How Do Different Stimulants and Depressants Affect Daphnia magna?

Sullivan, Jacquelyn (School: Hilton Head Preparatory School)
Reuben, Jared (School: Hilton Head Preparatory School)

The purpose of this experiment was to determine which comestibles, increased a daphnid's heart rate the most. The independent variables were chosen to have equal numbers of stimulants and depressants, and the levels of the independent variable were chosen to have amounts below the LD50 to ensure viable test subjects, yet different enough to study the effects of increased amounts. It was hypothesized that 20% of the LD50 of caffeine and ethanol would raise a daphnid's heart rate the highest. To determine this, solutions were made of nutmeg, caffeine, ethanol, peppermint, nutmeg and ethanol, caffeine and ethanol, and peppermint and ethanol, and then diluted to form 10% or 20% of the LD50. 15 Daphnia were then exposed to the mixtures for thirty minutes before heart rates were recorded under a microscope. These data did not support the hypothesis as Caffeine 20% had a higher average heart rate than Ethanol and Caffeine 20%. However, Ethanol and Caffeine 20% had the second highest average, so the ethanol may have counteracted the effects of caffeine to some extent. Sources of error included: a change in the Daphnia food, slightly incorrect measurements, slight splashing due to dropping of stir bar, difference in temperature of solutions, varying degrees of daphnids' health, pregnancy and size of Daphnia, trial 15 was tested separately from other control trials, and daphnid's heart rate was not take immediately after 30 minutes. This experiment is internationally applicable because it addresses the effects of drugs, a growing problem among youth especially.