ELL 788
Computational Perception & Cognition

July – November 2015

Module 5

Remembering visual space

We start with an experiment

- In the next slide, I shall show you a few images
  - Look at them (for about 1 sec each) and try to memorize
- In following slide, I shall show you a few images again
  - This slide will show some of the old images and some new ones
  - Old ones may have changed place
  - **Try to figure out which ones have you seen earlier**

Set 1

Source: Oliva, et al. 2010

Set 2

-1-

-2-

-3-

-4-

-5-

-6-

-7-

-8-

What you may have remembered

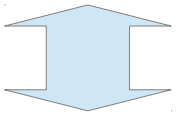

-A-

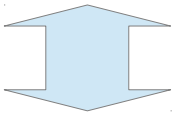

-B-

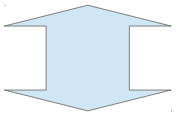

-C-

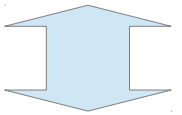

-D-

Set 1










-1-


-2-


-6-

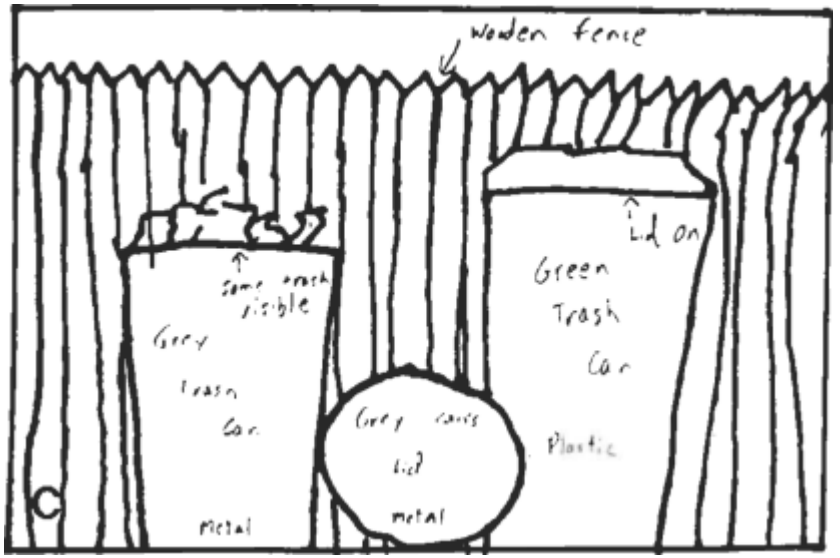

-4-

Set 2

Wide angle memories of close-up scenes

Boundary extension

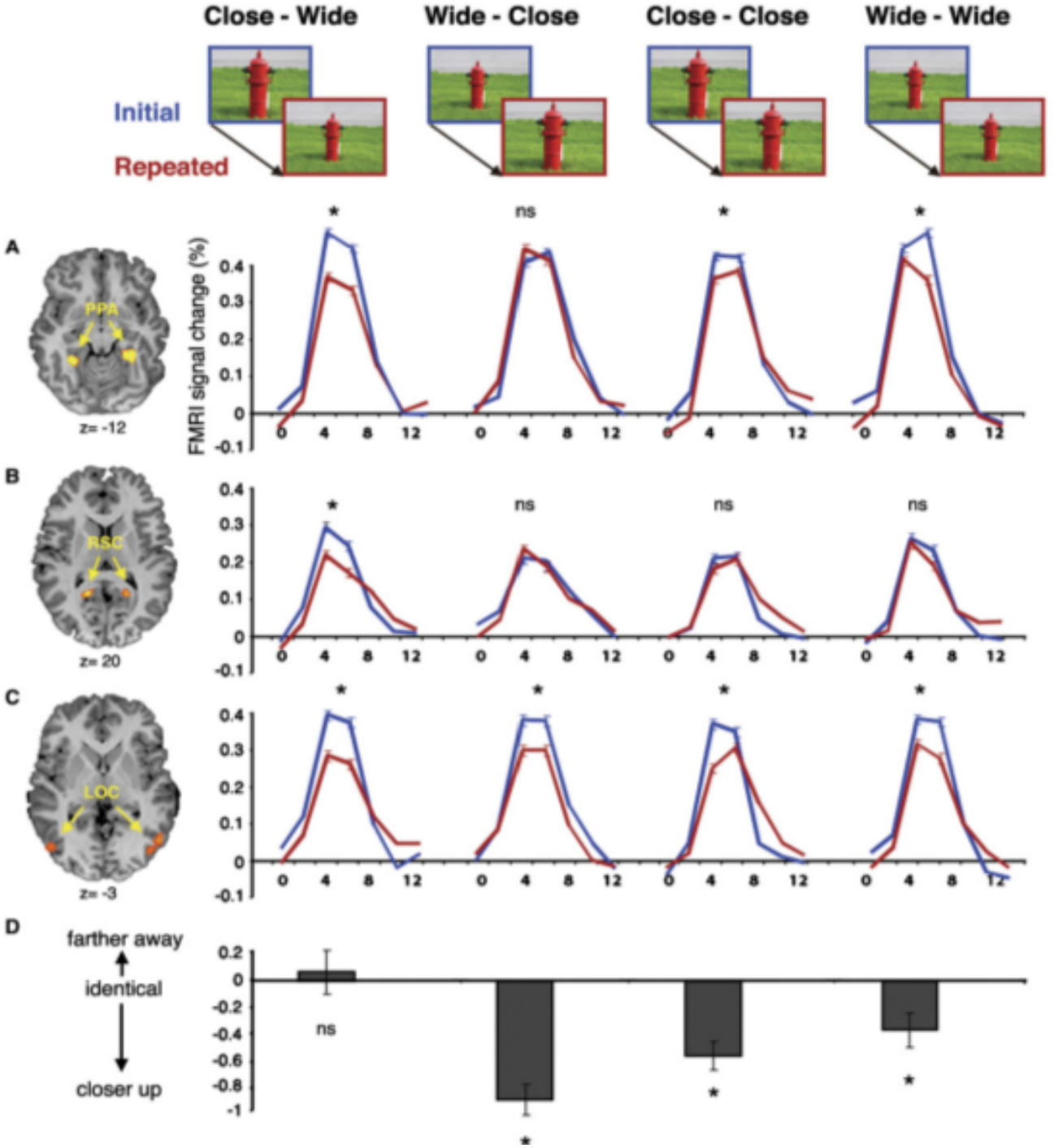
Drawing from memory



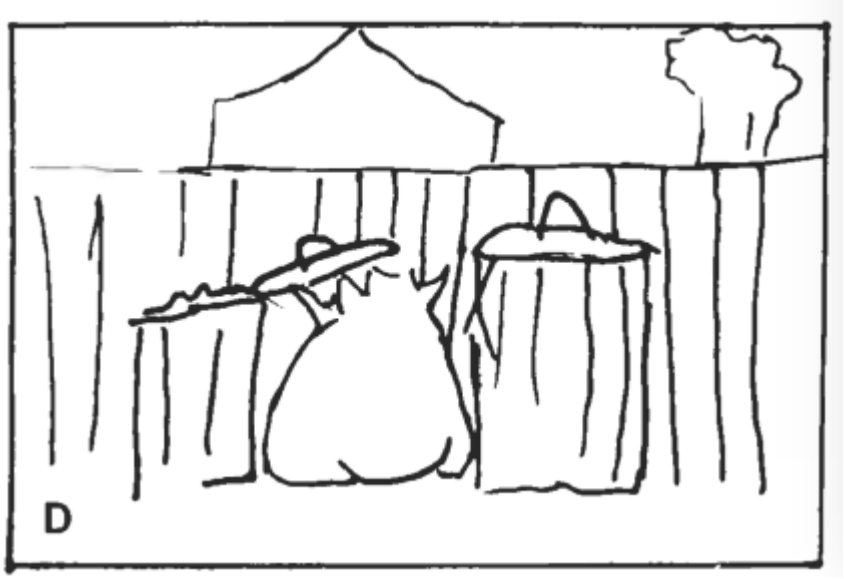
Large boundary extension happens even when the subjects are given feedback after their first attempts.

