

2018-04-02 Attention

PSY 525.001 · Vision Science · 2018 Spring

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# Today's topics

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Scheduling student presentations

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Attention

*"Everyone knows what attention is. It is taking possession of the mind, in clear and vivid form, of one out of what seems several simultaneously possible objects or trains of thought. Focalization, concentration of consciousness are of its essence. It implies a withdrawal from some things in order to deal effectively with others."*

William James

## *Anne Treisman, Who Studied How We Perceive, Dies at 82*

By NEIL GENZLINGER FEB. 13, 2018



Dr. Anne Treisman receiving the National Medal of Science from President Barack Obama at the White House in 2013. Jason Reed/Reuters

Anne M. Treisman, whose insights into how we perceive the world around us provided some of the core theories for the field of cognitive psychology, died on Friday at her home in Manhattan. She was 82.

Her daughter Deborah Treisman said the cause was a stroke after a long illness.

Dr. Treisman considered a fundamental question: How does the brain make sense of the bombardment of input it is receiving and focus attention on a particular object or activity?

What she came up with is called the feature integration theory of attention, detailed in a much-cited 1980 article written with Garry Gelade in the journal *Cognitive Psychology*, then refined and

elaborated on in later work.

Anne Treisman - 2011 National Medal of Science





Capacity limits on processing =>

Requires recruitment & focusing of resources

*When* does information get selected?

Early vs. Late

Attention as 'filter' (Broadbent's shadowing experiments)

# Stimulating in 'unattended' areas

## 'Inattentional blindness' or perception without attention

Rock, I., Linnett, C. M., Grant, P., & Mack, A. (1992). Perception without attention: results of a new method. *Cognitive psychology*, 24(4), 502–534. Elsevier. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/1473333>

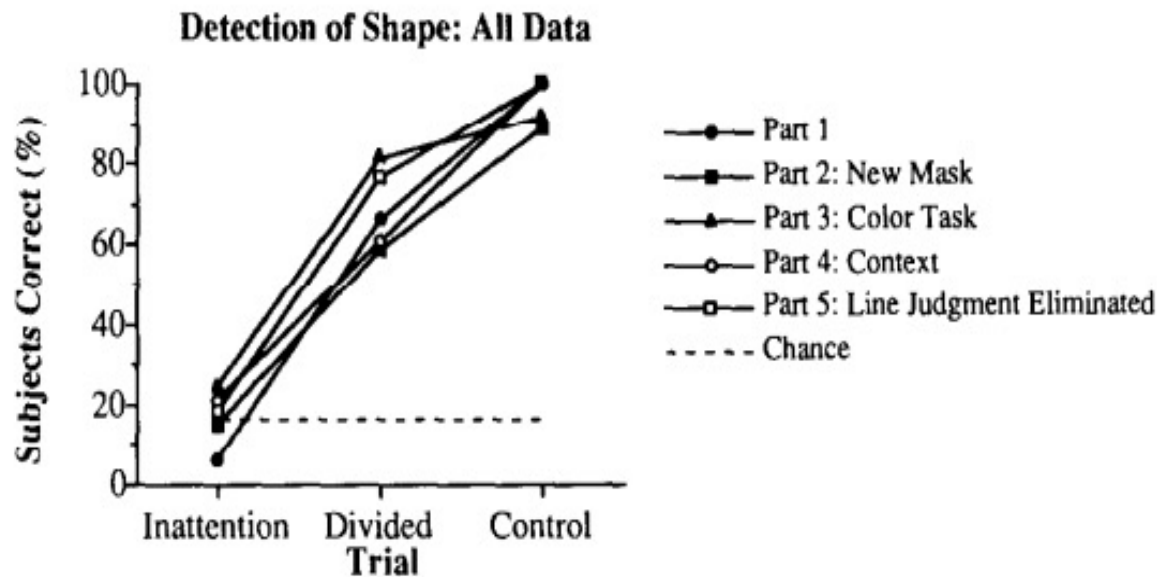


FIG. 5. The results for all variations of Experiment 4 on shape detection for the three critical trials and showing the chance level of 16.7% based on the fact that six choices were given in the recognition test.

Rock et al., 1992

Evidence for 'late' selection: personal relevance,  
emotional intensity, etc.

