



# Thinking 1

## Representations



- Mental representations allow us to
  - A. Think about physical objects that are not immediately present.
  - B. Consider the outcomes of actions that we are not currently experiencing.
  - C. Draw conclusions based on evidence from events that we've encountered in the past and so are available only through memory.
  - D. All of A/B/C
  - E. None of A/B/C

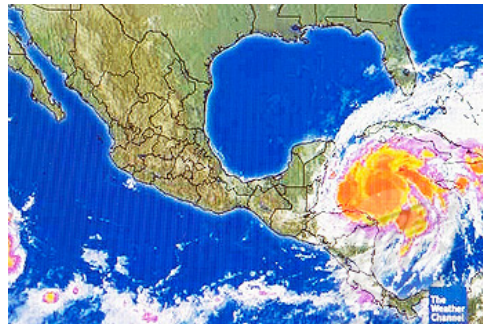


## Two Important Themes in the Text

- Human are simultaneously capable of
  - extraordinarily high-quality thinking
  - of coming to conclusions that are completely unjustified and making choices that are foolish
- The nature of thought depends critically on what it is that thought manipulates – i.e., ideas
  - and how they are represented



- A TV satellite weather map that shows cloud cover and the outlines of bodies of water could best be called a(n) \_\_\_\_\_ representation.
- A. mental
- B. hypothetical
- C. analogical
- D. symbolic



# Mental Representation

- Content, in the mind, that stands for some object or event or state of affairs
- Two broad classes of mental representations
  - *Analogical* Example: Mental Images
  - *Symbolic* Example: Propositions
- Continuum not a categorical distinction



- Thinking back to the questions I just asked, rate the vividness of you imagery using this scale.
  - A. Perfectly Clear and as vivid as normal vision
  - B. Clear and reasonably vivid
  - C. Moderately clear and vivid
  - D. Vague and dim
  - E. No image at all (only "knowing" that you are thinking of the object)

Scale taken from Kihlstrom, J.F., Glisky, M.L., Peterson, M.A., Harvey, E.M., & Rose, P.M. (1991). Vividness and control of mental imagery: A psychometric analysis. *Journal of Mental Imagery*, **15**, 133-142.

