

Attention/Reasoning and Decision-Making

CSP 502

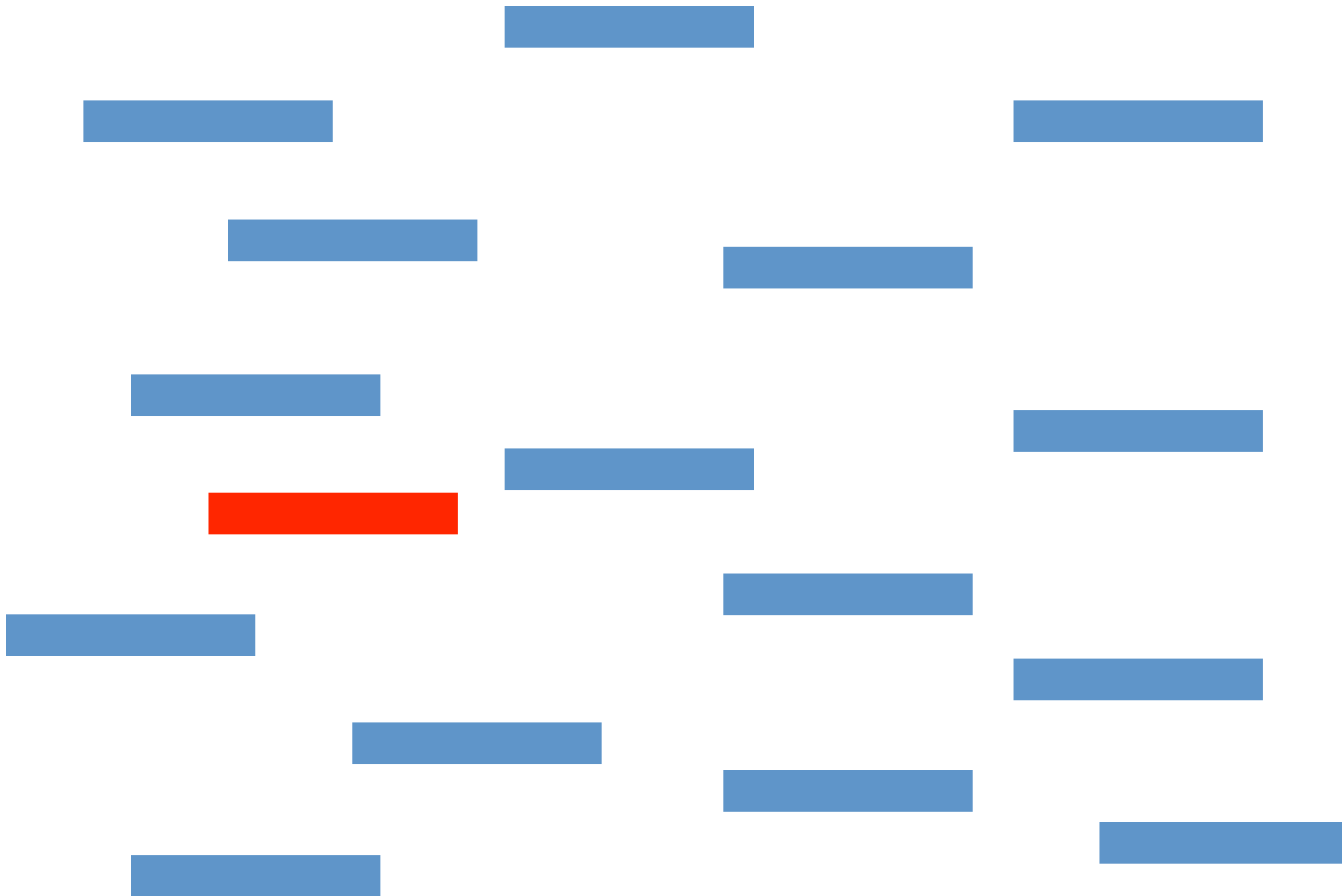
Wednesday Bushong

What is attention?

- Generally heightened alertness/awareness?
- Selecting certain stimuli in the environment to process in more detail?
- Concentration?

