Attention

PSY 200

Greg Francis

Lecture 12

Should you pay $59.95 for Mega-speed reading*?*

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Attention

- We saw last time that attention can have very powerful effects
  - when it is focused on one thing, you ignore other things
- Today we want to consider some more specific properties of attention
  - and look at experimental methods that are used to study attention

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Characteristics of attention

- By identifying the properties and characteristics of attention we can deduce properties of the underlying systems that are involved in cognition
  - whether attention is thought of as a "system"
  - or as a by-product of other systems
- Look at
  - temporal
  - featural

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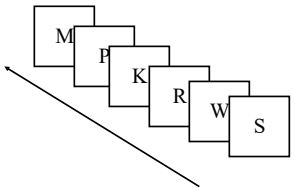
Attentional blink

- Suppose you have to identify rapidly presented (100 ms) letters
  - e.g., detect J and/or K in a stream of letters



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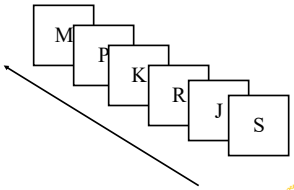
Attentional blink

- Turns out that detection of first letter tends to make detection of the second letter very difficult
  - if it immediately follows the first
  - Attentional blink



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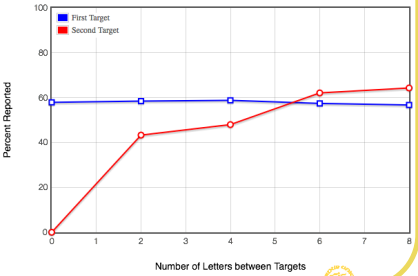
Attentional blink

- Measure frequency of detection
  - class data (121 observers)

Implies that detecting the first letter causes you to miss the second letter!



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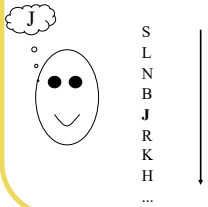
Attentional blink

- Suggests that processing the first target letter, "J"
  - uses up resources that would otherwise be used to process second target letter, "K"
  - attentional focus and refocus takes *time* and for this task takes approximately 400 ms



Once processing is done (a few hundred milliseconds), there is no difficulty detecting second letter.

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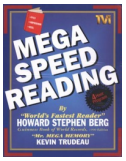
Speed reading

- Ever seen the ads for speed reading?
- One is for a program called *Mega Speed Reading*
  - claims to teach you to read 25,000 words per minute
  - ==> 2.4 milliseconds for each word
  - impossible, if only by attentional blink!
- The seller is skimming at best, and lying at worst



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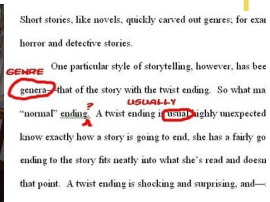
Visual search

- Proofreading
- Much of our time is spent looking for various things
  - Staplers, Road signs


Short stories, like novels, quickly carved out genres; for exa
horror and detective stories.
GENRE
One particular style of storytelling, however, has bee
genera that of the story with the twist ending. So what ma
USUALLY
"normal" ending. A twist ending is usually highly unexpected
know exactly how a story is going to end, she has a fairly go
ending to the story fits neatly into what she's read and doesn
that point. A twist ending is shocking and surprising, and—

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Visual search

- Time and type of processing can also be measured by having observers respond as quickly as possible when they detect a target
  - hypothesize that tasks that involve attention will be slower than "perceptually" based tasks
  - expect attention to depend on the number of things that must be searched
- Typically, we distinguish between a target and distracters by one or more features
  - we vary the number of distracters
  - and measure reaction time

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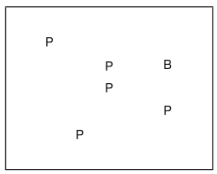
Set Size

- In some situations, more distracters make search take longer
  - fast



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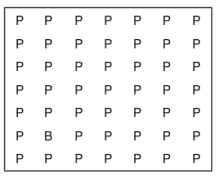
Set Size

- In some situations, more distracters make search take longer
  - slow



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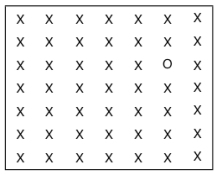
Feature Search

- But if the target differs from the distracters in the right way, search can be fast even with lots of distracters
  - "pop out"
- This often happens when the target has a unique *feature* relative to the distracters
  - shape



