Imagery: Representation

Image: mental representation that is similar to what it represents.

Main example: visual (pictorial) images
Maps, diagrams, pictures
Other: tactile, auditory, motor, olfactory

Key question: does the mind use a single, propositional (verbal) code, or multiple codes?
Kosslyn vs. Pylyshyn. Not just introspection.

Imagery: Computational Power

- Vision is far more complex than you realize. Illusions.
- Light on retina to experience of perception requires much processing.

Imagery: Computational Power

- Visual operations, e.g., Finke examples.
- Zoom
- Scan
- Rotate
- Flip
- Use for problem solving. Analogies.
- Learning. Language.

Discussion Question

- When do you use imagery? What kinds?
- What kinds of problems are most usefully solved using imagery?

Concepts are multimodal

- Concept of car is not just a verbal description, but includes visual and other kinds of representations.
Key Points

- Thinking is not just verbal, but also use visual images and other kinds of representations.
- Visual images allow different kinds of operations from verbal ones.

Psychological Evidence for Imagery

1. Anecdotes: limited.
2. Imagery and skill learning, e.g., sports.
3. Psychological experiments with reaction times: scanning, rotation, gestalt perception.

Psychological Evidence for Imagery

Neurological Evidence for Imagery

- Mental imagery activates visual areas of the brain: large increases in blood flow to the visual cortex.
- Defects in imagery tend to go with defects in vision. Image generation deficits in some people. Typically have damage in left posterior part of brain.

Discussion Question

- Is the psychological evidence for imagery convincing?
Key Points in Glasgow

- Computational imagery is the ability to represent, retrieve, and reason about spatial and visual information.
- Nested arrays can be used to represent spatial information.
- Visual information can be represented using occupancy arrays, and manipulated using operations such as rotate, translate, and zoom.
- Computational imagery is useful for cognitive science and AI, and has practical applications, for example in drug design.

Key Points

- The case for visual imagery is based on a combination of psychological and neurological experiments.
- Computational modeling of visual imagery is hard.