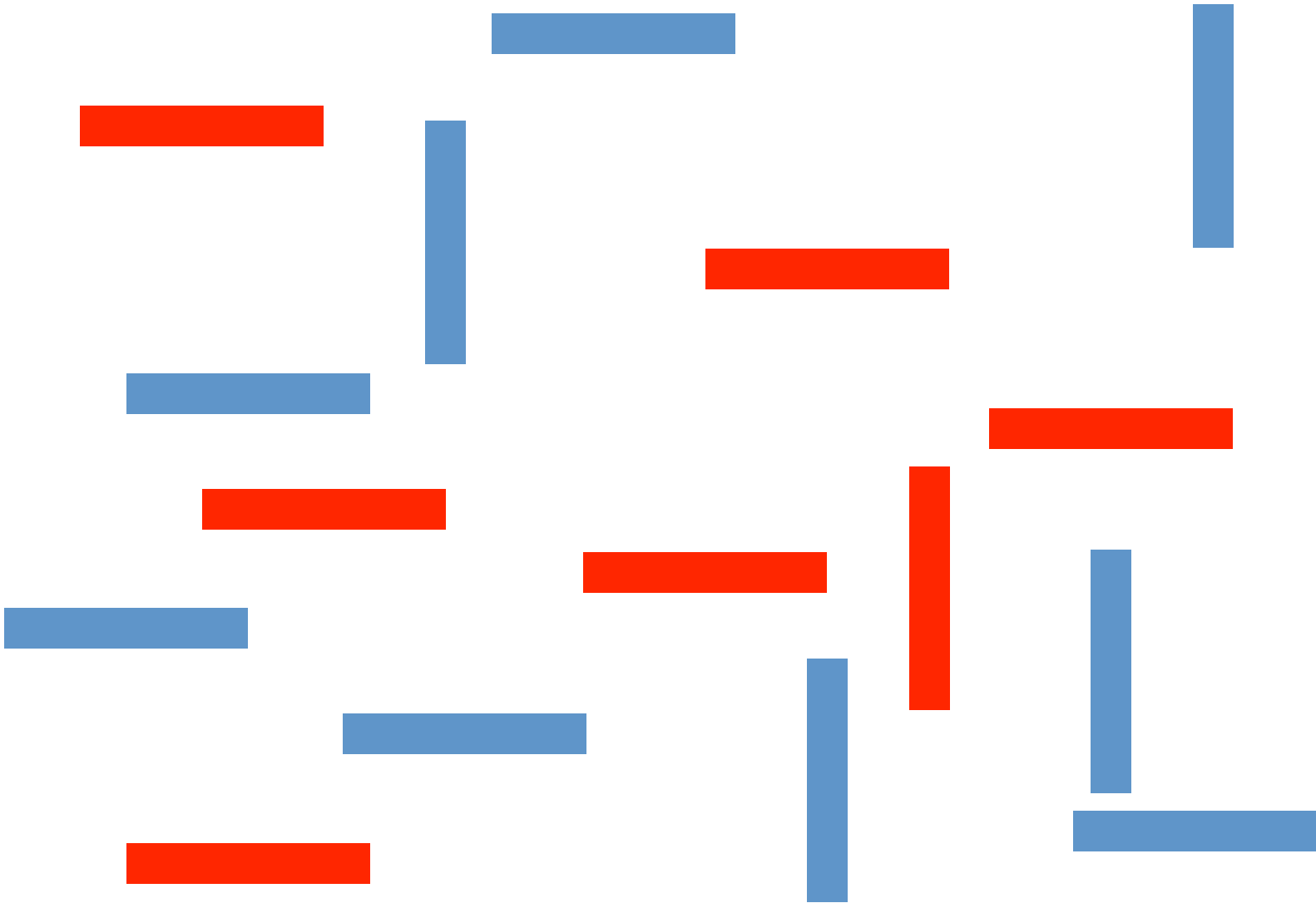
Endogenous vs. Exogenous Attention

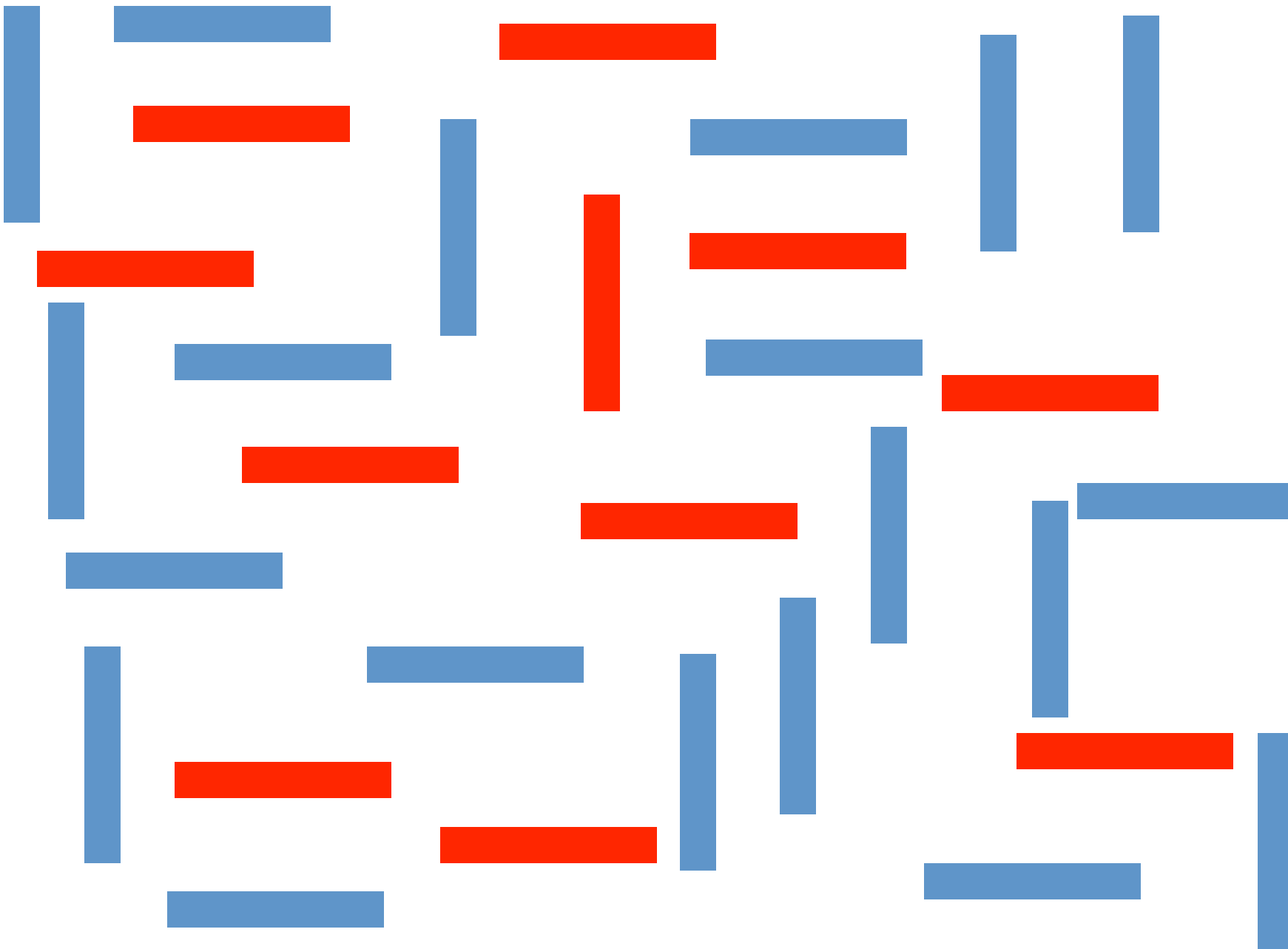
- Exogenous: stimulus drives the attention
 - 'pop-out' effect



Endogenous vs. Exogenous Attention

- Exogenous: stimulus drives the attention
 - 'pop-out' effect
 - reaction time is instantaneous no matter how many distractors
- Endogenous: the mind drives the attention