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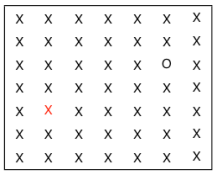
Feature Search

- But if the target differs from the distracters in the right way, search can be fast even with lots of distracters
  - "pop out"
- This often happens when the target has a unique *feature* relative to the distracters
  - color



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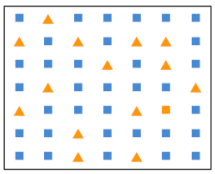
Conjunctive Search

- But if the target has shared features with different distracters, search is difficult
  - No "pop out"
- This often happens when the target is defined by a *conjunction* of features relative to the distracters
  - Orange rectangle: color and shape



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Visual search experiment

- Four types of responses
  - 1) Feature - present (can respond as soon as see target)
  - 2) Feature - absent (must examine all stimuli before sure target is not present)
  - 3) Conjunctive - present (can respond as soon as see target)
  - 4) Conjunctive - absent (must examine all stimuli before sure target is not present)

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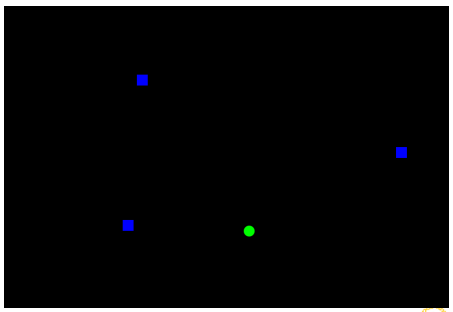
CogLab feature search

- Few distracters -easy



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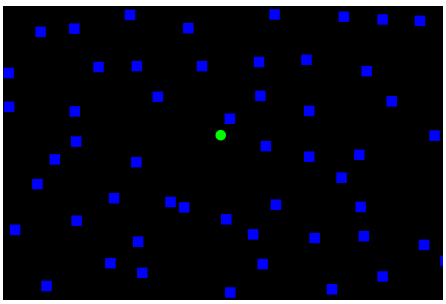
CogLab feature search

- Many distracters - still easy



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Conjunctive search

- Few distracters - fairly easy

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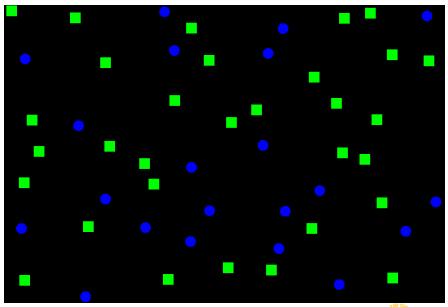
Conjunctive search

- Many distracters - difficult



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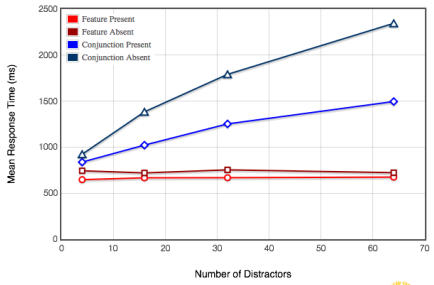
Visual search

- CogLab data (119 observers)



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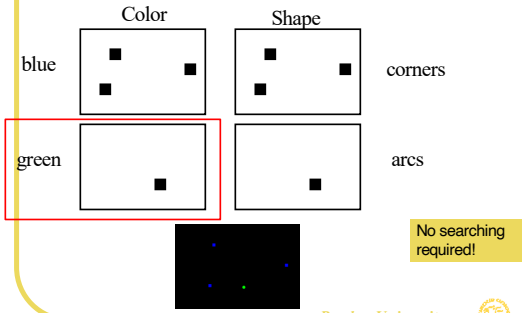
Interpretation

- Feature maps: color, shape
- Feature search can identify target *within* either feature map



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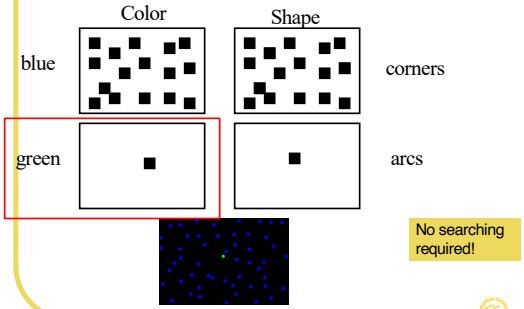
Interpretation