Task load and selection: high 'early', low 'late' (Lavie)

# Temporal factors

Attentional 'blink'

The "Attentional Blink" Test



Rapid Serial Visual Presentation (RSVP) task

# Change blindness



Change blindness demonstration

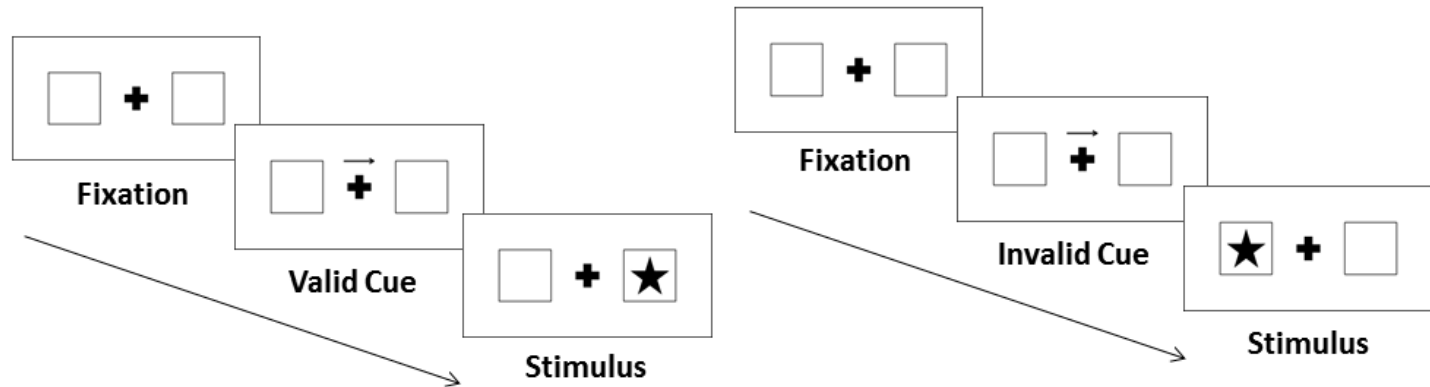


Would You Fall for That? - Change Blindness



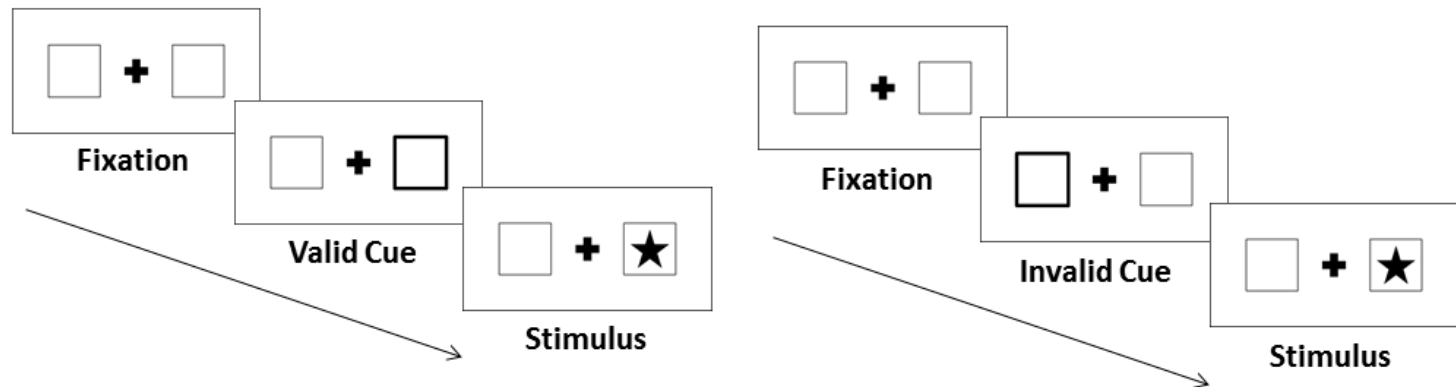
**'Cueing' attention**

## Endogenous Cues



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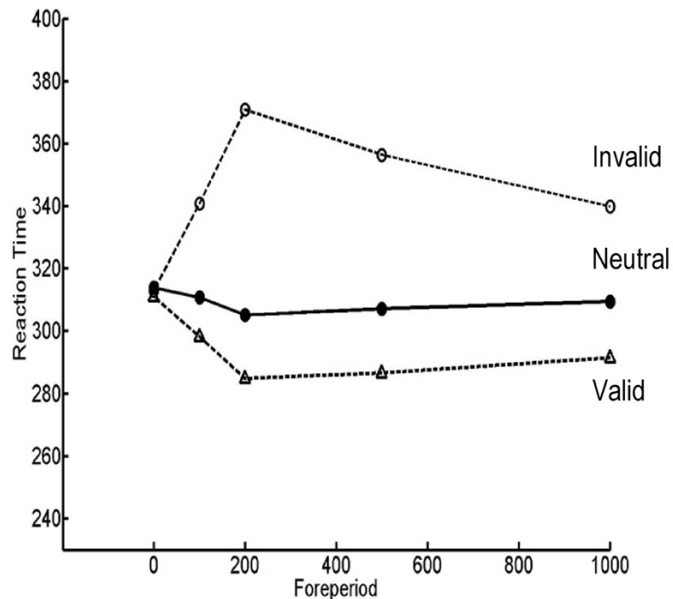
## Exogenous Cues



