PSI 428
Attentional Processes

Attentional Set

Learning Objectives

- **Attentional Set**
- Capacity allocation models of attentional set effects
- Alternative Accounts
- Orienting attention with endogenous vs. exogenous cues

Attentional Set

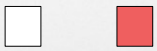
- People may be able to set their attentional system to process certain stimuli given some advance information, e.g. location cue

Cue Types

- Valid Location Cue

Cue Types

- Valid Location Cue

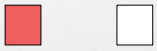


Cue Types

- Invalid Location Cue

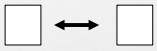
Cue Types

- Invalid Location Cue



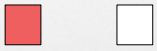
Cue Types

- Neutral Location Cue



Cue Types

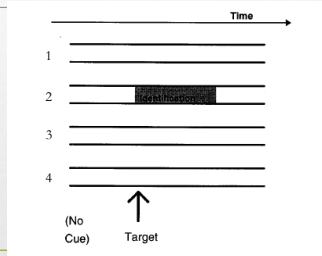
- Neutral Location Cue



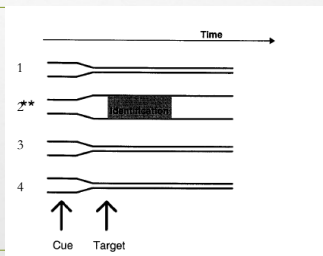
Learning Objectives

- Attentional Set
- **Capacity allocation models of attentional set effects**
- Alternative Accounts
- Orienting attention with endogenous vs. exogenous cues

Capacity Allocation Mechanism



Capacity Allocation Mechanism



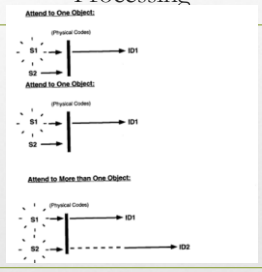
Capacity Allocation Mechanism

- Allocating attentional resources to the cued channel has the consequence that stimulus is recognized more quickly than it would be otherwise.
- Version A: The attentional resources are shifted gradually
- Version : The attentional resources are shifted completely

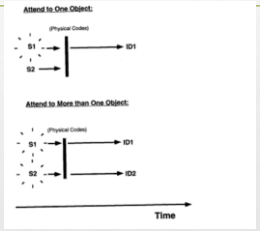
Capacity Allocation vs. Other Models of Attention

- How does the capacity allocation model of attentional set is related with the
  - A) Early selection theories
  - B) Late selection theories
  - 1) Serial processing
  - 2) Parallel processing

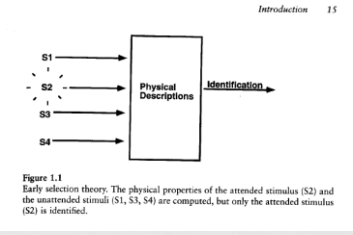
Capacity Allocation vs. Serial Processing



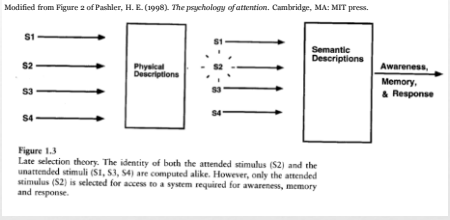
Capacity Allocation vs. Parallel Processing