- People tend to remember an extended view than what they actually see within the boundaries of an image
  - Gestalt principle for object completion? -- *Not the only contributing factor*
    - **People do complete truncated objects anyway**
  - Consistently happens with adults and children
- Strictly assymetric
  - Never happens the other way round
- If two close-up or wide-angle images are shown in succession, many people report the second image as closer up.

- True for other sensory modality (haptic) as well.
  - When observers are blindfolded they explore space with their hands (touch)
  - suggests an important link between the representations of space across sensory modalities

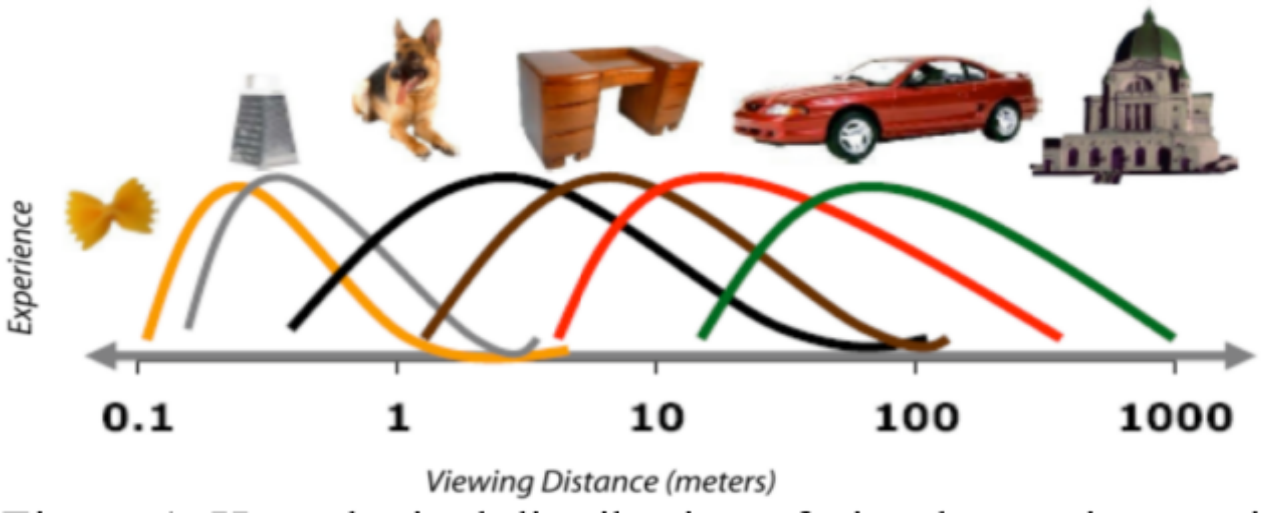

Close - Wide
Wide - Close
Close - Close
Wide - Wide
Initial
Repeated
A
PPA
z= -12
FMRI signal change (%)
B
RSC
z= 20
C
LOC
z= -3
ns
D
farther away
identical
closer up

Is there an “optimal” view?



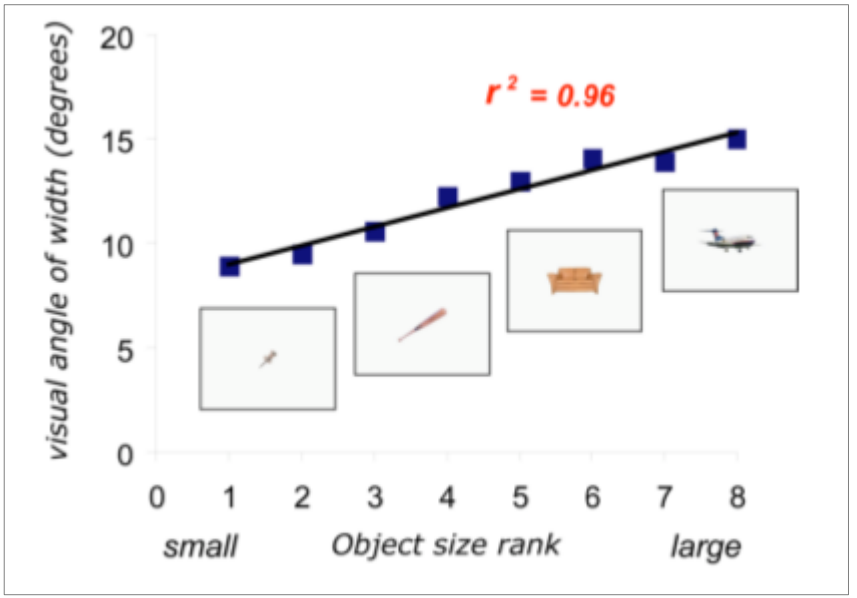
Prototypic representation?

