CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
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Project Number
J0337

Project Title
It's Catching!

Abstract

Objectives/Goals

A driver, talking on a cell phone, encounters an unexpected situation: another driver, coming down the wrong side of the road. How should the driver be alerted?

I tested reaction times resulting from visual, auditory, and tactile stimuli. I hypothesized that subjects would react fastest to the auditory stimuli. A follow-up study measured the effect of distraction.

Methods/Materials

I built a device out of PVC piping, with an optionally activated LED and buzzer. At the top, a rod is hangs from an electromagnet until a remote switch drops it to start the reaction-time test. When the subject catches it the hand position on the rod is noted. I calculated the distance that the rod would fall each ten milliseconds and labeled each rod with a #time ruler# from which the reaction time could be read. I controlled the electromagnet and other functions of the device (an LED and buzzer) through a switch box out of the subject#s view.

Five tests were performed with varying stimuli. Three visual: LED turning off, striped rod falling, and blank rod falling. Tactile: the subject catches when they feel rubber tubing attached to the rod hit their hand. Auditory: subject catches when the buzzer turns off. Each test was repeated four times.

Results

My hypothesis of auditory superiority was unsupported. I found that the tactile reflexes were nearly 100 ms (54%) faster compared to all the other stimuli, which had averages within 6 milliseconds of each other.

Conclusions/Discussion

I suspect that the tactile stimuli was fastest because it could be reacted to as a spinal cord reflex, without involving the brain.

I did a follow-up experiment with a similar procedure, using verbal word reversal puzzles to distract subjects while catching the rod. I read three- and eight-letter words to them, which they spelled backwards. I hypothesized that reaction times would worsen with the distraction, and that the more difficult eight-letter task would be worst.

My hypothesis was weakly supported by the results, with higher variability apparent. Experienced subjects behaved as expected, but some inexperienced subjects improved on each successive test. The first experiment randomized the order of tests, while the follow-up did not, allowing a #learning# effect to weaken the result.

In the future, I think that the second project could be redone with a randomized test order and larger subject pool to improve the significance of the result.

Summary Statement

I asked people to catch a falling calibrated rod to find whether they reacted fastest to auditory, tactile, or visual stimuli.

Help Received

Father helped build device and wire controls; Father helped revise abstract.