9. 65 Lab 2 report, Nov. 5, 2001:

1. Inspecting one's image, to read off information, like perception:

Weber and Castleman exercise in Lab 2. Almost everyone takes longer to image than to read off perceptually. In a previous year, the mean extra time per letter, in the imagery condition, was 322 ms (median was 270 ms, range 38-960 ms) in a sample of 30 labs. Various methodological problems arise in such a class demonstration, of course, that would be "counterbalanced" in the real experiment, e.g.:

-there were more talls than hanging (7 vs. 5);

-practice when you did it the second time.

Other differences between the conditions, other than having to produce one's own image in the imagery condition, that might have affected speed:

-It might be harder to keep track of the count, in the imagery condition.

-In the imagery condition you have to **recall** the next letter as well as image it; in perception, you didn't have to recall each letter, and perhaps you didn't even have to identify each letter.

In different years, have got class estimates of imaging time per letter ranging from 600 ms to around 200 ms (class averages): the class experiment is crude. What this DOES suggest is that retrieving information from memory about the look of a letter takes time.

Subtracting the perception time makes a BIG assumption: that inspecting an image involves the same kind of scanning as visual perceptual scanning, so the "only" difference in time is the time to construct the image.

2. Visual angle of mind's eye: Kosslyn, 1978. (Note that the text discusses other Kosslyn studies on visual acuity, not this study.)

Constraints on imagery: Kosslyn hypothesized that, like perception, imagery has some limitations, of which acuity (and the dropoff of acuity in the periphery) is one. Hence, the question about whether there is a limit on the "visual angle" of an image.

-In K's Exp. 1, he told subjects how tall/long each animal was, in feet or inches--but since people differ in the way they subjectively scale distances, there might still be a distortion. Note that your "knowledge" of an animal's true length doesn't matter, in estimating the angle, as long as you are consistent in how long you think a foot is, sideways and in distance to the "image".

-people often report a gradual overflow: may be hard to decide when the image has lost clarity.

-with strict criterion ("not being able to see all edges of the entire imaged object in sharp focus at the same time"--using as an analogy peripheral vision (Kosslyn, p 367)--Kosslyn got about 20^{o} as the angle at which the image lost clarity. In a visual version of the experiment with actual objects/drawings which the subject walked toward until the whole object wasn't in focus (i.e., the same instructions as the imagery task), he also got about 20 degrees.

-with loose instructions (more like those used in the lab), he got between 47^{o} and 62^{o}

-Lab 2 version: some can't do. The visual angle people come up with varies a lot, and on the average is larger than K. gets (in our sample of 30 students, it averaged 87 degrees, range 48-155 degrees).

INTERPRETATION: K: there's a specialized imagery ability that has constraints somewhat like those of vision itself, in this case with a limited "angle" of view. It may have the same constraints because imagery actually uses the same brain substrate (the visual cortex).

Critics: These results show that we "know" what perceptual experience is like and can make use of that information to make estimates in this task. In past years several students have said that what they did was to estimate from what they knew of vision, rather than actually "looking" at their image. Tacit knowledge? demand characteristics?

3. Representation of geographical information:

Experiments of Stevens and Coupe, and Tversky: Distortions in mental representations of large-scale space and geographic knowledge: We tend to regularize irregularities (e.g., we tend to align N and S America, rather than offset them; we tend to remember all intersections as right angles). Try to sketch the border between Cambridge and Boston/Allston, for example (most people straighten out the Charles River).

Another example: Downtown Boston/Beacon Hill: difficult to represent. Kevin Lynch's **Image of a City** is a well-known book from the 1960's that looked at the way people represent (and misrepresent) cities, focusing on Boston.

Errors we make are probably NOT due to the difference between flat and spherical representations, in maps.

Hierarchical structures seem to be used very generally in representing space (as well as other kinds of information). E.g., city in relation to state, state in relation to country, etc., rather than city directly to country.

This suggests: We DON'T remember a complete geographical layout as a mental image or array from which we can read off relative directions: we have to construct such an image (perhaps with errors), OR we simply infer direction from a set of propositions or other knowledge (Canada is north of US, Portland, Oregon is in the west, Toronto is in the middle, therefore T. is northeast of P.; or, Rome is warmer than Philly, therefore south of it).

But, probably this hierarchical reasoning is mixed with more 2-D-like array knowledge, at least for major relationships. The main point is that geographical information isn't directly stored as images, but involves propositional information and inferences from propositions, also.

4. Memory for line drawings: Is memory for pictures or visual patterns influenced by categorical information, such as a verbal label?

Carmichael, Hogan, & Walter (1932): See text, pp. 358-60. Glasses/barbell Tree/trowel etc.: They found small, subtle distortions, and most of you made at least one or two such distortions. (Note, by the way, that Reisberg's figure actually includes some distortions of the original figures as printed in the 1932 article--I used a xerox of the original published figure, in the lab.) Those of you who didn't think you made any distortions may have created alternative descriptions of the object at the time of viewing, or noted ways in which it did not conform to your standard image of that object.

Conclusion: While some characteristics of a particular drawing are remembered, the categorization offered by the verbal cue gives some default information that may be used to fill in when there is not a complete "visual" memory. But certainly when we try to remember exact appearance, we're not too bad at it. So, we don't ONLY remember what things "mean," or what their verbal description is.

5. Rating members of the category *furniture*.

This exercise comes from a study by E. Rosch (1975). Cognitive representations of semantic categories. **Journal of Experimental Psychology: General, 104**, 192-233. (See also Chapter 9: e.g., Table 9.1, p. 277.) I edited her instructions somewhat. Ratings tend to be fairly stable from person to person, and over time. What makes good examples good is that they tend to share some features common to many members of the category, such as being (often) made of wood, having legs, having surfaces for sitting/lying on or putting things on, being able to contain other things, being fairly large, and being placed on the floor. The bad examples sometimes seemed to belong to a different category, such as "appliance," as well lacking some of the typical furniture attributes and functions, such as **mirror**.

The implication for the nature of categories is, as discussed in lecture, that many natural and artifactual categories have graded membership, rather than crisp definitions. The more central members of the category are more readily thought of as exemplars, and in several other ways are treated as more representative or prototypical of a category than are more peripheral exemplars.