Normative size for objects



Source: Konkale & Olivia

- Subjects asked to resize an image of an object (in isolation) to “right size” for viewing
- There has been a strong consistency for the “right size” (4 – 14 degrees)



Bias of memory towards normative size

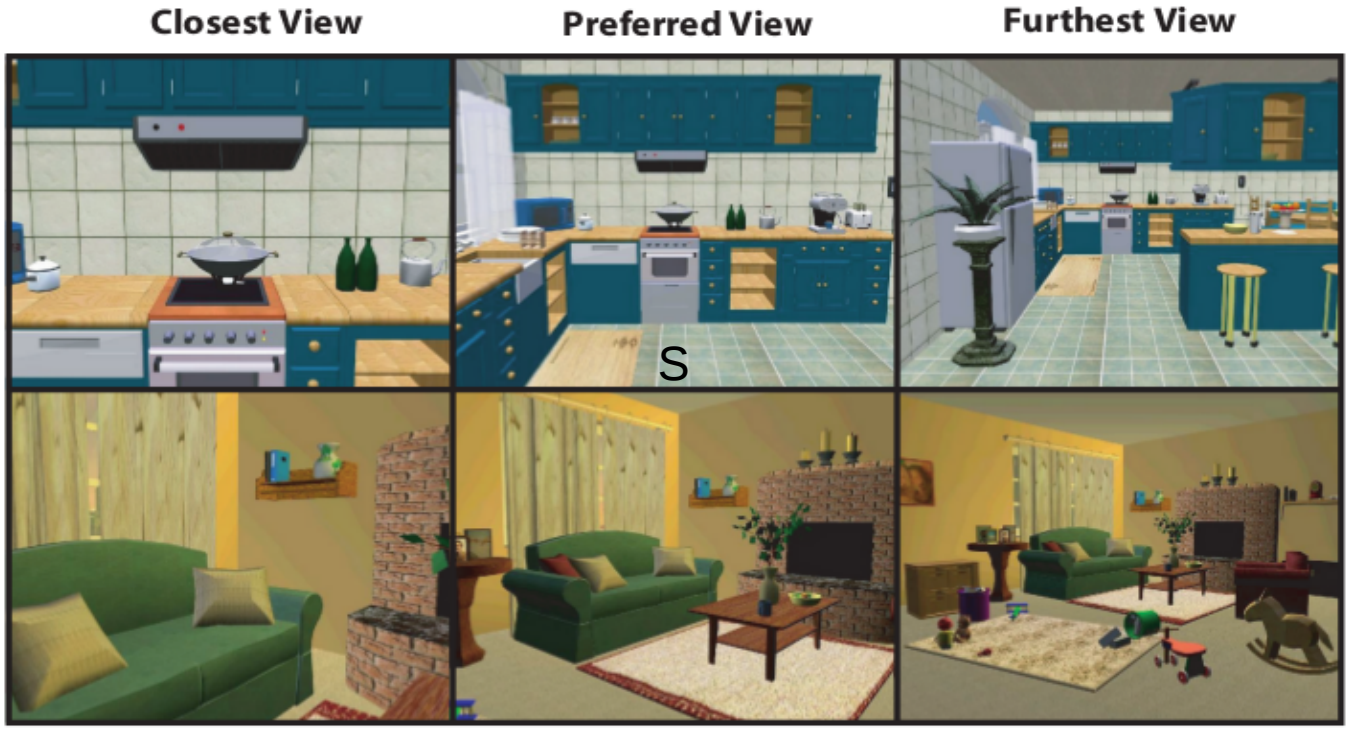
Long-term memory

- People were shown objects in different sizes
  - Larger / smaller than normative size
- Same objects were shown in different sizes later
  - Larger / smaller than originally shown
  - Were asked to resize to the original size
- Size adjustment error
  - Strong bias towards the normative size

Short-term memory

- People were shown objects in different sizes
  - Larger / smaller than normative size
- Same objects were shown in different sizes immediately after
  - Were asked if there is a change in size
  - Change towards normative size was harder to detect than a change away from the bormative size

What is the “best” view?

