peccary zoo enclosure space utilization and, back hair-up response to the zoo's train horn sound were statistically quantified and recommendations were made.	
Help Received Dr. Julie Woodruff provided encouragement and general guidance via email. I have never met or spoken with Dr. Woodruff. My parents proofread my presentation, drove me to the zoo, and were the timers.	