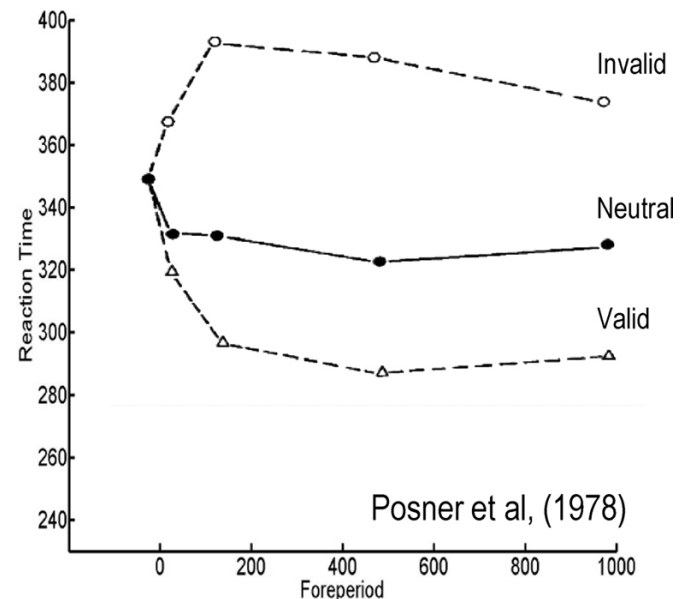
# Posner cueing task

Quantifying the (RT) costs and benefits of attention

## Simulated timing effects



## Empirical timing effects

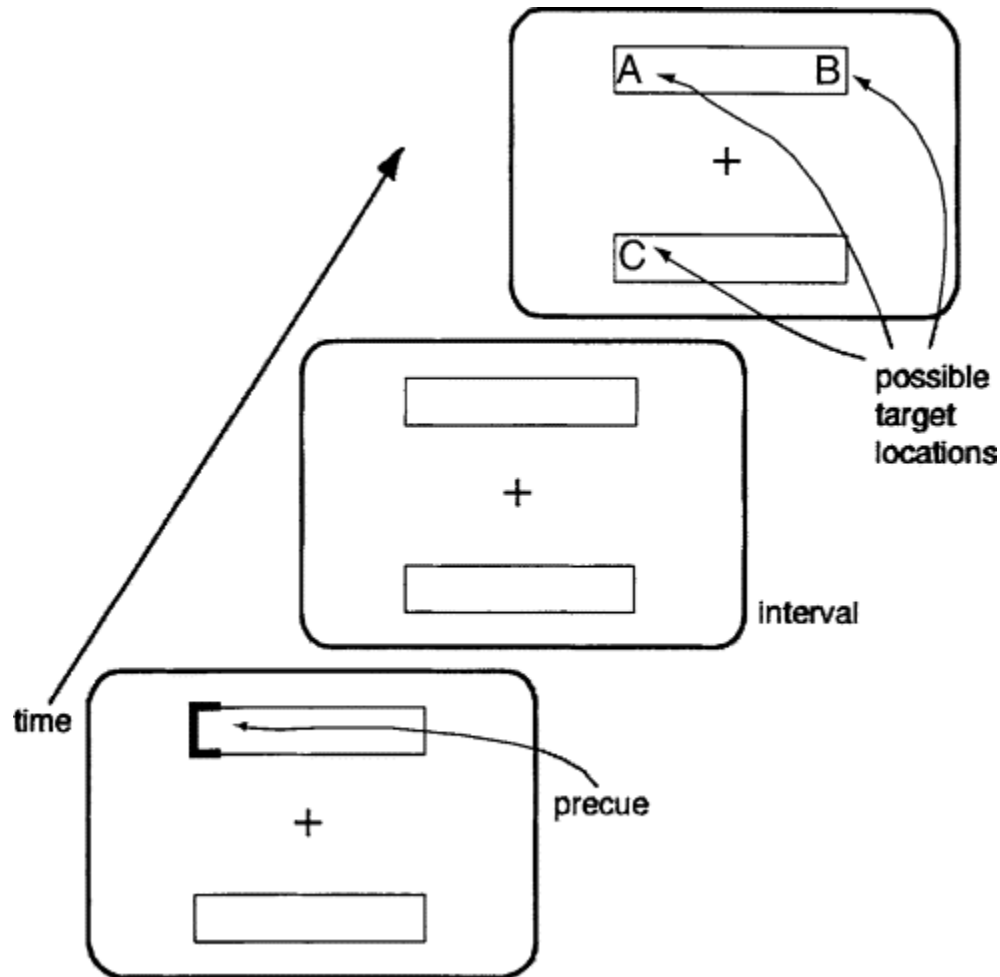


Feldman, H., & Friston, K. J. (2010). Attention, uncertainty, and free-energy. *Frontiers in Human Neuroscience*, 4, 215. [frontiersin.org](http://dx.doi.org/10.3389/fnhum.2010.00215). Retrieved from <http://dx.doi.org/10.3389/fnhum.2010.00215>

