The Scratch Stroop Effect Game

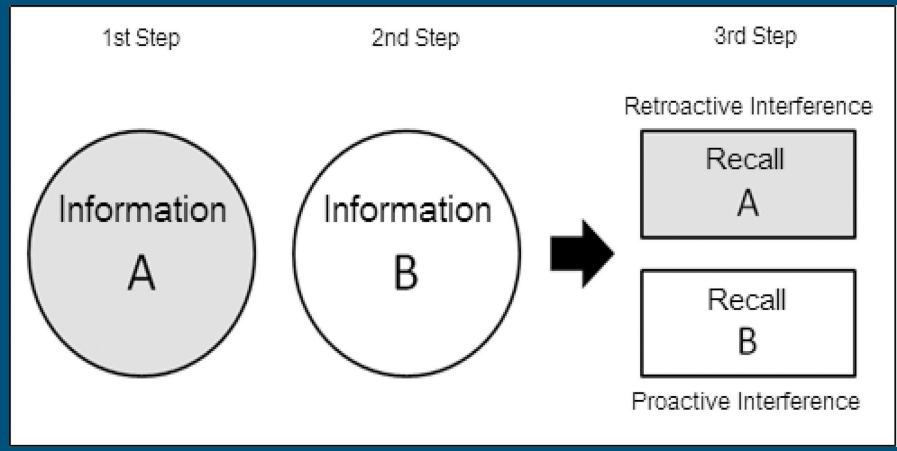
By: Barirah Amin (8D) Calgary Islamic School AJ Campus

Abstract

The purpose of this project is to find if there is a difference in response time between a color stroop effect test and a shape stroop effect test. To achieve this, I developed a Stroop effect game on Scratch. After debugging my game, I asked the volunteers to say the color of the word written and recorded that time it took them to say the colors of all ten words. I , then asked the volunteers to say the shape drawn and not the shape written on top and recorded my results. After comparing my results, I came to the conclusion that there is a slight difference between the response time of both Stroop effect tests. The shape Stroop effect test took the volunteers longer then the color Stroop effect test.

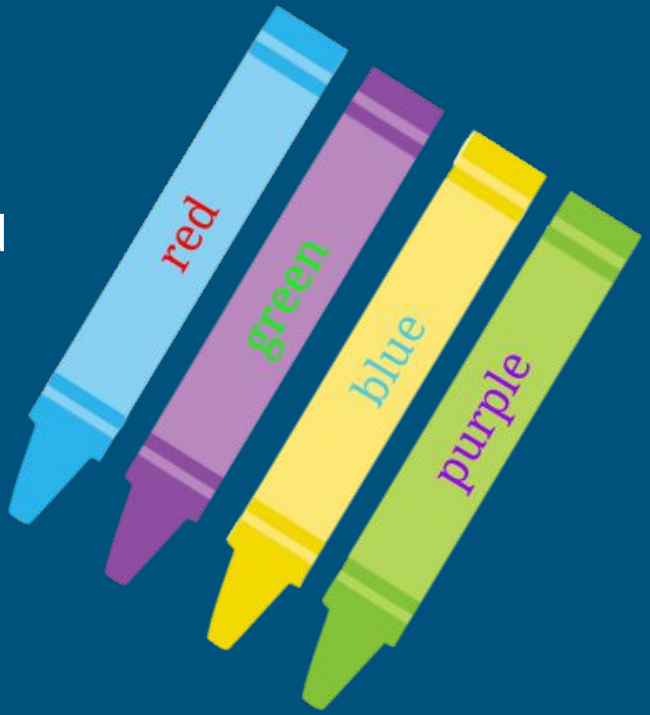
Objective

My objective is to find if there is a difference in response time between a color stroop effect and a shape stroop effect. This would be important because stroop effects are used in neurological examinations and different stroop effects could cause different results because of the processing of those tests.



Background Research

The Stroop Effect was named after J.Ridley Stroop who first published this strange phenomenon in English in 1935. The Stroop effect states that when faced with identical and different stimuli there is a delay in reaction time while stating the different stimuli. For example, if a person was shown the word blue written in blue ink, an identical stimuli, they would be able to say the color faster then if they were shown the word blue written in red ink, a different stimuli.



Background Research Cont.

There are three theories that explain the Stroop Effect.

1. The Speed of Processing Theory: this theory states that the interference occurs because we read words faster than we name colors
2. Selective Attention Theory: this theory states that the interference occurs because naming colors requires more attention than reading words.
3. Automatic Word Recognition Hypothesis: This theory suggests that people just read words automatically and reading is a function that is impossible to turn off.

Question

Is the stroop effect more prominent in shapes or colors?

VS.

Blue Green Purple Yellow Red

Hypothesis

My hypothesis is that the stroop effect will be more prominent in colors because based on my research, people read words automatically and it is impossible to turn the function of reading off. When they are asked to say the color of the word, looking at the word is necessary which enables the function of reading, yet when they are asked to say the shape drawn, looking at the word written on top is not necessary, making it easier for them to call out the shape.

Variables

Manipulated variable : The manipulated variable in my experiment is the type of Stroop effect that my participants are tested on.