Capacity Allocation vs. Early Selection



Capacity Allocation vs. Late Selection

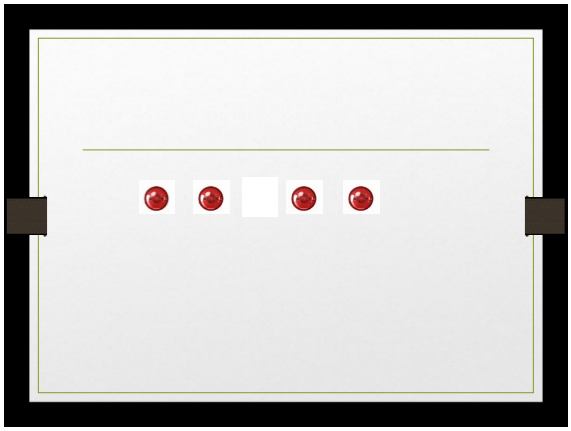


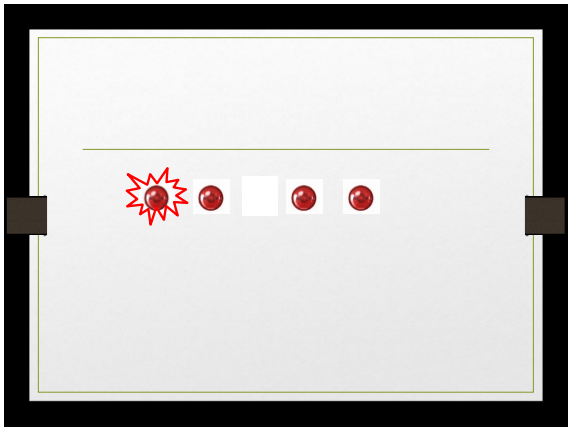
Attentional Set

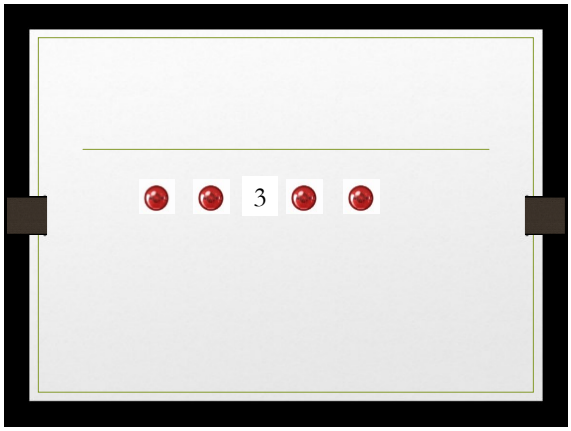
- Whether having an advance information about a stimulus can help one perceive that stimulus more effectively.
- Can people be able to **set their perceptual system** to process certain stimuli more effectively than would otherwise be possible.

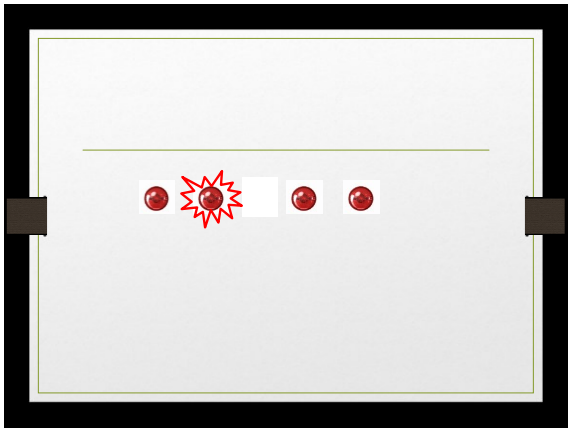
Posner et al. (1978)

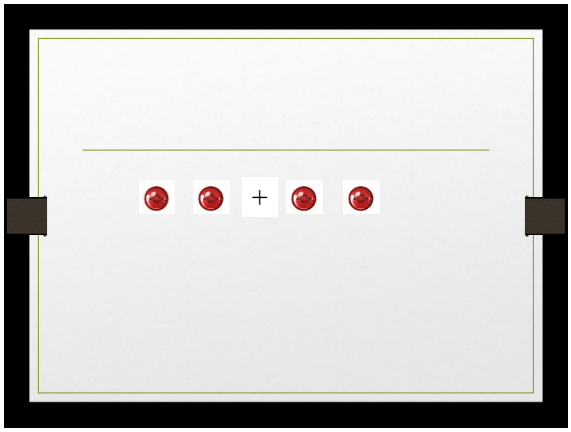
- Posner, Nissen and Ogden (1978) provided subjects with a precue as to whether a given event would occur to the left or right of fixation.

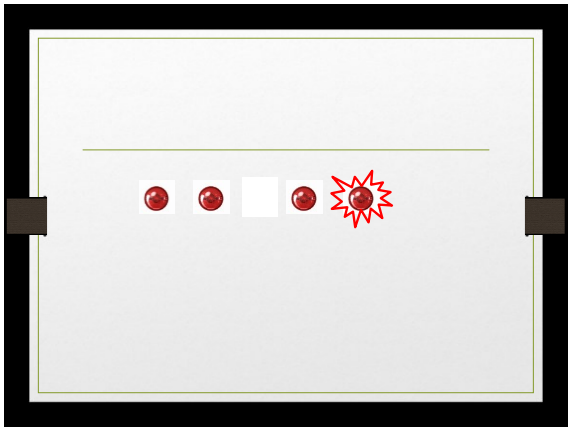












Posner et al. (1978)

