# PSYC 5316 – Plotting the Conditional Accuracy Function

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# Flanker task (Eriksen & Eriksen, 1974)

- basic idea – when people are asked to respond to a stimulus that is surrounded ("flanked") by irrelevant stimuli, the irrelevant stimuli can interfere with the response.

- two types of trials:

| | | |
|---|---|---|
| congruent | »»> | SSSSS |
| incongruent | »<» | SSHSS |

- *flanker effect* = RTs and error rates increase on incongruent trials (relative to congruent trials)

# Our experiment

- we performed an experiment based on Heitz and Engle (2007)
- stimuli were five letter strings consisting of S and H

| | | |
|---|---|---|
| congruent | SSSSS | HHHHH |
| incongruent | SSHSS | HHSHH |

- three blocks of 80 trials each (240 trials total)
- imposed RT deadlines on Block 2 (600 ms) and Block 3 (300 ms)
  - goal: "spread out" the distribution of response times

# Goal for today

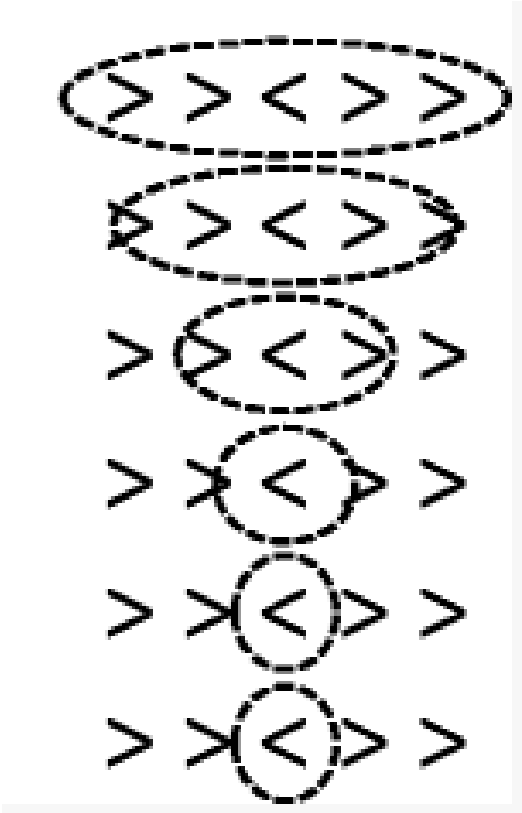
- introduce a theoretical model of the Flanker effect
  - the "attentional spotlight" model
- describe an analytic tool for testing this model
  - conditional accuracy functions (CAF)
- learn how to build CAFs in R

# Model of flanker effect

Why do subjects perform worse on incongruent trials? Gratton et al. (1992) explained it as follows:

- early on, subjects process both the target and distractor letters.
- later, subjects focus attention on central target.
- "spotlight of attention" narrows as time progresses

# "Spotlight of attention"



# Model of flanker effect

If this "attentional spotlight" model is true, what does it mean for performance?

- fast trials - driven mostly by *distractors*, so subjects will make lots of errors on incongruent trials (relative to congruent trials)
- slow trials - driven mostly by *target*, so error rates on incongruent trials will decrease
- Gratton et al. (1992) demonstrated this via a *conditional accuracy function*

# Conditional accuracy functions



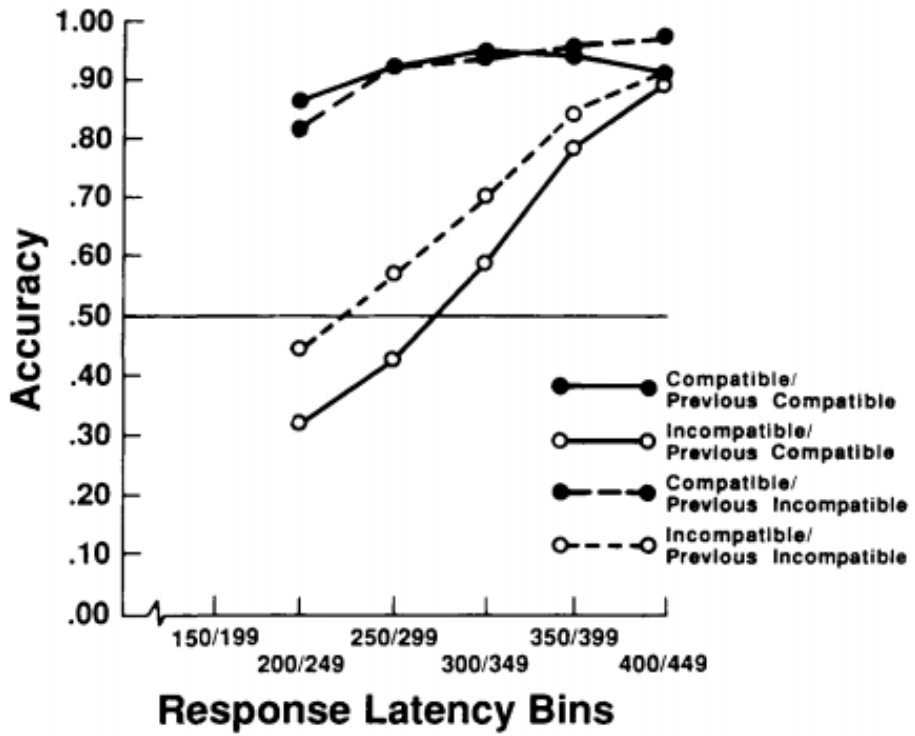



*Figure 2.* Experiment 1: Conditional accuracy functions for each of the experimental conditions. (Response latency is shown in milliseconds.)

# Conditional accuracy functions

The CAF provides a "behavioral signature" of performance:

- accuracy on congruent trials are relatively constant
- accuracy on incongruent trials increases with RT

# How to construct CAF

- split RT distribution into small number of "bins"
- compute mean RT for each bin
- compute accuracy for congruent and incongruent trials for each bin
- plot accuracy as function of mean RT (separate lines for each condition)

# How to construct CAF

Step 1 - split RT distribution into 4 bins

- the borders of these bins will be the 25%, 50%, and 75% `quantiles`