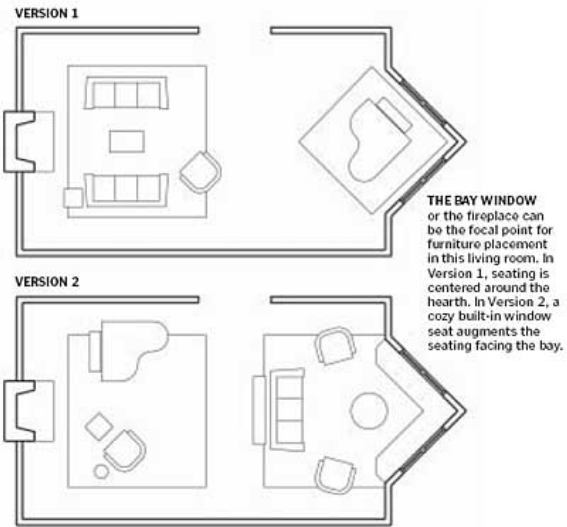
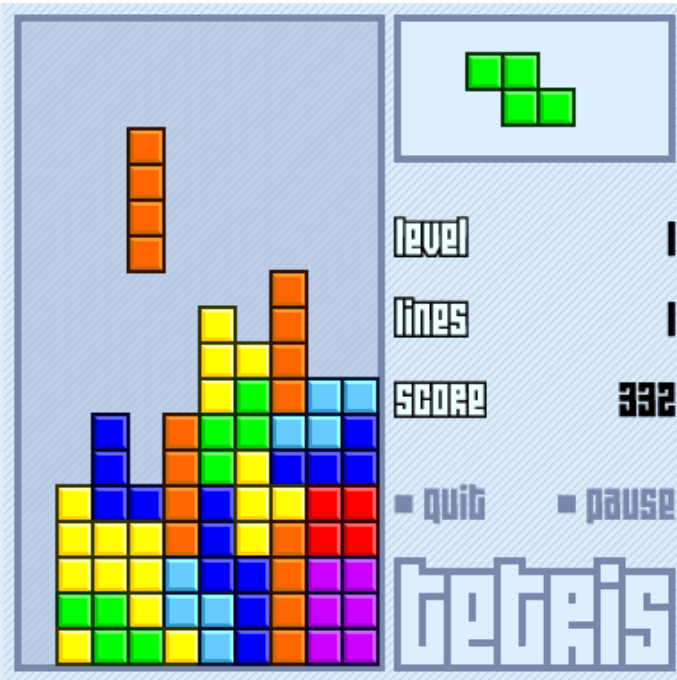
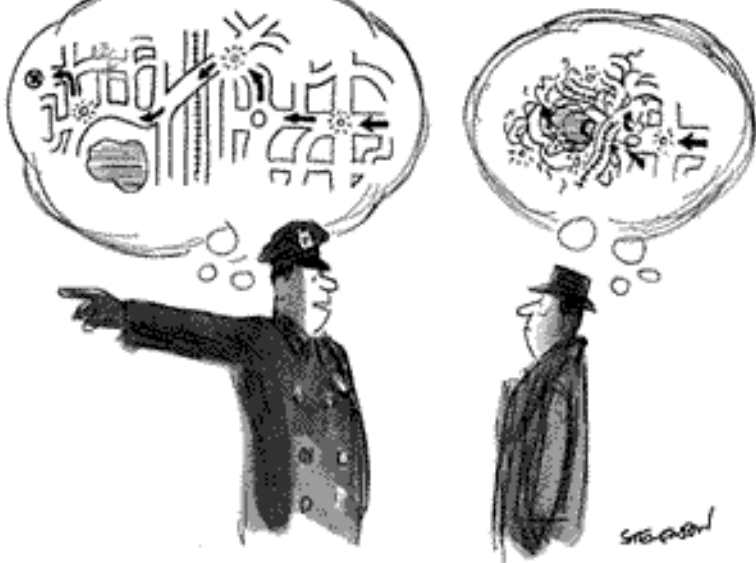


Mental Imagery & Cognitive Maps

Psyc 364: Oct 26th 2016

Shelagh Freedman

+



Mental Rotation

- Phenomena
 - mental rotation of objects
 - distance estimation
 - motor imagery
- Representation: How do we represent visual information?
 - Analog view
 - Propositional view