Endogenous vs. Exogenous Attention

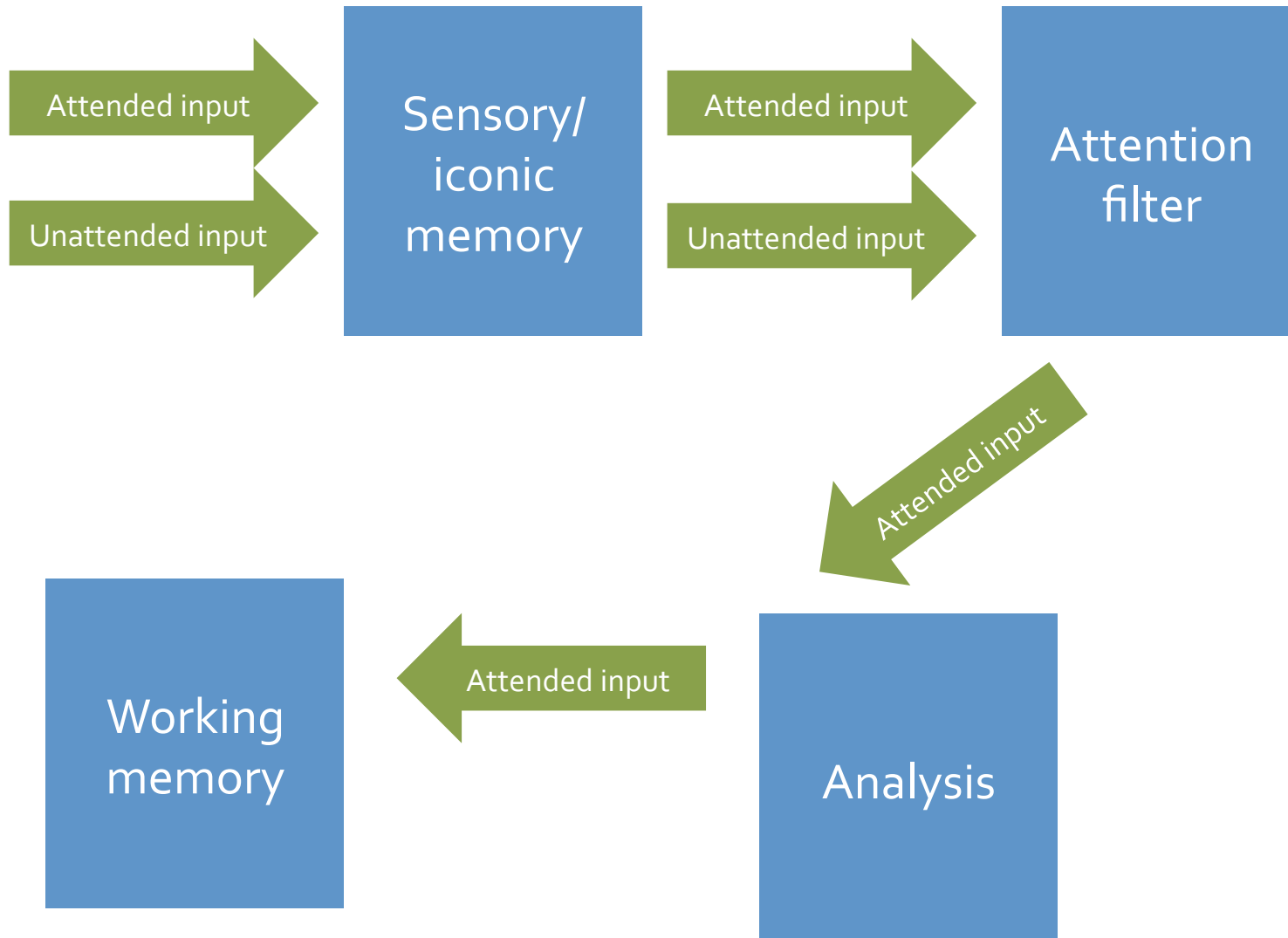
- Exogenous: stimulus drives the attention
 - 'pop-out' effect
 - reaction time is instantaneous no matter how many distractors
- Endogenous: the mind drives the attention
 - RT becomes slower with more distractors and more features