Controlled Variable: The controlled variable in my experiment is the gender and age of the participants. This is because gender and age affect the Stroop effect.

Responding Variable: The responding variable in my experiment is the reaction times of the participants when shown the two variations of the Stroop effect.

Experiment

For my experiment, I wanted to combine my love of coding and my love of science to make my testing into a game. I decided to make this game on Scratch, which is an programming language that is based on blocks. I wasn't able to include a stopwatch in my game, so I used the built in Iphone stopwatch to see how long it took my volunteers on both Stroop effect tests.

Materials

Volunteers (of the same gender and age group)

Programming Software

Stopwatch

Computer

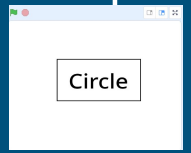
Any Internet Browser

Procedure

1. Develop a Stroop Effect Game on Scratch

2. Ask each volunteer to say the color of the word. Repeat for ten words

3. Record the time taken for them to say the color of all ten words.
4. Ask each volunteer to say the shape drawn. Repeat for ten shapes.
5. Record the time taken for them to say the shape drawn of all ten shapes.



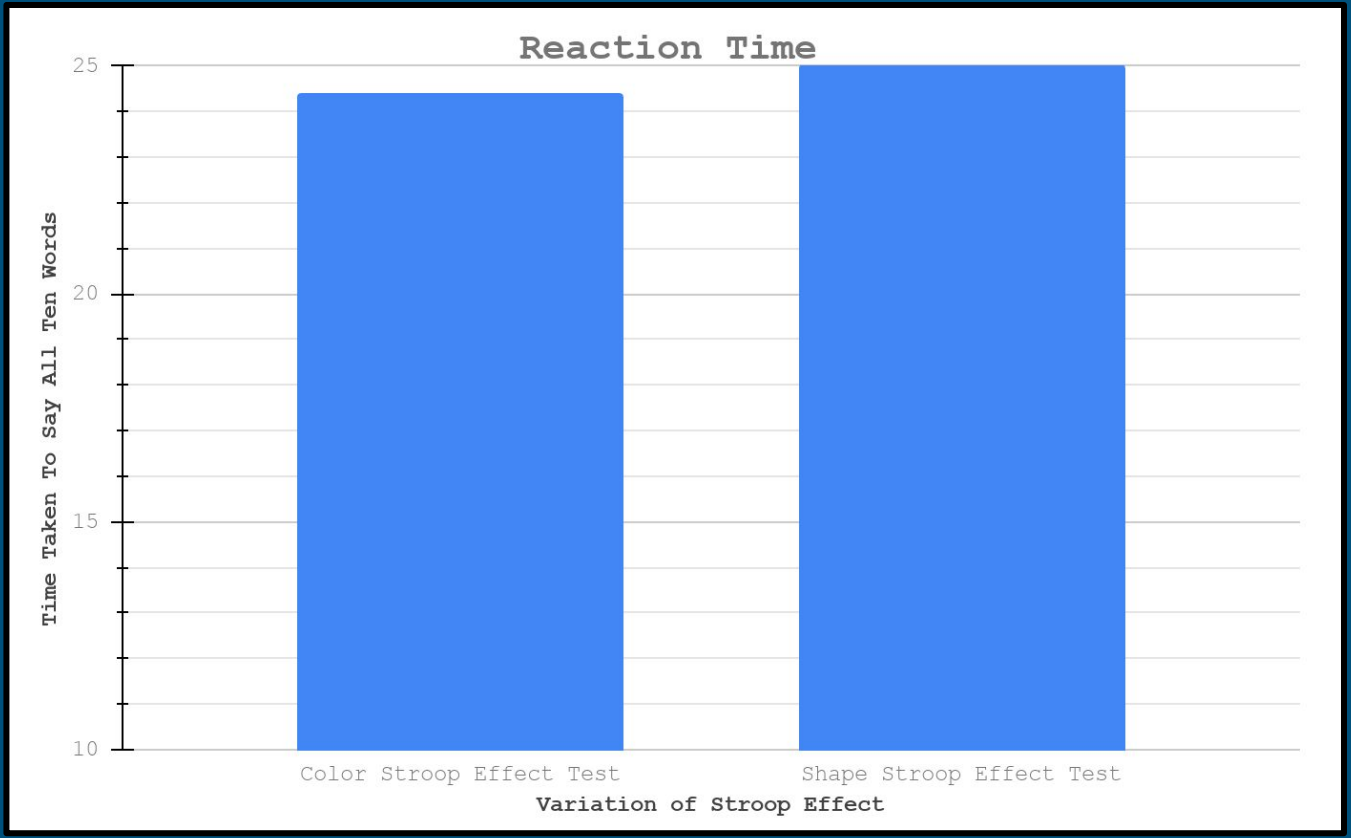
6. Compare your results

Observations

- I noticed that it was a little hard for people to call out the shapes because they didn't know what the shape was. The most common shape that people got stuck on was a pentagon.
- I also noticed that people were faster at stating the colors.

