

Lecture 8 - Cognition

The Abstract: This lecture will focus on are some of the ways that our thought processes diverge from the "thought processes" of a computer might "think". There are two main points (each with implications)

- 1) A computer, if asked nicely, retrieves exactly what was stored. You do not.
 - a. This has very important implications, for example, in the sphere of criminal justice.
- 2) A computer, if programmed correctly, will do very precise calculations of things like conditional probabilities. You, typically, do not.
 - a. This has important implications, for example, in the spheres of public policy debates and consumer behavior.

The general conclusion is that human cognition is a mix of rational, logical processes and emotional response. For the present (and perhaps to our surprise) that works better than the cold logic of the computer in running the world.

Lecture Notes:

A lot of thinking involves bringing things back from LTM and moving the bits around in Working memory but there are real limits to the computer desktop metaphors.

Point 1: Recall is not just taking stuff out of storage.

What can influence retrieval? (You want to know an example for each of these)

OLD 1. The Context of remembering:

OLD 2. The retriever's bias can provide context

NEW 3. Failures of source monitoring

"Man's most valuable trait is a judicious sense of what not to believe"
from Helen - Euripides (412 BCE)

Can you comprehend without belief?

cryptomnesia .- a special case of a failure of source monitoring

NEW 4. False Memories

Loftus, E. F. (1992). When a lie becomes memory's truth: Memory distortion after exposure to misinformation. *Current directions in Psychological Science.*, 1(4), 121-123.

NEW 5. Becoming plastic, again (a topic to write about, perhaps)

MAYBE: What is the distinction between **narrative** and **propositional** thought?

Point Two: We are not little logic engines

LET'S TALK ABOUT RISK

Risk assessment is based more on narrative than on propositional thought.
Examples might include....

----- **FRAMING DEMO** -----

Suppose that the US is preparing for the outbreak of an unusual flu. It is expected to kill 600 people. Here are two things that we can do.

If Program A is adopted, 400 people will die.
If Program B is adopted, there is a 1/3 chance that that no one will die and a 2/3 chance that 600 people will be die.

----- **End** -----

The way a problem is **framed** is important (say Kahneman and Tversky)

LET'S TALK ABOUT STEREOTYPING (SORT OF)

----- **BASE RATE DEMO** -----

Henry is a short, slim man. He likes to read poetry. He has been active in environmental and feminist causes. Henry is a _____.

Here are some possibilities:
Rank order these candidate answers from most probable to least probable:

MOST PROBABLE _____ LEAST PROBABLE

- A. A truck driver
- B. Ivy League Classics Professor
- C. A course XXI major (humanities) or
- D. A course VI major (EE&CS)
- E. A truck driver who is a member of the Audubon Society & Mensa

----- **END** -----

People aren't good at **base rates**. What does that mean?

Given a question that asks "Is it probable?"
People hear "Is it typical?".

Why do we do this?? Is it an "adaptive" behavior?

What should you do if you see a big hulking guy with what looks like a bat coming your way on a dark night?

LET'S TALK ABOUT MONEY

That sounds like a realm where logic and math should rule.

Danny Kahneman (now at Princeton) won a Nobel prize for elaborating on the (apparently) odd rules that actually govern our economic behavior.
See Kahnemen and Tversky, 1979, Econometrica, 47, 263-292

FOR EXAMPLE: How much is a dollar worth?

This works starts with Bernoulli (18th cent)

$$U(\text{utility of the money}) \sim \log(\$)$$

Some illustrative "gambles"

(\$100, .5, -\$100)

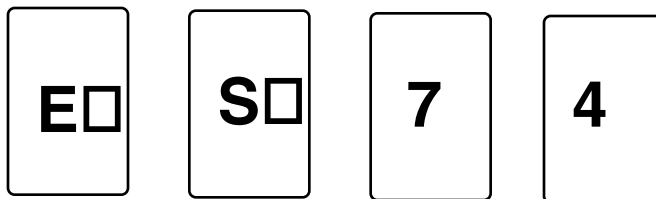
The notation means that you win \$100 with probability = 0.5. Otherwise you lose \$100.
Would you play?

Expected value (E) = $\Sigma(\text{Payoff} * \text{Prob}) = (100 * 0.5) + (-100 * 0.5) = 0$

How about (\$100, .5, -\$98)? etc

LET'S TALK ABOUT LOGIC

The Wason Selection Task



Each card has a letter on the front and a number on the back.

If the card has a vowel on the front, then it has an odd number on the back.

Which card(s) do you need to check to confirm if this rule is valid for these cards?

Some versions of this task are easier than others.

- 1) Why?
- 2) Why do we care? Is this a real problem?

Ref: Cosmides, L (1989) The logic of social exchange: Has natural selection shaped how humans reason? Studies with the Wason selection task. *Cognition*, 31, 187-276

Thoughts about Chapter Eight:

P278ff - Lecture is not going to cover the material on mental imagery even though this is an interesting topic. Look at Fig 8.1 to get a feeling for your own ability to rotate an image in your mind.

While you are at it, think about how you would answer the question "How many windows are there in your parents' home?" I bet there was some imagery involved.

P283 Fig 8.5 is a classic of Psychology for social gatherings. You can win money getting people to bet on the Reno - San Diego thing.

P284 discusses the idea of a semantic network...which we will have mentioned earlier, I think.

P287-298 Problem Solving: I hate to admit it, but I have never much cared for the problem solving literature - at least not as it gets played out in Intro Psych texts. Still, you can have fun solving the various puzzles presented here. I think that the ideas are largely descriptive. Maybe I am being unfair. You decide.

P300-1 Discusses the Wason selection task, overlapping with lecture. Why is this interesting?

P302-309 Discusses more of the Kahneman and Tversky-style work on heuristics in reasoning. You want to be able to define some of the various heuristics or short-cuts that we seem to use in our reasoning.

P311 If you are interested in the Neural Correlates of Consciousness (the NCC as Christof Koch labels it), you could read his book or you could read my review of his book: Wolfe, J. M. (2004). "Looking at your self: Review of "The Quest for Consciousness" by C. Koch." Nat Neurosci 7(6): 565.

Something to write about #8: Daniel Wegner's disturbing thoughts about thought.

We are inclined to think that we are in control of what we do. However, there is a lot of recent work that calls this into question. Daniel Wegner (Harvard) has done some of the most interesting that I know about (and seems to have written a great deal on the topic (<http://www.wjh.harvard.edu/~wegner/pubs.htm>)). I have put a couple of papers that I like in Folder #8. They make a good starting place for a paper.

Wegner, D. M. (1994). "Ironic processes of mental control." Psychological Review 101(1): 34-52.

Wegner, D. M. and T. Wheatley (1999). "Apparent mental causation." American Psychologist 54(7): 480-492.