- To what extent do we filter out irrelevant information?
- Dichotic listening tasks



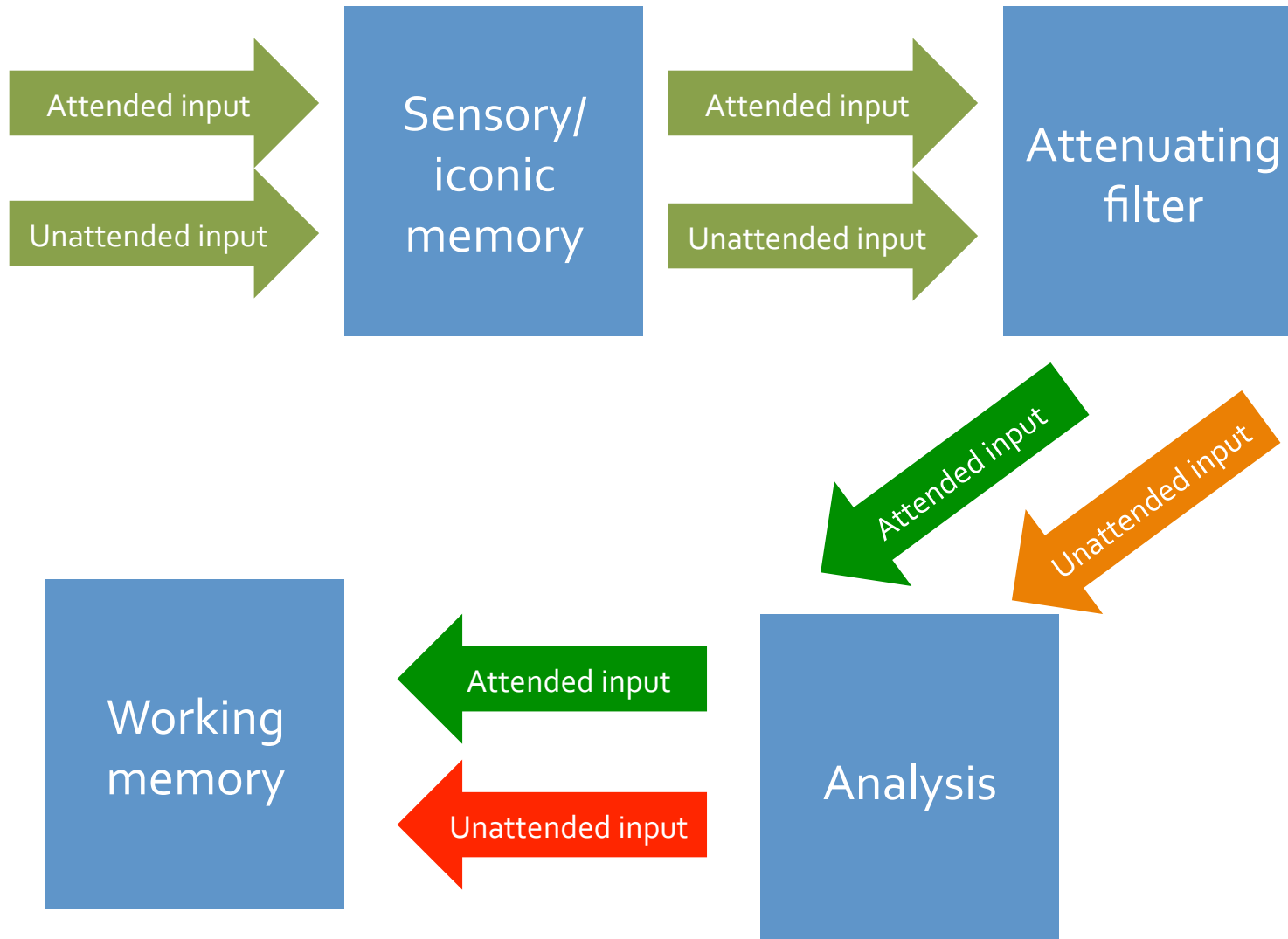
- Very little information processed consciously in the unattended channel

