Question: How can you explain interference? What is the effect of each conflicting dimension on the other?

Exp 1:
- Expmt’l: read color words aloud (incongruent color ink)
- Control: read color words (black ink)

Exp 2:
- Expmt’l: Name font color aloud (incongruent color ink)
- Control: Name color of square patch
Stroop (1935): Method

- 10 x 10 stimulus card – each word 2x on a line
- Colors: red, green, blue, brown, purple
- Each Ss read 4 cards (2 experimental, 2 control)
- Exp 1: N = 70; Exp 2: N = 100

**Exp1: READ WORD**

- RED
- BLUE
- GREEN
- XXXX

**Exp2: SAY COLOR**

- BROWN
- PURPLE
- BLUE
- XXXX

- PURPLE
- GREEN
- RED
- XXXX

- BLUE
- PURPLE
- BROWN
- XXXX

- GREEN
- BROWN
- BLUE
- XXXX

- BROWN
- RED
- PURPLE
- XXXX
Stroop (1935)

**Results:**
- Exp 1: Expm’l = 43.3s; Control = 41.0s
  - 5.6% increase
- Exp 2: Expm’l = 110.3s; Control = 63.3s
  - 74% increase

**Discussion:**
- Reading interferes with color naming, but not the reverse
- Reading is automatic; Color naming is controlled
- Interference: Stimuli can affect our behavior even if trying to ignore them
The Stroop effect

- 1935 – 1991:
  - 700+ Stroop or stroop-related articles (MacLeod, 1991)
- PsycInfo search “stroop”
  - 9/07: 3220 (971 articles on “stroop effect”)
  - 1/09: 3584 (1007 articles with stroop in title)
- WHY?
- Method useful to measure a hidden process!
- Many variations on methodology
Stroop: CogLab

- **Question/Hypothesis**
  - What are the properties of automatic behaviors?
  - What info is processed automatically; what needs control?

- **Method**
  - Classify color of color-words (w/ speed & accuracy!)
  - Dependent variable (DV): Time (ms) of correct trials
  - Independent variable (IV): Congruency of font color and word
    - Levels: Congruent (same) vs. incongruent (different)
  - Other method details:
    - Spacebar to begin trial; fixation before stimulus
    - Colors: Red, Green, Blue
    - 30 incongruent trials; 15 congruent trials
    - Re-run on trial if incorrect
Results:
- N = 11
- Congruent = 713ms; Incongruent = 775ms
- Slower on incongruent trials; faster on congruent trials

Discussion
- Automatic process of reading interferes with controlled process of color naming
Klein (1963): Experiment 1

- Question

- Hypothesis

- Method
  - IV:
  - DV:

- Participants:

- Other details:
Klein (1963): Experiment 1

- **Question**
  - What is the effect of manipulating verbal text in Stroop task?

- **Hypothesis**
  - More related (in meaning) to color the more interference

- **Method: say color of stimulus (w/ speed & acc!)**
  - **IV:**
    - Word relatedness (6 incongruent conditions vs. Color alone)
    - Nonsense syllables (bjb)  Rare English (abjure)
    - Common English (take)    Implies color (lemon)
    - Same Color class (purple) Color name (blue)
  - **DV: time difference (ms)**
    - Expmt’l condition-color alone (****)= interference

- **Participants: 19-28 yrs old (Between Ss conditions; n=15, N=90)**
Klein (1963): Experiment 1

Klein (1964) Fig 1

Means of interference (sec) from baseline color-alone

* Indicates significant difference from previous condition
Klein (1963): Experiment 1

- Results
  - Slower on condition pages vs. color alone
  - Increase in interference as words became more closely related to color

- Discussion
  - Meaning of words affects color-naming response
  - Automatic attention to word’s meaning
Stroop variations

- Number stroop
  - 111 4444 33
- Direction stroop
  - + left left + right +
- Auditory stroop
  - Say “low” to high pitch
- Global/local stroop (M made of F’s)
- Picture stroop (word embedded in pic)
Hester, Dixon, & Garavan (2006)

• Question
  • Do substance-related cues attain greater attention for addicts?

• Hypothesis
  • Stroop effect for drug-related pictures

• Method
  • Picture stroop: say border color of photo
  • IV: picture condition (cocaine-related pic, evocative pic, neutral pic)
  • IV: group (cocaine addict vs control)
  • DV: time (ms)
Hester, Dixon, & Garavan (2006)

![Graph showing mean reaction time (ms) for different picture types in an emotional Stroop task. The x-axis represents the picture type: Cocaine pic, Evocative pic, and Neutral pic. The y-axis represents the mean reaction time in milliseconds. The graph compares Cocaine user and Control groups. Higher reaction times are observed for Cocaine users compared to controls.]
Hester, Dixon, & Garavan (2006)

- **Results**
  - Accuracy at 96%
  - *Controls*: evocative pics RT longer than neutral or cocaine-related pics
  - *Cocaine users*: RT evocative pics > RT cocaine pics > RT neutral pics

- **Discussion**
  - Drug cues automatically receive attention for addicts
  - Attentional bias for cocaine-related material in users