



**CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY**

Name(s) Pauline H. Alarcon	Project Number 34713
Project Title Caffeine: Friend or Foe?	
Objectives/Goals The goal was to study caffeine's effects on the memory, reflexes, and agility. Additionally, I tested a control group with a placebo (decaffeinated coffee) to see if the belief of ingesting caffeine would still boost memory proficiency, improve physical, mental, and reflex agility. My hypothesis was that people would have greater concentration and alertness when they consumed caffeine or believed they were consuming caffeine. Abstract Methods/Materials The procedure I used was to test subjects' physical, mental, and reflex agility before and after consuming caffeine. Testing 4 subjects each using regular coffee, black tea, and decaffeinated tea; the experimental constants were 1) a test measuring clear sweeps within 60 seconds of jumping rope; 2) playing the classic "Fruit Ninja" computer game to determine the maximum points in one game play; and 3) reading and writing from memory a paragraph (each with 3 sentences containing 46 words). The control is the subjects tested before and after caffeine ingestion. I measured the dependent variable by calculating the difference between the subject's scores before and after consuming caffeine. Results The results show that when given coffee: 100% improved with Fruit Ninja, 50% with jump rope, and 100% in memorization skills. When given tea: 75% improved on all tests. When given decaffeinated coffee (believing it is caffeinated): 100% improved with Fruit Ninja and memorization while only 25% improved with jump rope. These results demonstrate that physical, mental, and reflex agility improves even when people only believe they are consuming caffeine. Caffeine and even the belief that a subject is ingesting caffeine does impact the brain. Conclusions/Discussion I found that the subjects that were tested showed measurable results in physical, mental, and reflex agility. This confirmed my hypothesis that caffeine has an effect on the subjects' abilities based on caffeine's interaction with the neurotransmitters which cause the release of stress producing hormones in the body. It should be noted that the amounts of caffeine given to the subjects were limited so only the positive aspects of caffeine intake were observed. Not observed was the effect of large amounts of caffeine, consistent with the ways that coffee and other caffeine containing items can be abused and create such negative effects as extreme nervousness, racing heartbeat, and increased blood pressure.	
Summary Statement The central focus of the project was to determine whether people consuming normal amounts of caffeine would improve in their memorization skills, reflexes, and physical agility and whether other subjects tested with a placebo would also sho	
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