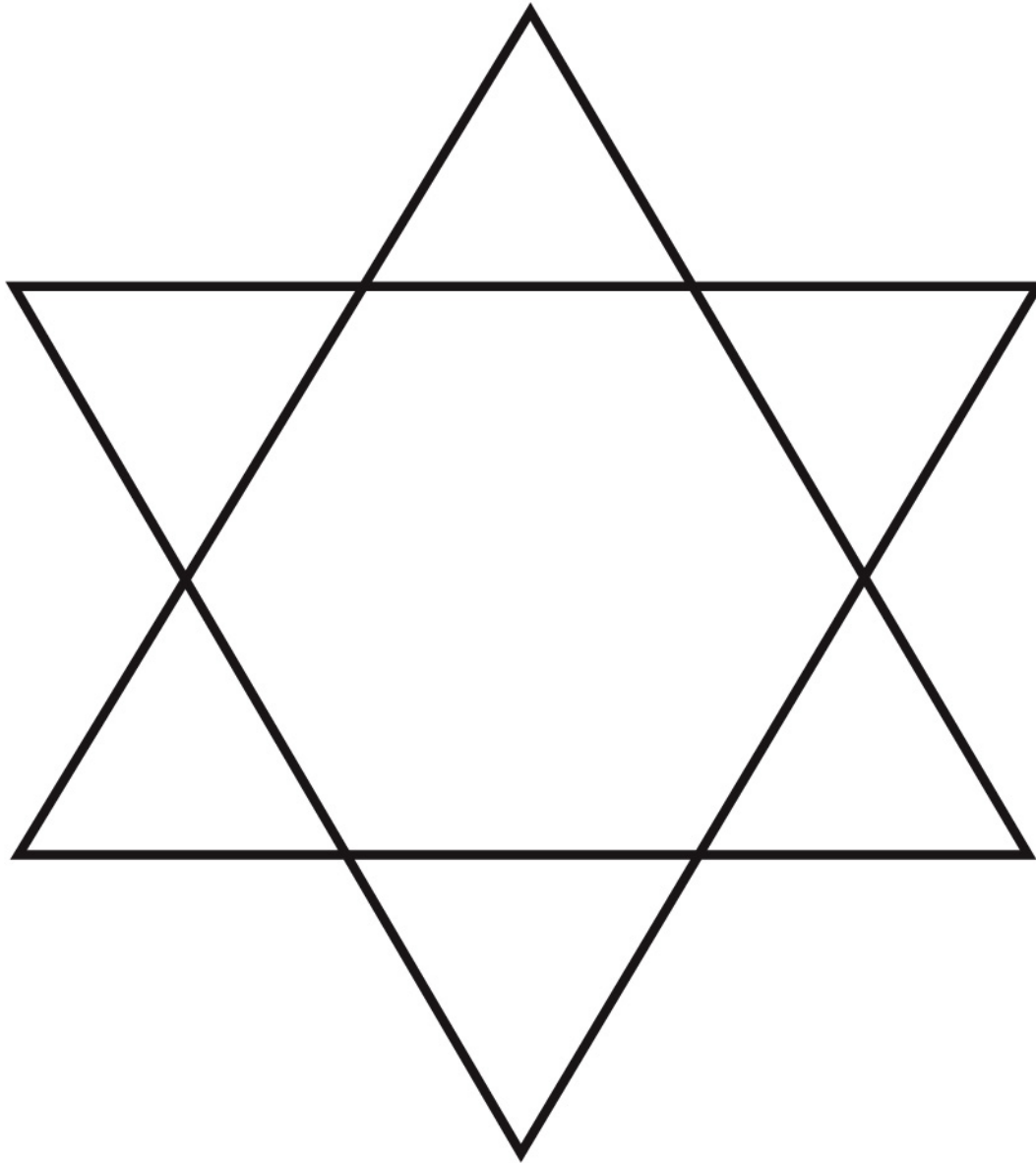
Two Opposing Views

Analog

- Led by Steve Kosslyn
- Assumptions
 - Representation has picture-like quality
 - Analogous to the original visual input
 - Mental image should have similar physical properties
 - Available for inspection, rotation, reinterpretation