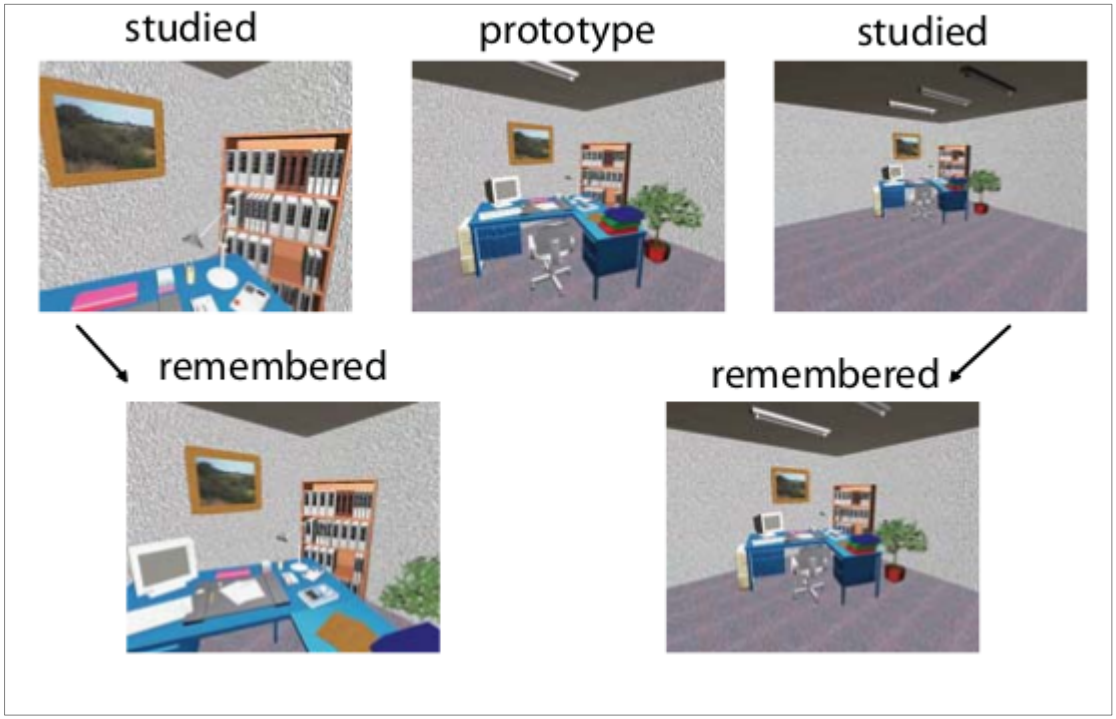


Source: Oliva et al. 2010

- Subjects were asked to find the “best” view in a virtual world by moving to and fro
- Consistent results for a preferred view
- Navigational behavior:
  - People generally moved back to get a far view and then came forward to choose the best view

People tend to remember the “best” view

- Subjects studied particular scene views of different rooms
  - close up and wild angle, relative to the best view
- Subjects were placed in the room at either the back or front of the space
  - They had to maneuver through the space to match the remembered view
- Bias towards preferred view



References

- Oliva, Park and Konkale.
  Representing, perceiving, and remembering the shape of visual space (Book Chapter), 2010 [overview]
- Park, et al. Beyond the Edges of a View: Boundary Extension in Human Scene-Selective Visual Cortex
- Intraub & Richardson. Wide angle memories of close-up scenes
- Konkale & Olivia. Normative Representation of Objects: Evidence for an Ecological Bias in Object Perception and Memory