

Stroop (1935). Studies of interference in serial verbal reactions. *Journal of Experimental Psychology*, 18, 643-662.

- 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*

<b>RED</b>	BLUE
<b>BROWN</b>	PURPLE
<b>PURPLE</b>	GREEN
<b>BLUE</b>	PURPLE
<b>GREEN</b>	BROWN
<b>BROWN</b>	RED

*Exp2: SAY COLOR*

<b>GREEN</b>	<b>XXXX</b>
<b>BLUE</b>	<b>XXXX</b>
<b>RED</b>	<b>XXXX</b>
<b>BROWN</b>	<b>XXXX</b>
<b>BLUE</b>	<b>XXXX</b>
<b>PURPLE</b>	<b>XXXX</b>

# 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

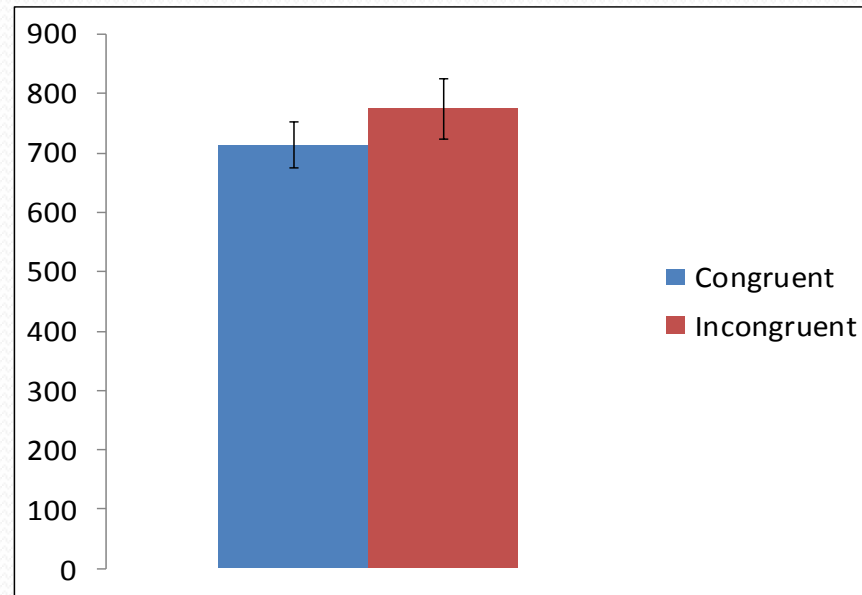
# The Stroop effect

- 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

# Stroop CogLab



- Results:

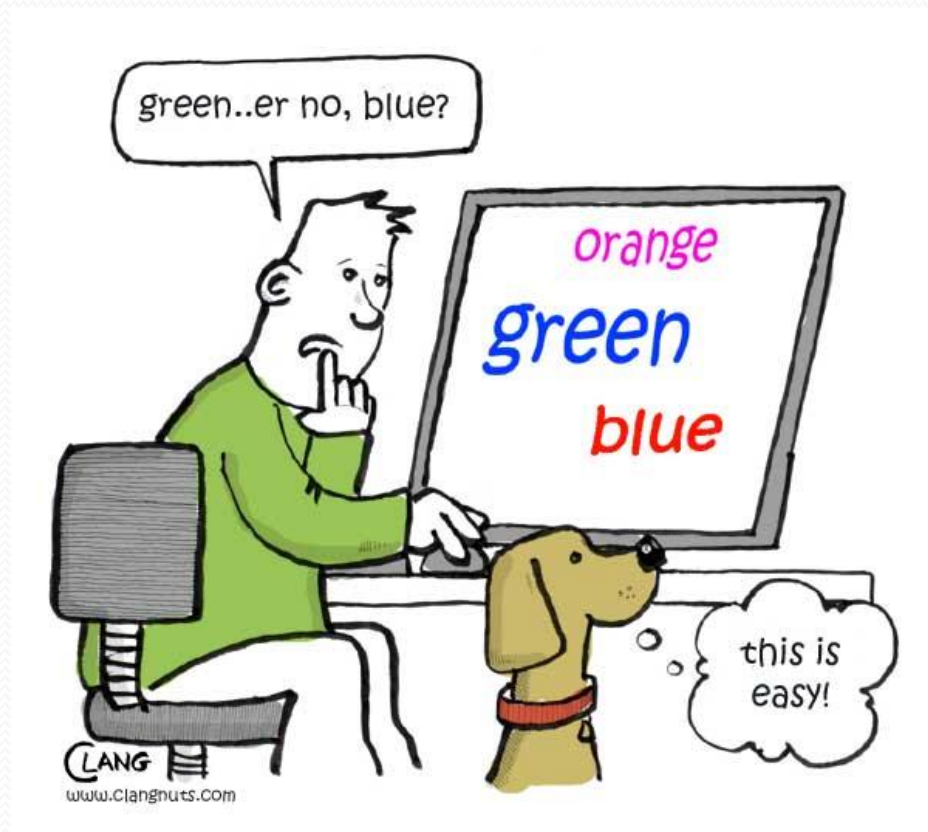
- N = 11
- Congruent = 713ms; Incongruent = 775ms
- Slower on incongruent trials; faster on congruent trials