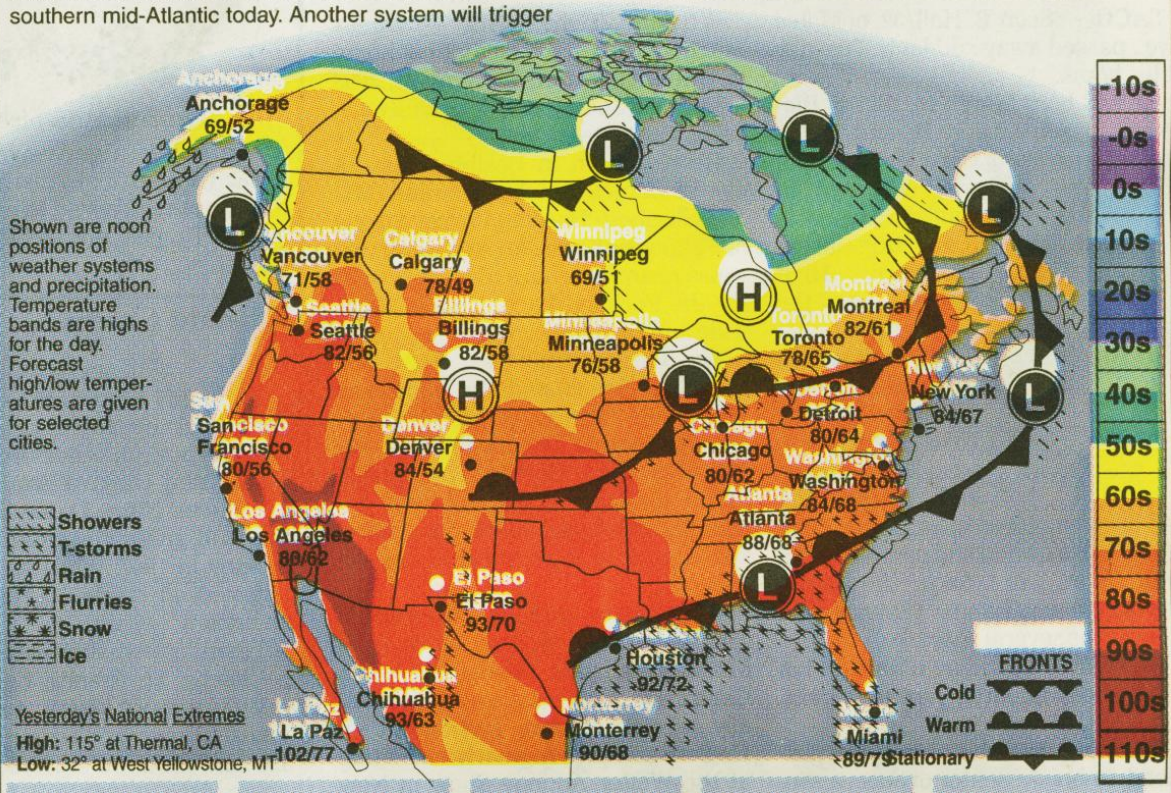
# Mental Images & Symbols



CEWRIGHT

A storm system riding along a stationary front will bring showers and thunderstorms to the Southeast and southern mid-Atlantic today. Another system will trigger

some showers and thunderstorms across parts of the upper Great Lakes to the mid-Mississippi Valley.



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- What does research on visual imagery indicate?
- A. The same brain areas are involved in visual perception and visual imagery.
- B. People who lose the ability to perceive colors often also lose the ability to imagine colors.
- C. People who lose the ability to perceive fine detail often also lose the ability to see fine detail in visual imagery.
- D. All of the above answers are correct.

# Strengths and Weaknesses of Analogical Representations



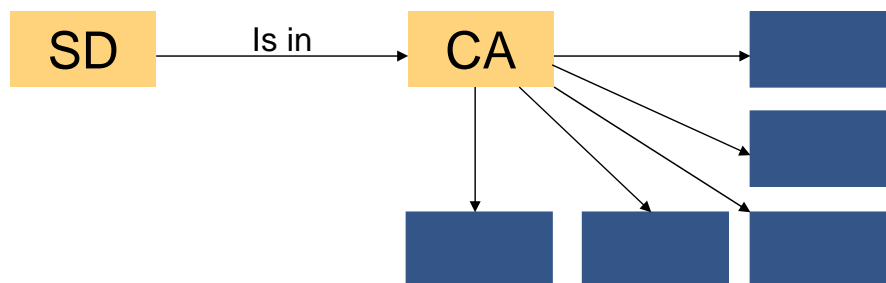
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# Symbolic Representations

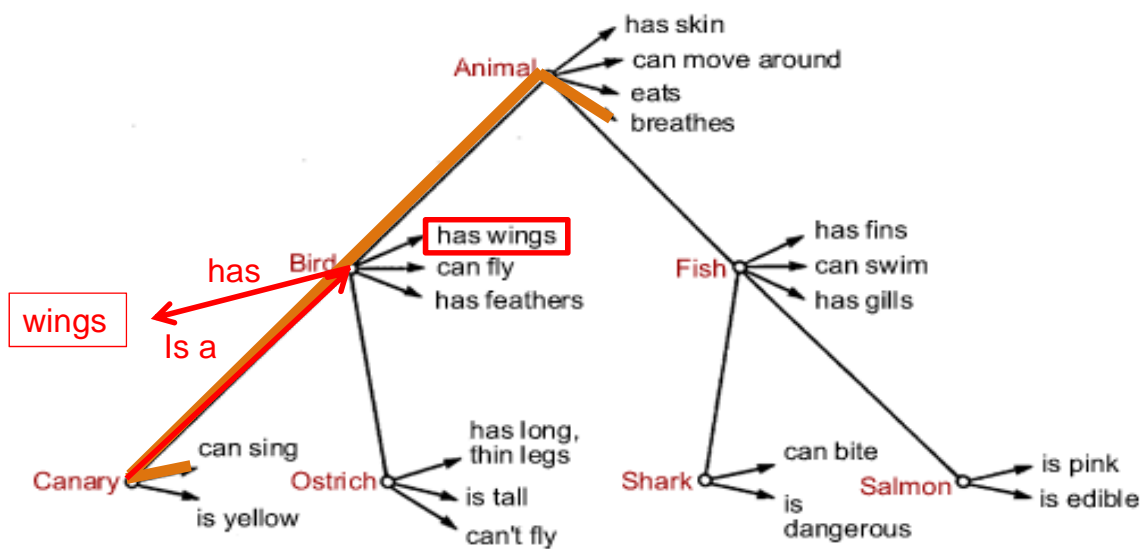
- More flexible *because* they are arbitrary
- Symbols can be combined to represent more complex ideas: propositions





- The Sentence Verification Zap that you did two weeks ago, draws heavily on \_\_\_\_\_ representations.
- A. analogical
- B. symbolic