- Valid trials
- Invalid trials
- Neutral Trials
- Catch Trials

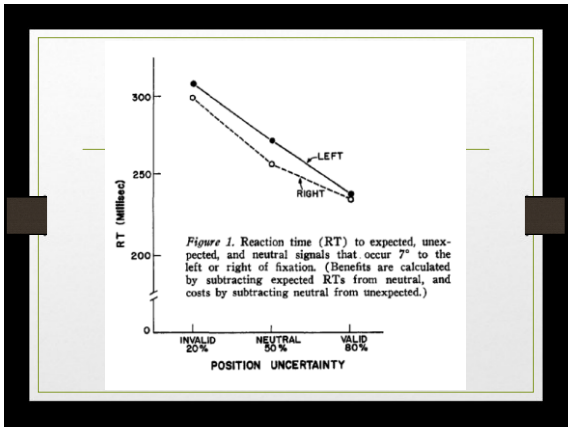
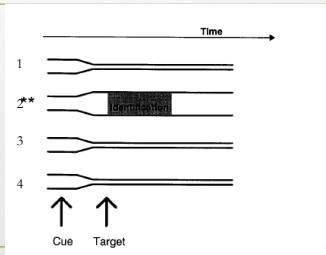


Figure 1. Reaction time (RT) to expected, unexpected, and neutral signals that occur 7° to the left or right of fixation. (Benefits are calculated by subtracting expected RTs from neutral, and costs by subtracting neutral from unexpected.)

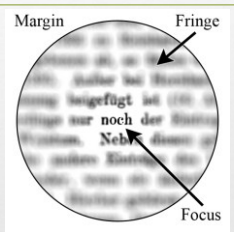
Posner et al. (1978)

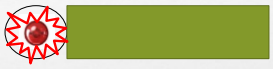
- Subjects set their attention for the position in space at which the signal was most expected.
- Subjects may orient their attention toward a signal without having first detecting it