Propositional

- Led by Zenon Pylyshyn
- Assumptions
 - Representation has verbal propositions to describe the visual stimulus
 - Should not have physical properties, therefore we should not be able to reinterpret ambiguous mental images



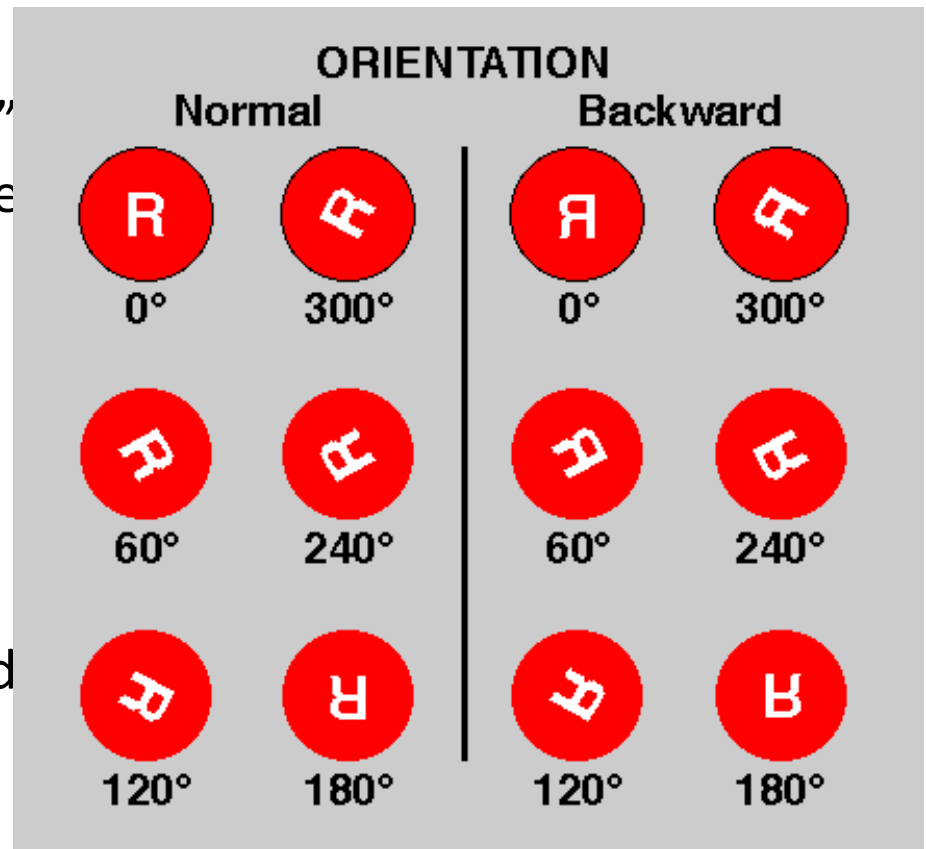
Copyright © John Wiley & Sons, Inc. All rights reserved.