Attention as a filter (Broadbent)



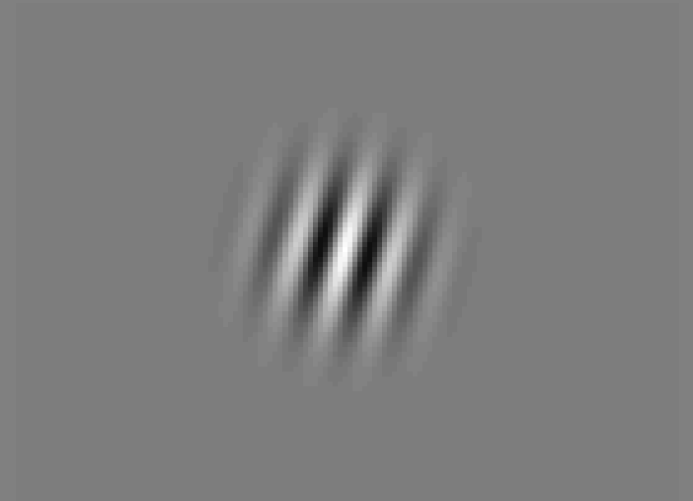
- But, some information maintained
 - gender of speaker
 - music vs. speech
 - loudness
 - pitch

Attention as a searchlight (Treisman)

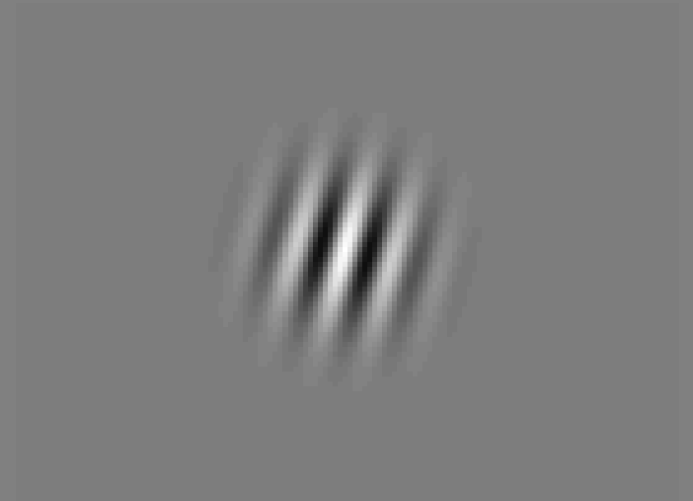
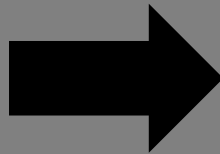


- Unattended information only reaches awareness under some conditions
 - cocktail party effect (subjective importance)
 - priming
- Is unattended information simply attenuated, or is it penalized relative to neutral?

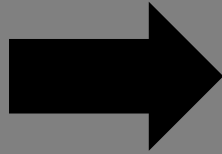
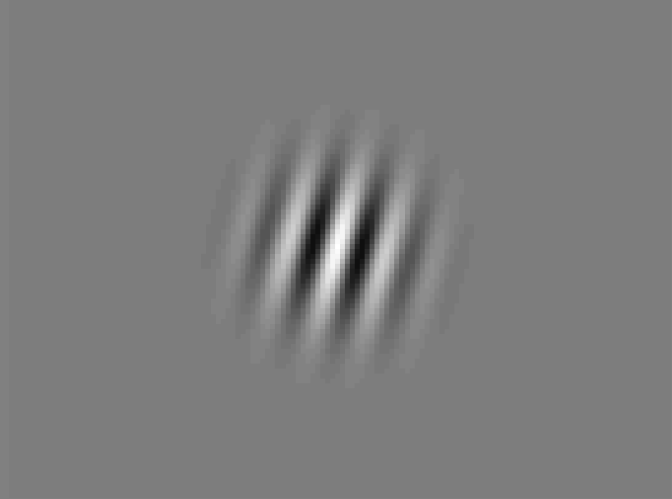
Cueing Paradigm



