Mental imagery

PSY 200
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Lecture 24

Is a picture in your head like a picture in the world?

Mental representation

- How do you mentally represent knowledge?
  - concepts (prototypes, exemplars)
  - propositions
  - mental images, maps

Perception

- We have knowledge about, and memories of, perceived stimuli
  - sights
  - smells
  - touches
  - sounds
- Are these converted into propositions, or concepts
  - or is there something else?

Images

- When we see this image how do we represent the information in the image?
  - analog: copy of image in head and we can retrieve it
  - symbology: convert to propositions/concepts

Images

- I can remember the image on the previous slide and it feels like I picture the image in my head
  - but is it really?
  - could it be a proposition?

Images

- If you ask me questions about the previous slide, my answers would not necessarily identify the representation

There was a girl running to a soccer ball. She wore red shorts.
Pure propositions
- Let’s look at the arguments for a purely propositional representation
- Look at this picture, I’ll ask you questions about it

Working with images
- If this image was printed on a piece of paper, you would have no problem answering the questions about it
- If you had an exact copy of the image in your head, you would expect you could “look” at the copy and make all kinds of judgments
  - but you cannot
  - how you interpret the image to a large extent determines what you know about it
- Mental images are not exactly like real images
  - this tends to be particularly true for memory of images
  - verbal descriptions dominate memory for images

Another example
- Answer these questions:
  - Which is further North, Seattle, Washington or Montreal, Canada?
  - Which is further East, Detroit, Michigan or Indianapolis, Indiana?
  - Which is further South, Boston, Massachusetts or New York City, New York?
  - Which is further West, Reno, Nevada or San Diego, California?

Another example
- How did you do?

Propositions
- So this suggests that mental images are not exactly like real images
  - and something like propositional information likely influences reports that are ostensibly based on mental images or mental maps

Propositions
- It is clear that propositional information influences mental imagery
  - but is it all propositions?
  - are there mental images, as we tend to experience them?
- Is there any reason to believe that mental images are at all analogous to real images?
  - yes
Representation of mental images

- Imagine you have a mental image of a lion
  - If the mental image is a description (set of propositions), then it should include descriptive information (head, mane, ears, whiskers, tail, …)
    » size of body parts shouldn’t matter much (except as information in the proposition)

- Kosslyn (1976)
  - Ask subjects to quickly answer questions like:
    » Does a lion have a head? (big body part)
    » Does a lion have claws? (small body part)
  -Subjects in two groups
    » 1) form a mental image of a lion
    » 2) think about a lion, but without a mental image
  - Subjects forming a mental image respond more quickly to the head question than the claw question
    » presumably because the head is bigger in the mental image

Representation of mental images

- Subjects that did not form a mental image respond more quickly to the claws question than the head question
  » presumably because the propositions about a lion having claws are more accessible in some network of propositions
- So, different ways of thinking about a lion can lead to different patterns of access to information
  » which implies mental images are different than propositions

Mental rotation

- Shepard & Metzler (1971)
  - 3-D shapes
  - rotated in plane
  - or in depth
  - decide if shapes are same are different
  - measure time to decide

- CogLab experiment
  - 163 participants
  - The more rotated the stimuli are, the longer it takes to make a response
    » close to linear increase in RT
Mental rotation

- This type of experiment has been taken as strong evidence that mental images are not just propositions
  - imagined movement of the mental image (rotation) resembles actual movement
  - it takes time to mentally move through a mental space
    - The Coglab data suggests it is about 100 degrees/second
    - 10 milliseconds for each degree
  - no reason why propositions would give data that incorporate spatial and temporal relations between aspects of the mental images

Vividness

- There are individual differences in reports of mental image vividness
  - some people report their mental images are just like real images
  - others report they are fuzzy and vague
  - some people report no mental images at all (10%)
  - Nevertheless, people all do basically the same on many tasks that seem to require operating on mental images

fMRI

- Hugdahl et al. (2006) had subjects perform a 3-D mental rotation task or a control task (no judgment, just look at 2-D oriented bars and press a button) in an fMRI scanner

Conclusions

- Mental representations of pictorial information
- There are some things you cannot do with mental images
- Propositions are important
- Mental images are not just propositions
- Mental rotation task

Next time

- Review for exam 3
- After Exam 3
  - Start a discussion of language
  - Language as an instinct
  - pidgins and creoles
  - Why we do not have to worry about teaching language in school.