Demonstration 7.2

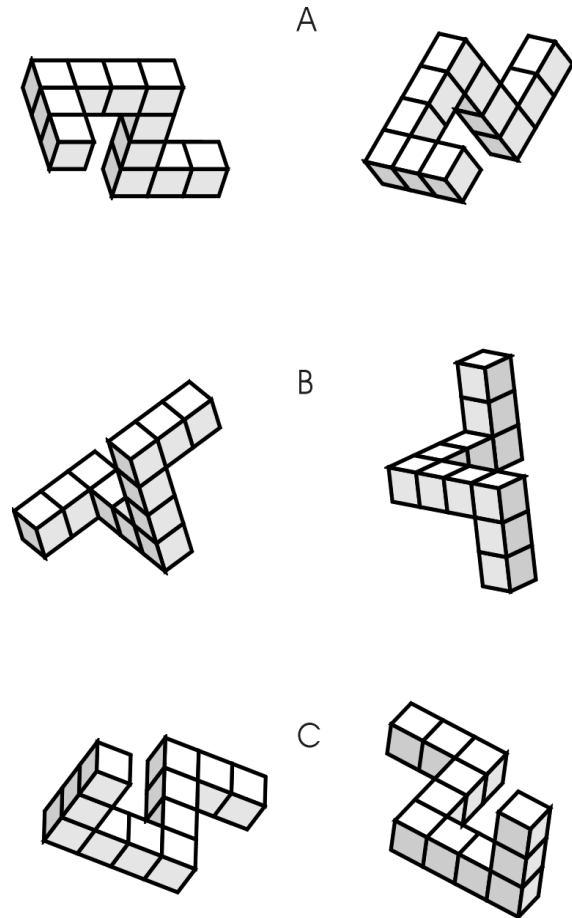
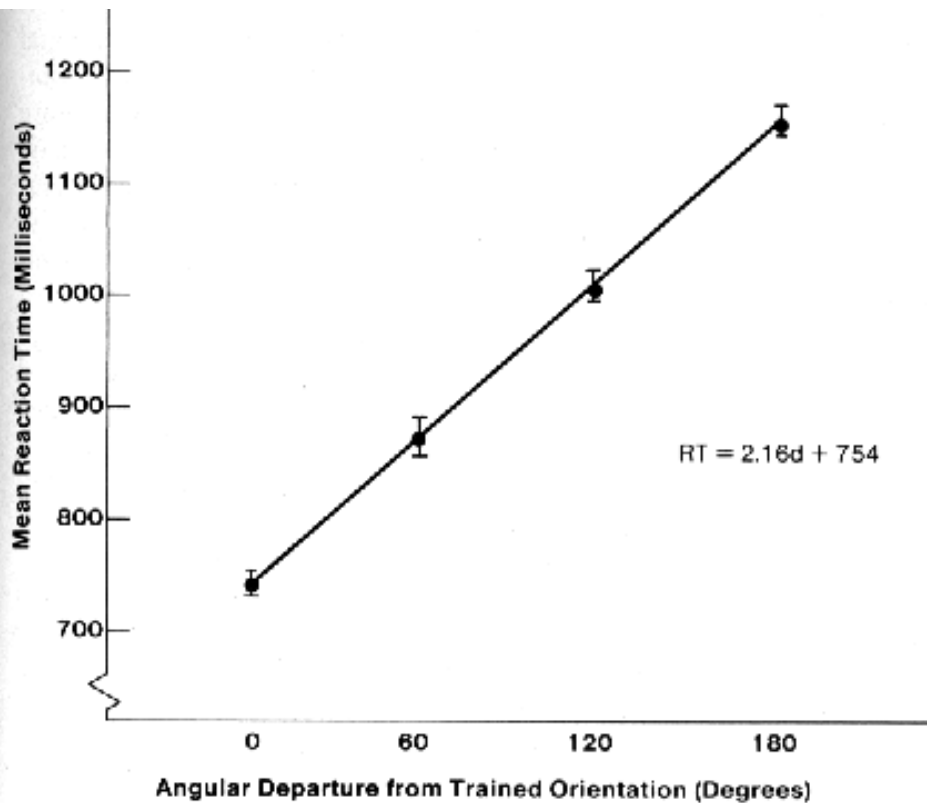
Copyright © John Wiley & Sons, Inc. All rights reserved.

Mental Rotation Paradigm

- Led by Shepard and Metzler
- Subjects view pairs of line drawings of 3-D objects
- Respond “same” or “different”
- Experimentally manipulate the *angular disparity*
- Test multiple pairs (1000+) of drawings that vary randomly in angular disparity from trial to trial
- Half of trials are different because they are mirror images which are then rotated