**Spotlight (move/enhance/disengage) vs. Zoom lens**

# Object-based attention





Vecera, S. P., & Behrmann, M. (2001). 6 - Attention and Unit Formation: A Biased Competition Account of Object-Based Attention. In T. F. Shipley & P. J. Kellman (Eds.), *Advances in Psychology* (Vol. 130, pp. 145–180). North-Holland. Retrieved from

**Attention to properties/dimensions**

**Red**  
**Yellow**  
**Blue**  
**Green**  
**Green**  
**Yellow**  
**Blue**

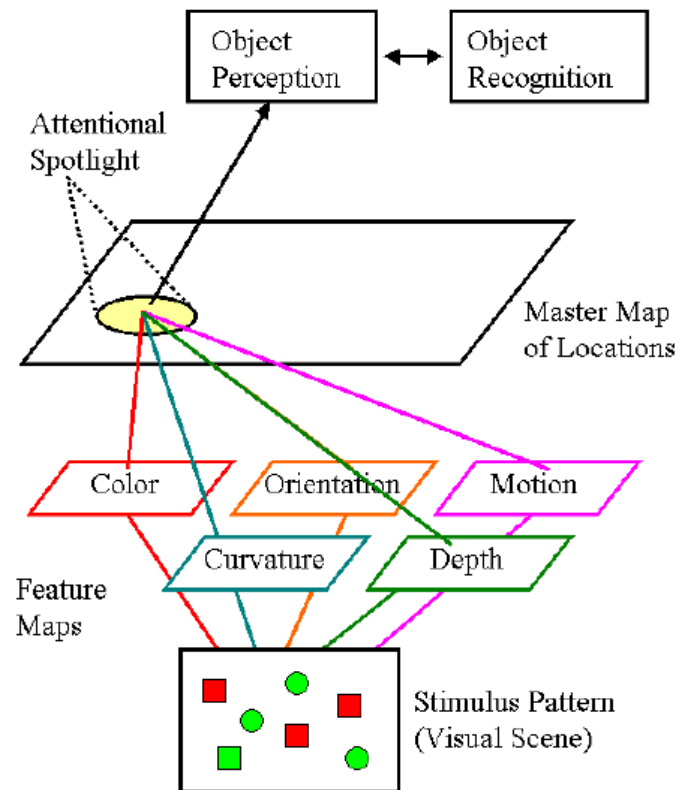
**Blue**  
**Green**  
**Yellow**  
**Red**  
**Green**  
**Blue**  
**Red**