- Discussion

- Automatic process of reading interferes with controlled process of color naming

# Klein (1963): Experiment 1

- Question
- Hypothesis
- Method
  - IV:
  - DV:
- Participants:
- Other details:

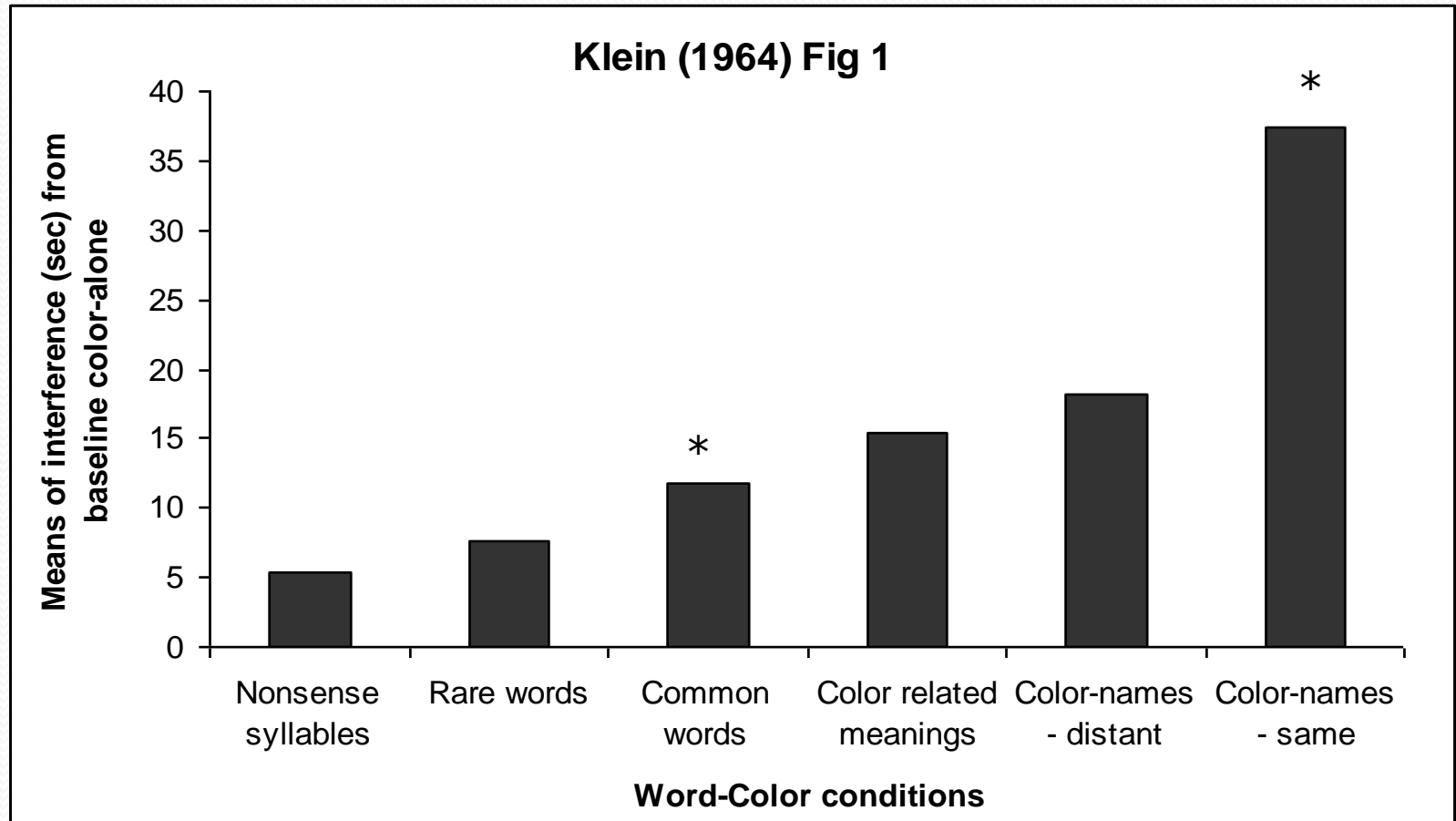


# Klein (1963): Experiment 1

- 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



\* 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)

