



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

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| Name(s) Esther Min | Project Number S0319 |
| Project Title Arithmetic Differences: Does a Language Affect Arithmetic Calculations? | |
| Abstract Objectives/Goals My objective is to investigate whether a language influences the arithmetic performance. The hypothesis is that more complex number structure and more phonemes would lower the performance score in arithmetic calculations. Methods/Materials Two sets of test questions were developed for each level, elementary and high school. Both sets at each level had exactly the same operators but different operands. One set (Type A) had numbers with fewer phonemes and the other (Type B) with more phonemes. At elementary schools, 176 English-speaking students in USA and 288 Korean-speaking students in Korea participated in this study. At high schools 322 English-speaking students in USA and 488 Korean-speaking students in Korea participated. Results The score of English-speaking students is significantly lower than that of Korean-speaking students for both types at the two levels. For Type A test at the elementary school level, the mean score for English-speaking students was 14.6, while the mean for Korean-speaking students was 18.2; For Type B test at the elementary school level, the mean score for English-speaking students was 12.7, while the mean for Korean-speaking students was 17.4. The test scores of Type B test were lower than the score of Type A for both levels in two countries. The differences between Type A and Type B in English-speaking students were larger than the differences in Korean-speaking students. Conclusions/Discussion A language affects arithmetic performance. The English number structure is more complex than Korean number structure. The English numbers have more phonemes than Korean numbers. English-speaking students experience more difficulty in arithmetic calculation than Korean-speaking students. | |
| Summary Statement This project studies whether number structure and phonemes of a language influence the arithmetic performance. | |
| Help Received Teachers of my high school, Daedeok High School, Gyeong-il Girls High School, Mt. View Elementary School, and Dunwon Elementary School allowed classes to take the tests. Ms. Benitez arranged elementary school classes. Dad taught me how to use SPSS program. | |