Stroop, J. R. (1935). Studies of interference in serial verbal reactions. *Journal of Experimental Psychology*, 18(6), 643. Psychological Review Company. Retrieved from <http://psycnet.apa.org/record/1936-01863-001>

# Break

Treisman, A. M., & Gelade, G. (1980). A feature-integration theory of attention. *Cognitive Psychology*, 12(1), 97–136. Elsevier. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/7351125>

## Feature Integration Theory (Treisman)

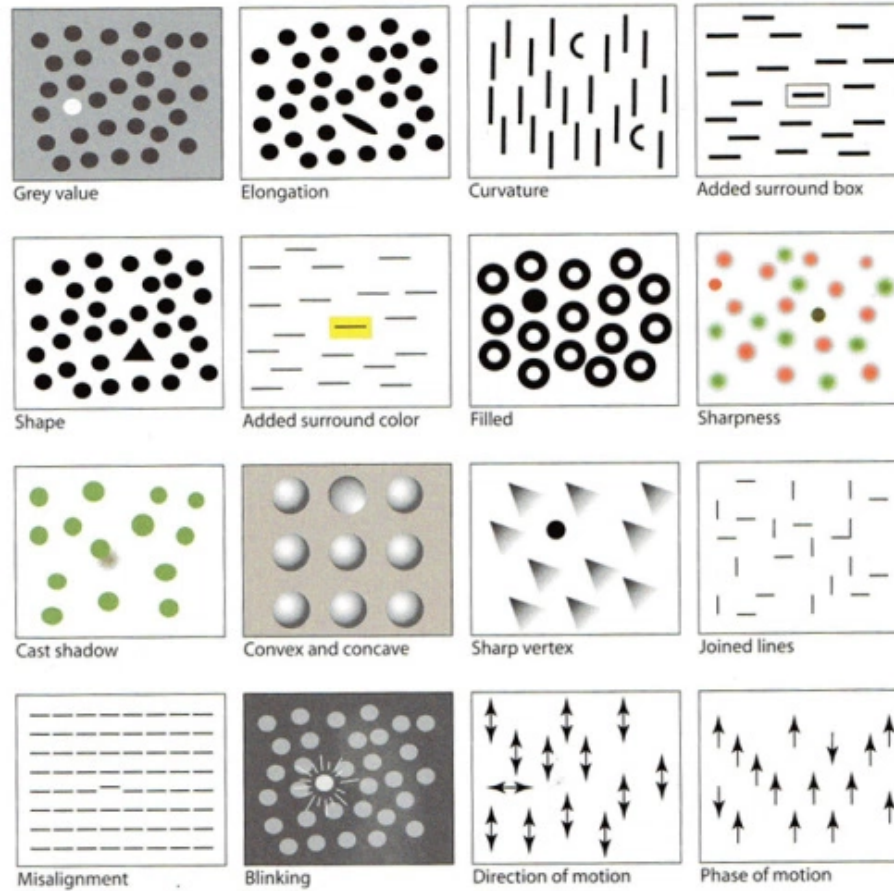


# Integral vs. separable dimensions (Garner)

Separable: color vs. shape

Integral: color saturation and lightness; length & height





# Pop-out

Brief Overview of the Tachistoscope



# Tachistoscope

Why are search slopes for single features 'flat' as the number of items increases?

Why are search slopes for 'negative' (conjunction target not present) conditions ~2x those for 'positive' (conjunction target present) conditions?

Simons, D. J., & Chabris, C. F. (1999). Gorillas in our midst: Sustained inattention blindness for dynamic events. *Perception*, 28(9), 1059–1074.  
Retrieved from <http://dx.doi.org/10.1068/p281059>



Neisser, U., & Becklen, R. (1975). Selective looking: Attending to visually specified events. *Cognitive Psychology*, 7(4), 480–494. Elsevier. Retrieved from <http://www.sciencedirect.com/science/article/pii/0010028575900195>



Becklen, R., & Cervone, D. (1983). Selective looking and the noticing of unexpected events. *Memory & Cognition*, 11(6), 601–608. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/6669028>

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