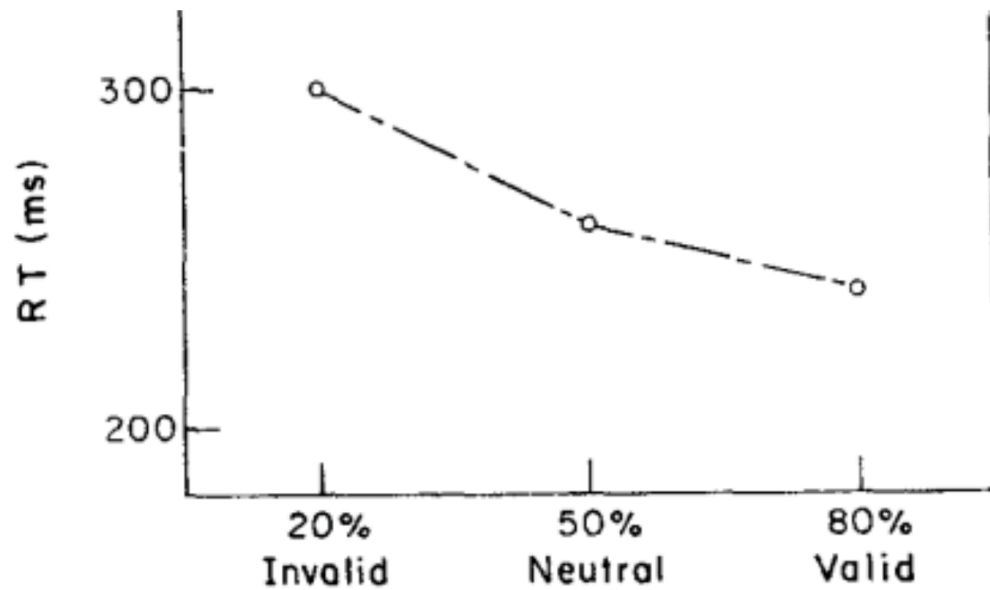
Valid Cue



Invalid Cue



Reaction time *worse* for invalid cue than neutral



Neural evidence

- Firing increases when attended stimulus is in receptive field, decreases when unattended stimulus is in it

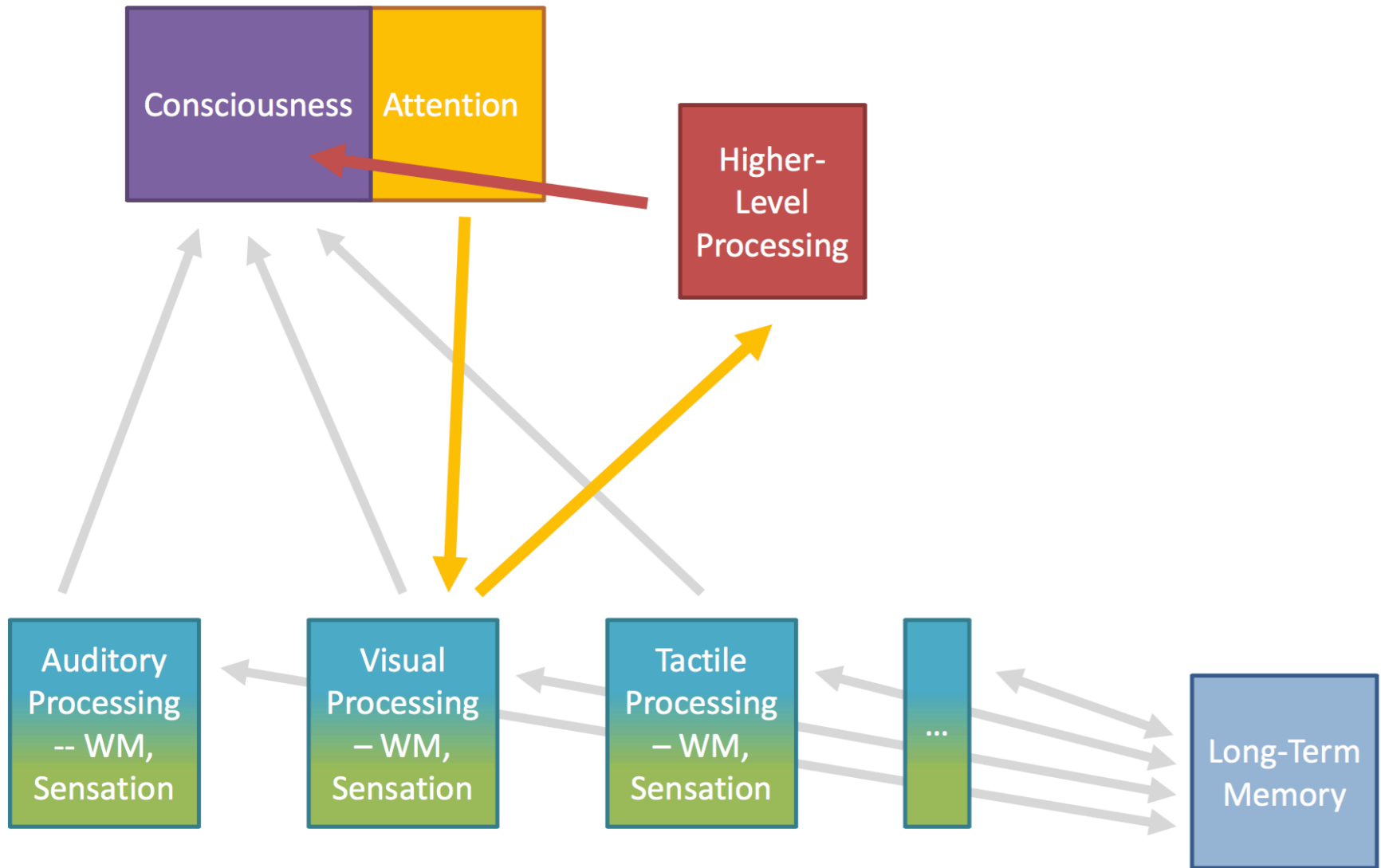
Is attention a single resource or more distributed?