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F      F
FF     FF
FF     FF
F F F F
F  FF F
F      F
F      F
F      F
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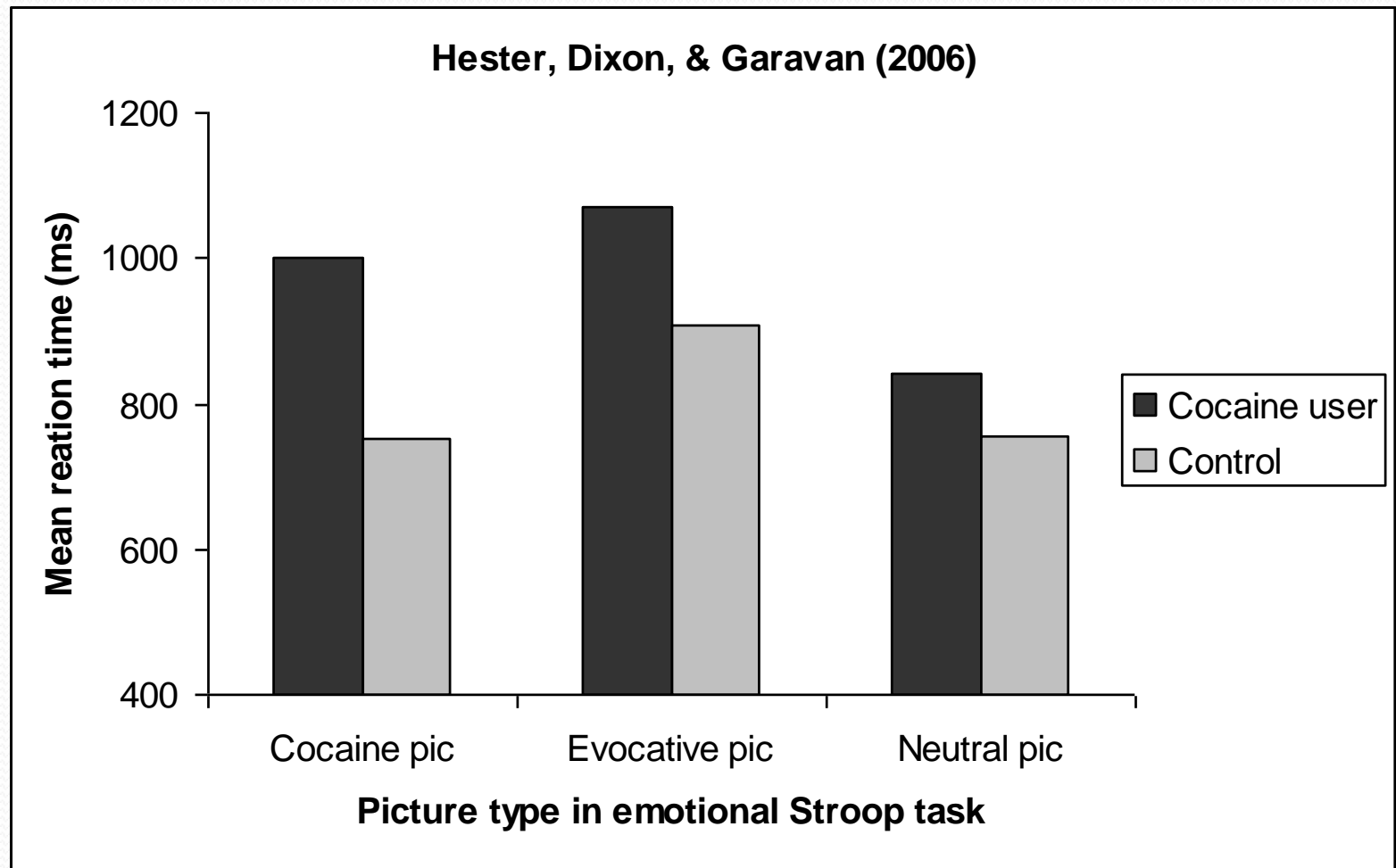


# Hester, Dixon, & Garavan (2006)



- 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)



# 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