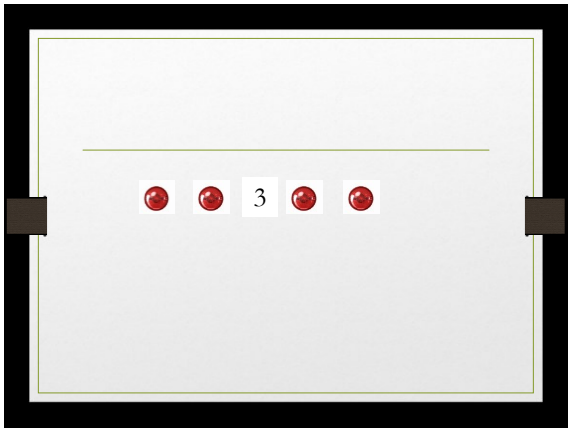
Capacity Allocation Mechanism

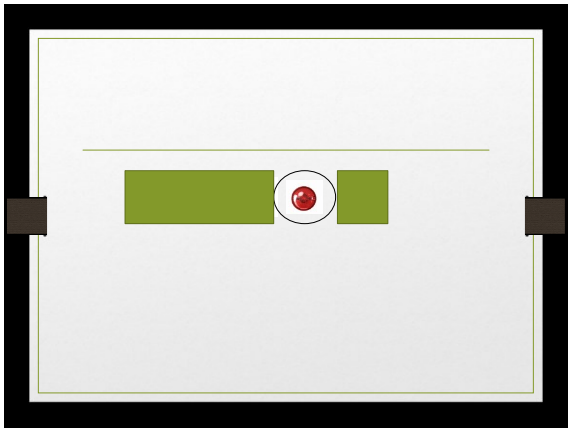


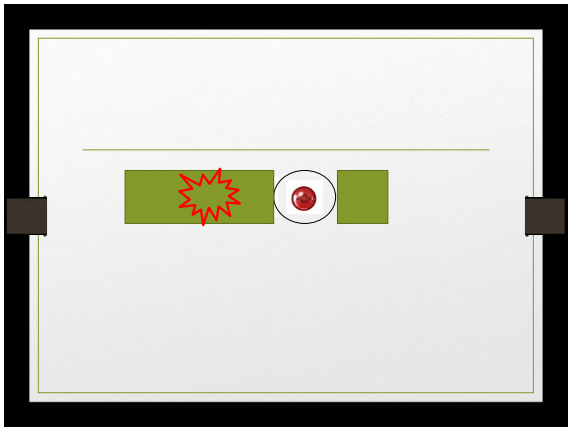
Capacity Allocation Mechanism

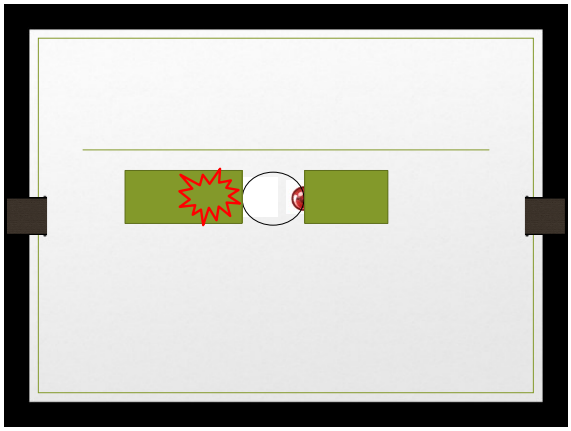


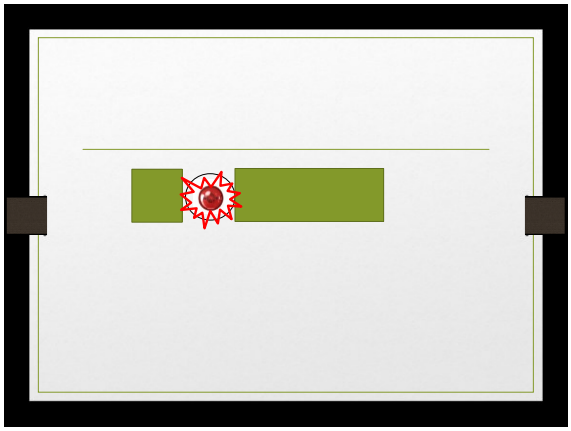












Posner et al. (1978)

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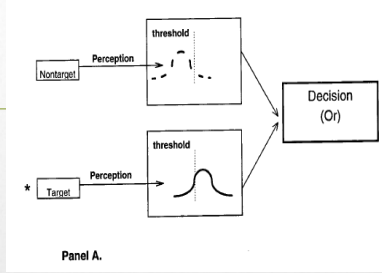
- **Alternative Accounts**
- Orienting attention with endogenous vs. exogenous cues

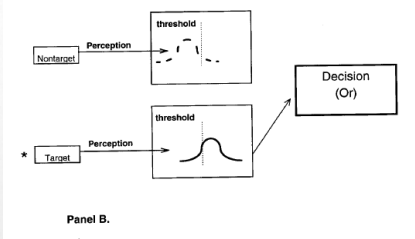
Explanation with Decision Noise

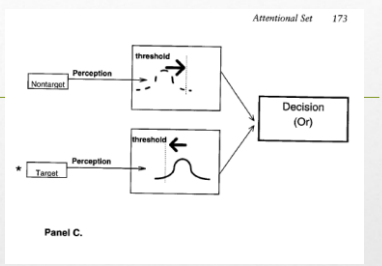
- Pashler (1988)
- Monitoring more channels increases noise in decision making
- The problem of decision noise:
- The number of errors increases with the number of distractors in the display even if the system has no capacity limitations

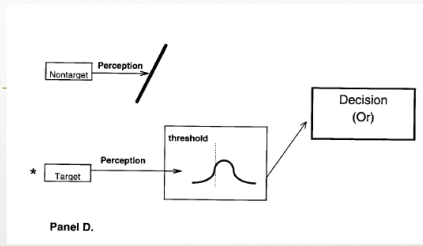
Explanation with Decision Noise

- Decreasing the number of to be monitored by a cue improves the accuracy for purely statistical reasons
- This model can be proposed within a signal detection framework



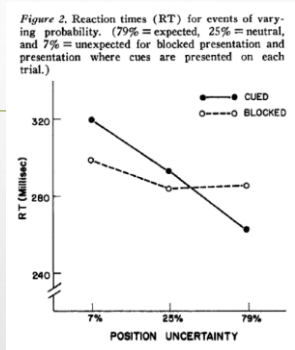






Posner et al. (1980) Experiment 1

- Subjects prepared for one location for a block of trials (pure blocks).
- Subjects prepared for different locations on each trial (mixed blocks)
- How does this manipulation distinguish capacity allocation and noise reduction hypothesis?



Posner et al. (1980) Experiment 1

- In the Pure block sessions, only the costs were significantly different from the neutral condition. There was no evidence of benefit.
- Do these results support capacity allocation or noise reduction hypothesis?

Posner et al. (1980) Experiment 2

- Comparison of providing subjects with information about the shape of a stimulus with providing information about the location of the stimulus.
- How do alternative theories predict the performance under these conditions?