- Feature maps: color, shape
- Feature search can identify target *within* either feature map



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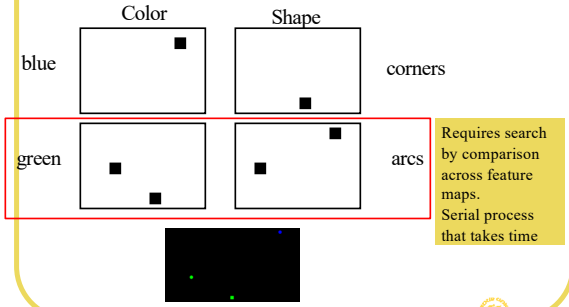
Interpretation

- Feature maps: color, shape
- Conjunctive search **cannot** identify target *within* either feature map alone



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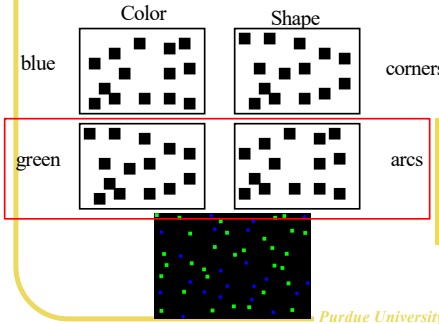
Interpretation

- Feature maps: color, shape
- Conjunctive search **cannot** identify target *within* either feature map



Requires search by comparison across feature maps. Serial process that takes time

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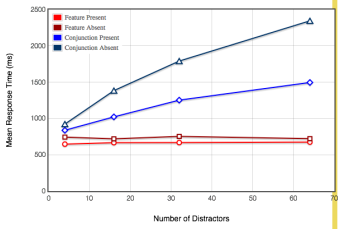
Visual search

- Conjunctive search for target absent has a slope twice as steep as for target present
  - Because when the target is present you find it, on average, after searching half the items and then can stop the search
  - For target absent searches, you must search all items to verify each is not the target



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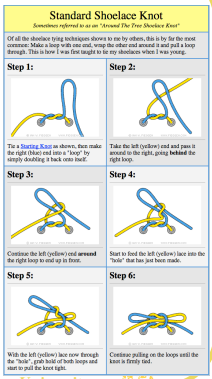
Automaticity

- When a task is unfamiliar it seems to require a lot of attention to perform
- Later it requires less attention
  - riding a bike
  - driving a car
  - typing
  - tying shoelaces
    - » http://www.fieggen.com/shoelace/knots.htm



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Automaticity

- The process whereby a task goes from requiring a lot of attention to requiring little is called *automatization*
- Many tasks are automatizable
  - color naming
  - word naming
- Can measure effects by pitting an automatized task against a non-automatized task

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Stroop task

- Stroop (1935)
- Identify the color of ink for words
- It takes longer when the words are color names
- Demonstration
  - measure reaction time

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Stroop effect

blue green red
yellow red blue
green yellow red
blue green red
yellow red blue
green yellow red
blue green red
yellow red blue
green yellow red

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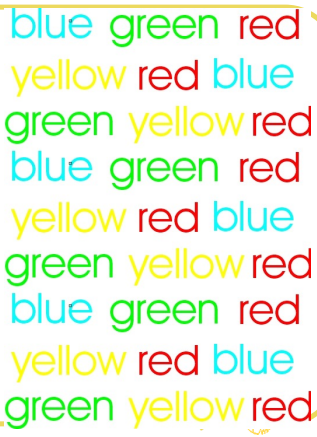
Stroop effect



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Stroop effect

- Word name interferes with ink color naming
  - ink color does not generally interfere with word naming
  - lots of studies on Stroop effect
- Many effects that are similar to it
- You can try it on CogLab
  - Not required, no credit

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Explanation

- Word reading is well practiced
  - especially among college undergraduates
  - so it occurs quickly and is automatic
- Color naming is unpracticed, so it occurs slowly and requires attention
- With two tasks, both trying to report on a color
  - the automatic one tends to mess up the unpracticed one, it takes more mental effort (and time) to do the unpracticed task

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Conclusions

- Methods of studying attention
  - attentional blink
  - visual search
  - Stroop task
- Characteristics of attention
  - timing
  - role of perceptual features
- Automaticity

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Next time

- Intersection of attention, perception, and memory
  - Iconic memory
  - echoic memory
- Serial position curves
- CogLab on Partial report due!
- *Why telephone operators seem rude.*

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