CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
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Project Number
S1206

Project Title
What's So Great about Sex?

Abstract

Objectives/Goals
To determine whether the rate of evolution towards on optimal genome is greater among a sexually reproducing population (SRP) or an asexually reproducing population (ARP).

Methods/Materials
Construct two separate computer programs using the programming language Python. One simulates evolution among a SRP and the other simulates evolution among an ARP. Each individual strives to become more fit, which is defined as the distance between an individual's genome and the target and reach a target genome. Adjusting certain values, such as genome size, average mutation rate, etc., makes it possible to compare average evolutionary efficiency under different conditions to acquire the most accurate results possible.

Results
The sexually reproducing population achieved a higher level of fitness at a faster rate than the asexually reproducing population. Changing the values of the parameters created both favorable conditions and extreme conditions in which the populations were to evolve, and only when the average mutation size was extremely high was asexual reproduction advantageous in the evolutionary process.

Conclusions/Discussion
The results we acquired are further proof of why more species in real-life reproduce sexually rather than asexually. We surmise that genetic recombination and variability account for the superiority of sexual reproduction. Because an offspring's genome in a SRP takes beneficial genes from two parents, it will become more fit at a faster rate while also increasing genetic variability within the entire gene pool. Because of the close similarity between a parent and an offspring's genomes in an ARP, genetic variability is low and the population as a whole does not evolve at as fast of a rate as the SRP.

Summary Statement
This project explores whether sexual reproduction or asexual reproduction is more efficient in the evolutionary process of a population.

Help Received
Stefan Karpinski helped with improving and looking over the programs.