Mental Rotation Typical Data

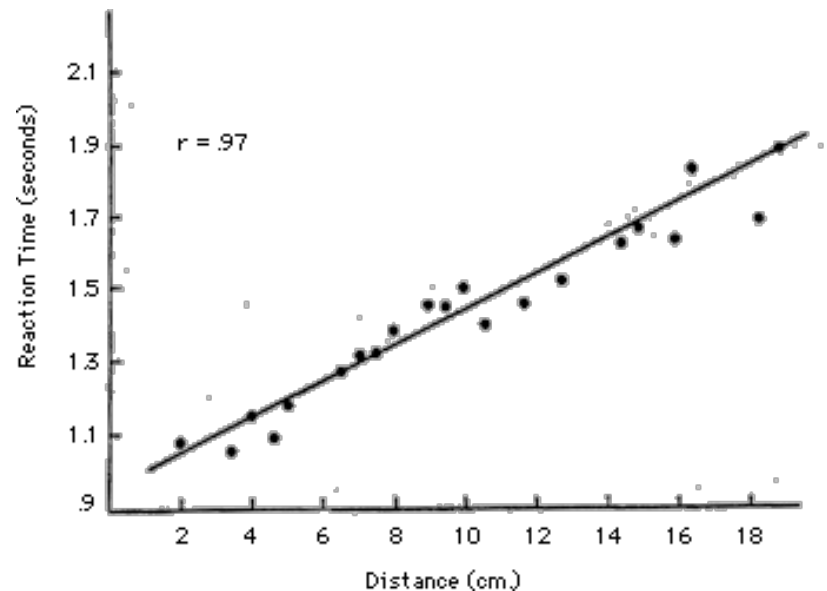


Distance Estimation

Time to scan from one location to another



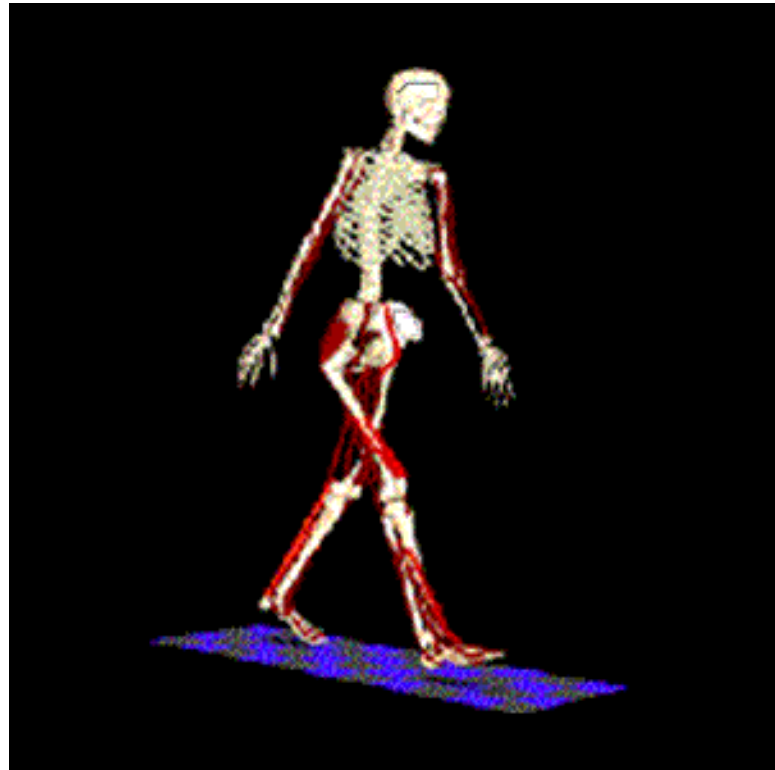
Linear relationship between actual distance and scanning time



Kosslyn, Ball, & Reiser (1978)