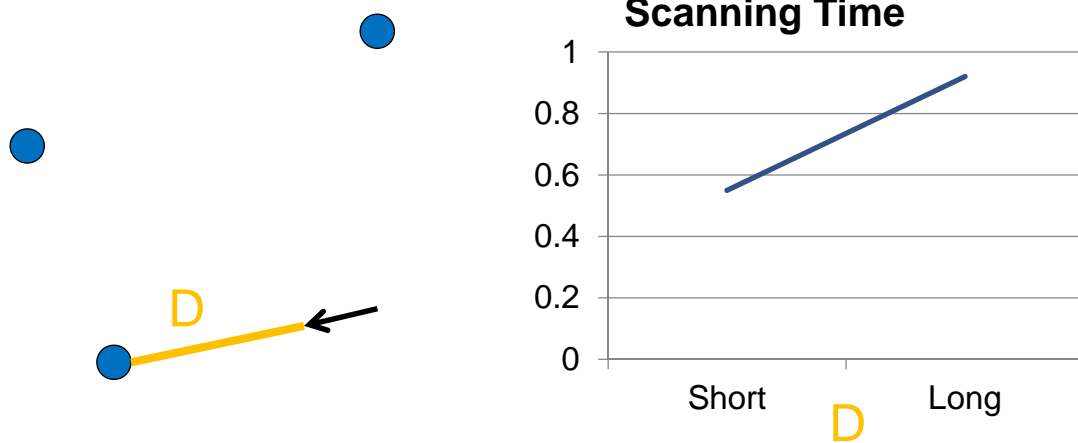
# Sentence Verification Zap



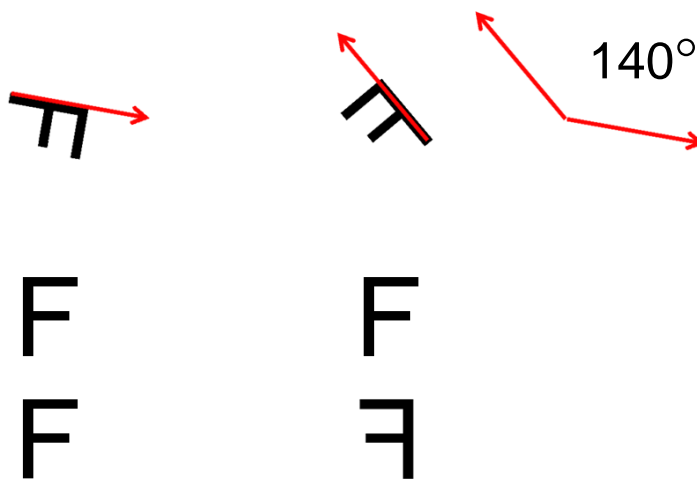


- Consider the sentence  
“Jane loves Caesar salad.”
- A. Although this is a sentence, it not a proposition.
- B. Considered as a proposition, ‘Jane loves’ is the predicate and ‘Caesar salad’ is the subject.
- C. Considered as a proposition, ‘Jane loves’ is the subject and ‘Caesar salad’ is the predicate.
- D. Considered as a proposition, ‘Jane’ is the subject and ‘loves Caesar salad’ is the predicate.