Posner et al. (1980) Experiment 2

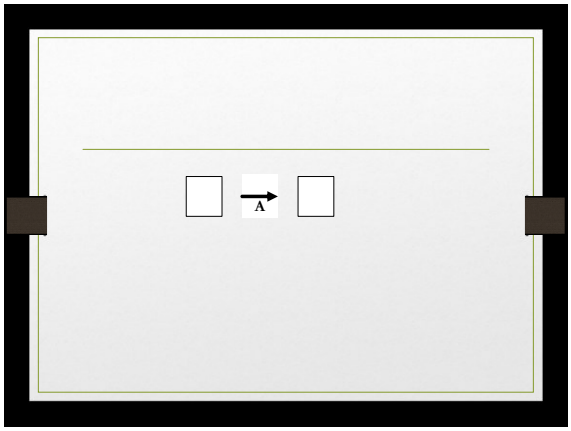
		LOCATION		
		Expected	Neutral	Un-Expected
FORM	Expected			
	Neutral			
	Un-Expected			


A


A


A


A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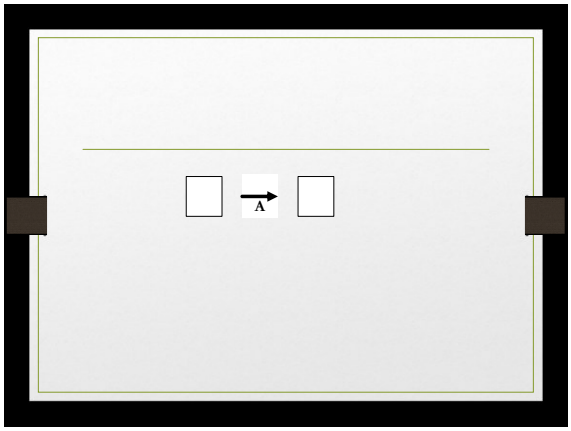
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Posner et al. (1980) Experiment 2

- How do alternative capacity allocation and noise reduction theories (predict the performance under these conditions?

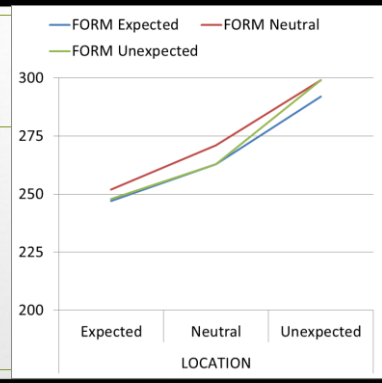
Posner et al. (1980) Experiment 2

- Information about the target's shape serves to disentangle the signal from noise as well as the location.

Table 1
Mean Reaction Time for Expected, Unexpected, and Neutral Form and Location Cues

	Location			
Form	Expected	Neutral	Unexpected	*M*
Expected	247	263	292	267
Neutral	252	271	299	274
Unexpected	248	263	299	270
M	249	266	297	

Note. Time is measured in milliseconds.



Posner et al. (1980) Experiment 2

- Results
- Information about the location of the letter improves performance, but information about the form does not.

Conclusion

- The subject's knowledge about where in space a stimulus will occur affects the efficiency of detection.
- Capacity allocation mechanism explains the results better than the more theory of noise reduction.

Learning Objectives

- Attentional Set
- Capacity allocation models of attentional set effects
- Alternative Accounts
- **Orienting attention with endogenous vs. exogenous cues**

Endogenous vs. Exogenous Cues

- **Endogenous :** Originating internally (tfd.com)
- Visual attention is voluntarily directed to a non-fixated location in visual space based on an instruction.
- **Endogenous :** Originating externally (tfd.com)
- Visual attention is automatically directed to a non-fixated location in visual space by an abrupt change in the v.

Endogenous cue

Endogenous cue

Endogenous cue

Exogenous cue

Exogenous cue

Exogenous cue

Exogenous cue

Endogenous vs. Exogenous Cue

Endogenous vs. Exogenous Cue

Endogenous vs. Exogenous Cue

Endogenous vs. Exogenous Cue

Exegenous cue

Endogenous vs. Exogenous Cue

Endogenous vs. Exogenous Cues

- When attention is focused to a location, visual onset presented at nonattended locations do not interfere.
- By voluntary focusing, the attention-attraction effect of peripheral onsets and offsets can be eliminated.

Article 3 Green and Woldroff (2012)

- The article is related with endogenous vs. exogenous cuing of attention
- Central arrows, since they were highly overlearned stimuli, can trigger rapid automatic shifts of spatial attention similar to exogenous cues.
- Therefore, **observed effects with central arrows might or might not reflect orienting attention with endogenous cues**