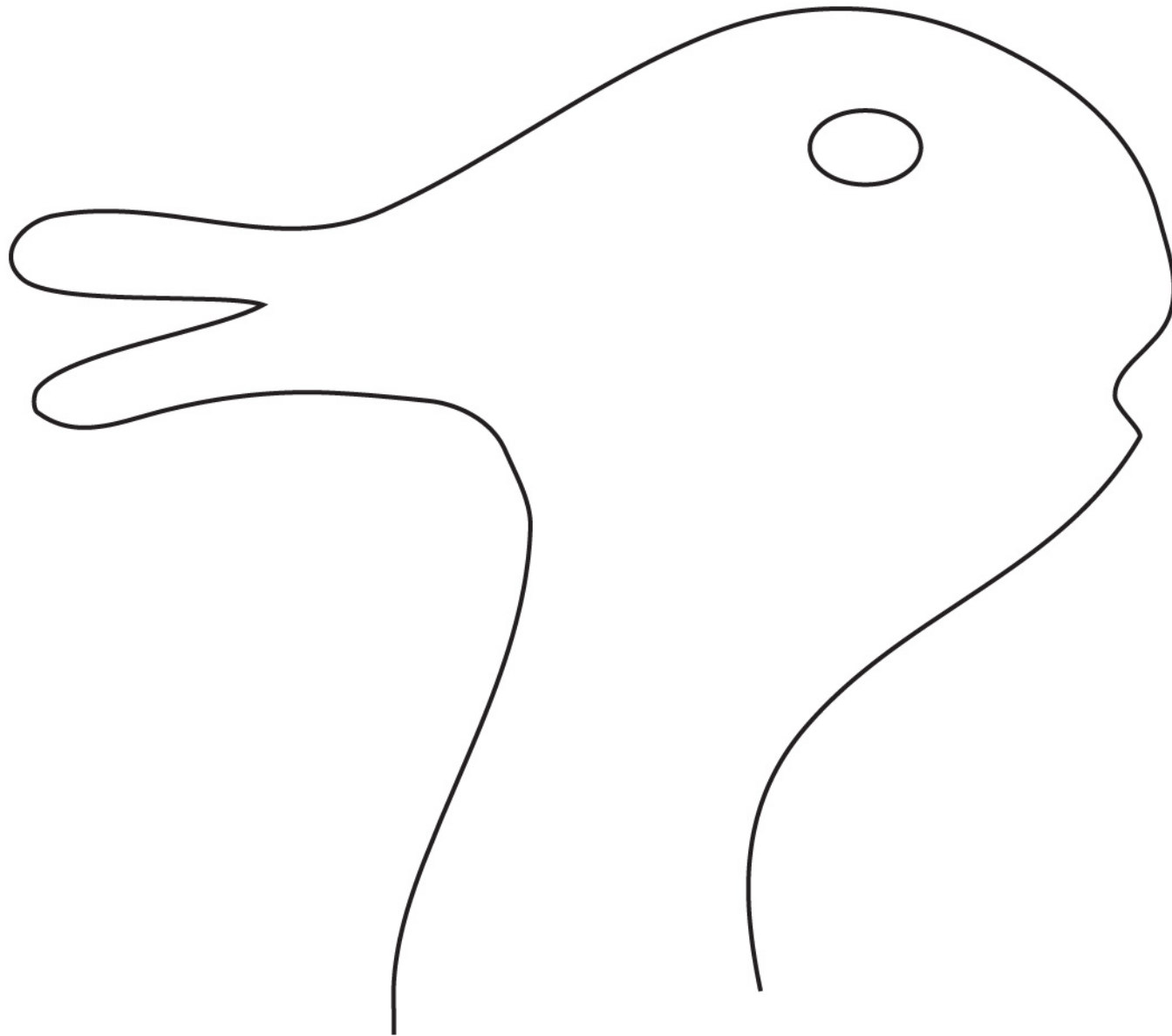
Imagery of Locomotion

- Distance walked is proportional to mental imagery time
- Functional brain imaging reveals similar brain activations to actual locomotion
- Walking curved paths and imagined walking along curved paths involves similar brain regions and eye movement patterns



Ambiguous Figures





Copyright © John Wiley & Sons, Inc. All rights reserved.

Figure 7.2

Copyright © John Wiley & Sons, Inc. All rights reserved.

Resolution of the Imagery Debate?

- The weight of the evidence supports the analog view
 - Mental rotation
 - Distance estimation
 - Interference from images
 - Imagined walking
 - Neuroimaging
- Auditory imagery shows similar temporal properties (e.g., timbre and pitch similarity)
- Propositional coding may be more commonly used when stimuli are ambiguous or are complex (e.g., star of David)
- Difficult to separate out demand characteristics and “folk psychology” expectations about imagery although there is some evidence that rules out this confound
- Storage capacity problem: how many mental images can we store?

Distance Judgments



- Top-down distortions of distance judgments
 - Categorical membership
 - Intervening items (e.g., cities)
 - Border bias

Heuristics and Distortions



Spatial Framework Model

Franklin & Tversky (1990)

Model Assumptions

- Human spatial frameworks make reference to anatomically and experientially guided axes
- Vertical
 - Asymmetrical
 - Indexed by gravity
- Front-back
 - Asymmetrical
 - Front is functionally more significant
- Left-right
 - Symmetrical
 - Hence, L-R confusions are common

Evidence

- Narrative texts describing 5 object locations to be studied
- Instruction to imagine changing location (e.g., 90 degrees right)
- Test: Direction word (right) is given, then name object that would be seen in that direction
- Varied instructions across experiments: egocentric labels (head, feet), guided mental rotation, reclining
- Results: across all versions, fastest response times for top-bottom and front-back decisions, and slowest for L-R