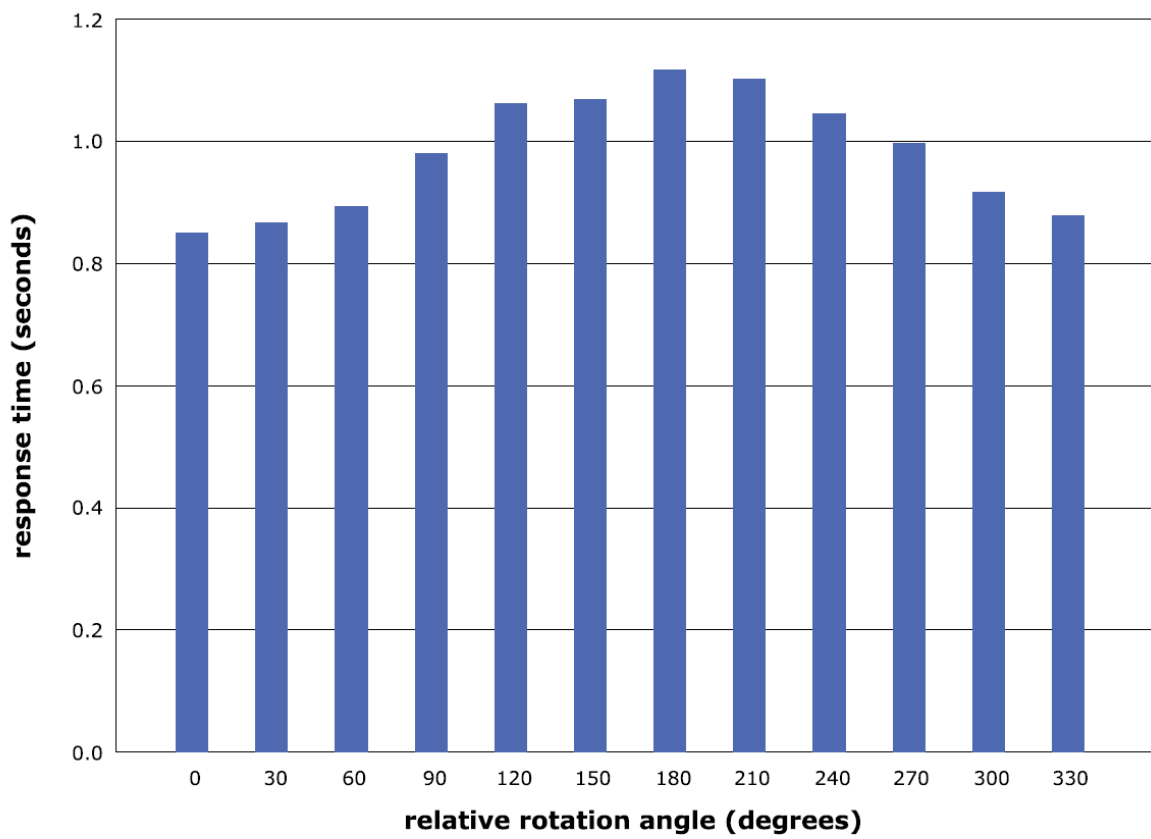
# Mental Scanning Zap



# Mental Rotation 2-D Zap







# Transcranial Magnetic Stimulation: TMS

- TMS uses electromagnetic induction to generate, from the outside, currents in the brain up to 1" from the coil
- The induced currents briefly disrupt (10 – 20 ms) normal neural signals
- TMS has been used to show that visual imagery and perception both depend on processing in visual cortex





# Summary: Representations

- We represent information
  - analogically
  - symbolically
- This distinction is critical because  
What we *can* think depends on the  
nature of the mental representations for  
the ideas we are considering

# Overview

- Focus in the text: ***Directed*** thinking
  - mental activities used to achieve goals
- Examples:
  - Judgment - interpreting information
  - Reasoning - judging the truth of an assertion
  - Problem solving
  - Decision making - weighing the costs and benefits of a decision
- Alternatives to directed thinking
  - Emotions
  - Heuristics
  - Diffuse mode thinking



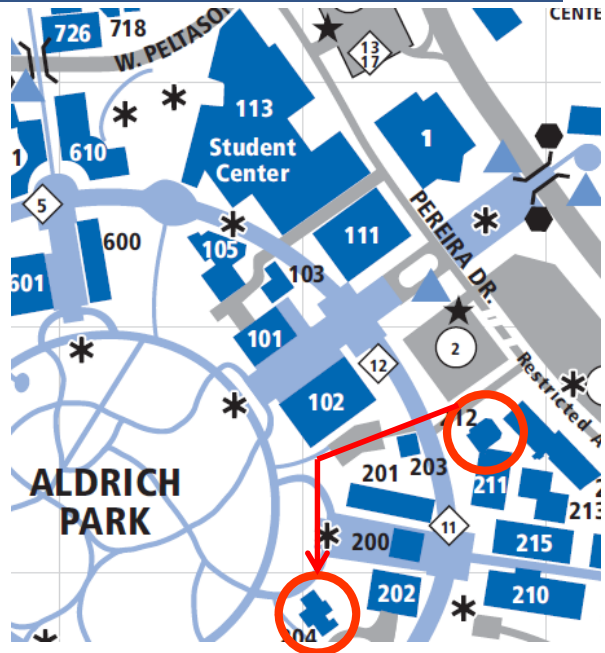
## Diffuse mode thinking: Not a new idea

- The research of the diffuse mode has almost all be done in the last 10 years
- William James (1842-1910)

*“There is an ‘alternation’ of consciousness, such that the fringe briefly but frequently comes to the fore and is dominant over the nucleus of awareness.”*

# Looking Ahead

- For Monday
  - Gleitman:  
pp. 348-354
- Coffee after class at  
Phoenix Grill?



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