

Stroop Experiment and Executive Functioning

PSY250

Tree

Automatic Processing

▶ Difficult not to read "TREE"



▶ Tendency to quickly read words

▶ Attentional effort to ignore

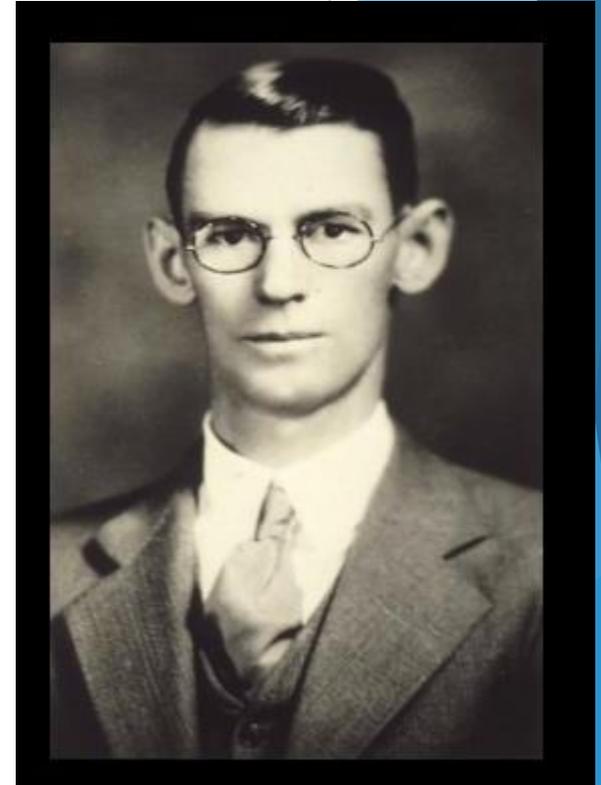
GREEN

The background features abstract, overlapping geometric shapes in various shades of blue, ranging from light sky blue to deep navy blue. These shapes are primarily located on the right side of the frame, creating a modern, dynamic feel. The word 'GREEN' is centered in a bold, blue, sans-serif font.

John Ridley Stroop

PH.D. Thesis 1935

- ▶ Emphasizes interference
- ▶ Automatic processing of words than more mentally "effortful" task naming colors
- ▶ Task of making an appropriate response when given 2 conflicting signals



Testing for the Stroop Effect

- ▶ Task involves showing words “colors”
- ▶ Words printed in different color than the color name
- ▶ Respond to the color you see, disregard the word you read
- ▶ Much harder than it sounds

Orange Blue Green Pink Orange Purple Pink
Purple Yellow Green Blue Green Blue Purple
Yellow Orange Gray Red White Red Pink
Blue Gray Red Blue Orange Red Blue
Purple Red Purple Orange Gray Red Green
Blue Purple Pink Yellow Pink Green Yellow
Orange Yellow Red Yellow Pink Orange Green
Purple Gray Red Orange Green Blue Green
Pink Gray Red Yellow Purple Blue White
Pink Blue Green Purple Yellow Gray Yellow

Testing for the Stroop Effect

- ▶ Measure: # Correct/Time
- ▶ Level 1 - Congruent: Colors and words match (practice round - baseline)
- ▶ Level 2 - Incongruent: Colors and words don't match (experiment round)

Testing for the Stroop Effect

- ▶ Congruent: meaning of word & color are the same
 - ▶ Ex: "**BLUE**" in blue color
- ▶ Incongruent: meaning different than color
 - ▶ Ex: "**BLUE**" in red color
- ▶ Word recognition faster/stronger than color recognition.

2 Processes Compete

- ▶ Brain is attempting to process two different sources of information at once
- ▶ Brain has to inhibit word recognition to allow color recognition to be final response
- ▶ Requires selective attention
- ▶ Reaction time - Indicator of attentional process in brain

Executive Functioning

- ▶ Cognitive functions
- ▶ Operations of the brain that enable effortful (or “top down”) control of behavior (Hall et al. 2008)
- ▶ the capacity to reflect on ones situation
- ▶ to evaluate what is working and what is not
- ▶ to formulate plans of action
- ▶ and to carry out such plans successfully
- ▶ the capacity to learn from our mistakes so that we don't make the same ones over and over again.
 - ▶ (Brooks, 2009)

Skills include:

- ▶ Self evaluation
- ▶ Planning
- ▶ Time awareness
- ▶ Inhibition to stimuli
- ▶ Self-correction
- ▶ Problem solving
- ▶ Executing new tasks

Components of Executive Functioning

- ▶ **Cognitive flexibility:** The ability to switch between thinking about two different concepts and/or to think about multiple concepts at once
- ▶ **Shifting:** Ability to move freely from thinking about one situation to another
- ▶ ***Inhibition:** The ability to stop a behavior at a certain time. Stroop test...

What's going on with the Stroop? Interference

- ▶ 2 pieces of information in conflict
- ▶ Make a choice
- ▶ Experience taught you word meaning is more important than ink color

- ▶ Interference occurs when you try to pay attention *only* to ink color

For the Stroop Test

- ▶ Executive function needed to perform this task
- ▶ Asked to name the COLOR rather than the written word
- ▶ ...which means you have to **inhibit** what we've been trained to automatically do - read written words - to do a less practiced task - naming the ink color (when it conflicts with a written word)

Our experiment

- ▶ Study the effect of the Stroop Test and noise distractors on response times
- ▶ Two independent variables
 - ▶ Stroop test - two levels
 - ▶ Easy (congruent words and colors)
 - ▶ Hard (incongruent words and colors)
 - ▶ Noise condition - two levels
 - ▶ Easy (no noise distractor)
 - ▶ Hard (with noise distractor)
- ▶ Dependent variable

Research Questions

- ▶ Is there a difference in response times on the Stroop congruent and incongruent conditions?
- ▶ Does having a distractor, such as an annoying sound, affect response time on the Stroop task?
- ▶ Is there an interaction between the Stroop test and noise distractor on response time?