- How easy are these:

Reading a book while listening to instrumental music

Reading a book while listening to a podcast

	Spatial Task	Verbal Task
Spatial Response	Hard	Easy
Verbal Response	Easy	Hard



Reasoning and Decision-Making

Types of processing

- System 1: fast, automatic, frequently inaccurate
- System 2: slow, effortful, but accurate

Which sequence of coin flips is more likely?

T T T H H H

T H T T H H

You get tested for ebola. Ebola occurs in about 0.1% of the population. The test can detect it with 99% accuracy, and has a 5% false positive rate. You test positive. What's the probability that you have ebola?

$$P(\text{ebola} \mid \text{test} = \text{positive}) = \frac{P(\text{test} = \text{positive} \mid \text{ebola})P(\text{ebola})}{P(\text{test} = \text{positive})}$$

$$.99 * .001 / (.99 * .001 + .05 * .999) = 1.94\%$$

Availability Bias

- When were kidnappings more common: 20 years ago, or 2 years ago?
- Which category is larger: words that start with “R”, or with “R” as their third letter?

Confirmation Bias

- Only pay attention to evidence that aligns with your prior beliefs
 - e.g., if you think big dogs are more violent, you're more likely to notice violent big dogs

- People don't seem to reason according to 'normative' (ideal) models
- Use broad heuristics rather than effortful reasoning
- How do these reasoning heuristics affect our decision-making?

Which would you prefer?

1. \$30 for sure
 2. \$45 80% of the time (\$0 for the other 20%)
- Option 2 has an expected value of \$36, but people generally avoid risk

Imagine that the US is preparing for a flu outbreak which is expected to kill 600 people. There are two vaccine options. Which would you choose?

- Vaccine A: 200 people will be saved
- Vaccine B: there is a $\frac{1}{3}$ chance that all 600 people will be saved, and a $\frac{2}{3}$ chance that no one will be saved.

72% say A

- Vaccine A: 400 people will die
- Vaccine B: there is a $\frac{1}{3}$ chance that nobody will die, and a $\frac{2}{3}$ chance that 600 people will die.

Now 78% say B!

More framing effects

- Global Warming vs. Climate Change
- Affordable Care Act vs. Obamacare