Results

Here are the results from my experiment:

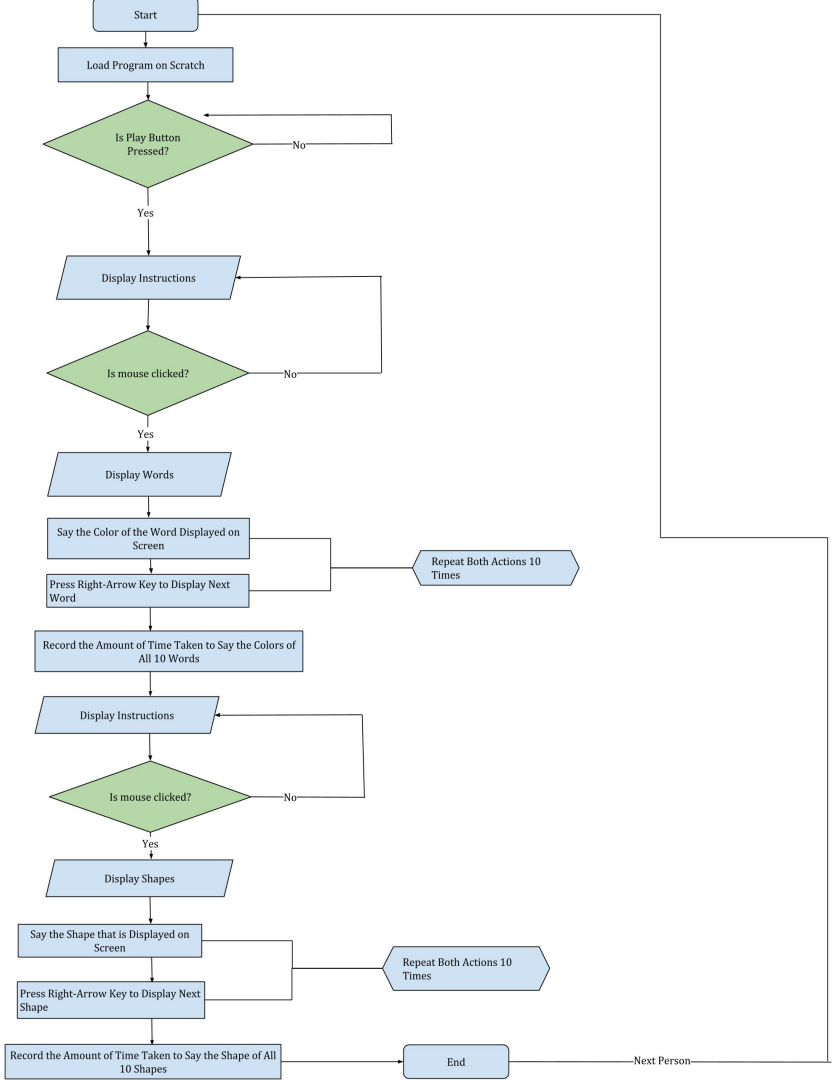


Conclusion

My hypothesis was incorrect. The Stroop effect was more prominent in shapes than it was in colors. I think this was because this experiment was the first time they were exposed to the shape Stroop effect, causing a delay in reaction time.

Sources of Error

- The volunteer could have been tired or drowsy while performing the test
- I could have started my stopwatch early or late
- I could have ended my stopwatch early or late
- I could have forgotten to turn on my stopwatch
- The volunteers could have weak eyesight affecting their ability to see, making them faster at the Stroop effect.



Flowchart

Using Google Drawings, I made this flowchart to show how my program works.

Flowchart Cont.

In my flowchart, the oval represents the starting and ending points of my program. The parallelogram represented the action done and the response that action causes in my program. The rectangle represents a series of actions performed to achieve results in my program. The diamonds represent a decision that the person playing the game had to make. Finally, the arrows led to other actions and decisions.

Symbol	Name	Function
	Start/end	An oval represents a start or end point
	Arrows	A line is a connector that shows relationships between the representative shapes
	Input/Output	A parallelogram represents input or output
	Process	A rectangle represents a process
	Decision	A diamond indicates a decision

Importance

The research paper published by John Ridley Stroop in the Journal of Experimental Psychology has been cited almost 15, 000 times. It is the most repeated studies in all of experimental psychology, meaning that there a lot of variations of this study. The Stroop effect test is used in both clinical psychology and cognitive psychology. There is a variation of the Stroop effect called the Emotional Counting Stroop Effect, which is used in clinical psychology. This variation is used to study the cognitive processes of people who have PTSD, panic disorder,and even depression. My project is important because it compares people's ability to process shapes with their ability to process colors.

Application

The application for my project is that neurologists can understand that people are slower at recognizing shapes, especially when those shapes are unfamiliar to them, then they are at recognizing colors. Shapes are processed by the visual processing centers in the brain. The visual processing centre receives information through the eye. That information is then processed, meaning it is organized and understood in some way. To remember that information our brain associates that information with information that is already learned or new information. We recall or retrieve information from our long or short term memory and express that information.

Resources

Youtube.com

Faculty.washington

Youtube.com

Youtube.com

ScienceBuddies.org

Razlab.mcgill.ca