9.65: November 28, 2001 Reasoning Handout

Outline:

Logical reasoning:

- 1. Syllogisms and problems with them:
- -Atmosphere effect
- -Conversion error
- -Belief bias
- 2. Mental models in reasoning (Venn diagrams)
- 3. The Wason "Selection problem"
- -modus ponens
- -modus tollens
- -meaningfulness?
- -permission schemas/detect cheaters
- 4. Hypothesis testing:
- -confirmation bias
- 5. Utility theory
- -costs and benefits
- -probability of outcomes
- -choices between bets
- -subjective utility
- -risk aversion for gains, risk-taking for losses
- 6. Are we rational?

Logical reasoning:

1. Syllogisms and problems with them:

All X are Y All Y are Z -----

All X are Z

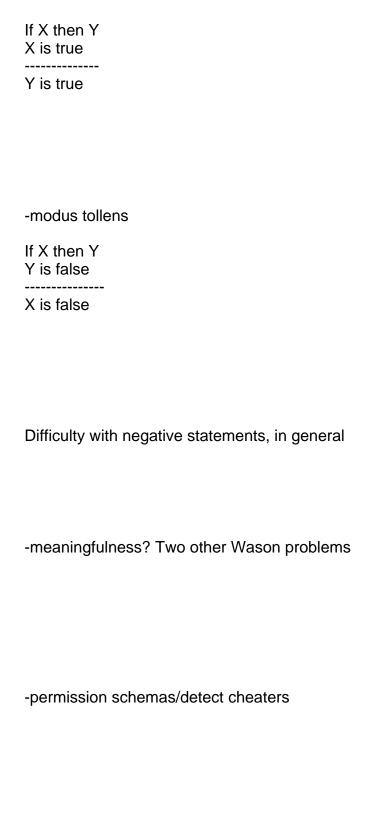
-Atmosphere effect:

All A are B All C are B

-----All C are A?

-Conversion error:				
Some P are not Q All P are R				
Some Q are not R?				
-Belief bias				
All robins are birds Some birds eat worms				
Some robins eat worms?				
2. Mental models in reasoning (Venn diagrams)				
2. The Mason "Coloction problem"				
3. The Wason "Selection problem"				

-modus ponens



4. Hypothesis testing:

The 2, 4, 6 problem: What is the rule?

-confirmation bias

5. Utility theory: Rational decision-making

-costs and benefits, probability of outcomes

	OUTCO	EXPECTED	
	Rain P(.40)	No rain P(.60)	VALUE
Take umbrella			
Don't take umbrella			

-choices between bets (framing effects)

H: 8/9 chance to win \$4 L: 1/9 chance to win \$40

Another choice:

A: Sure chance of gaining \$100

B: .50 of gaining \$200, .50 gain nothing

Versus:

You are given \$200:

A: Sure chance of losing \$100.

B. .50 chance of losing \$200, .50 of losing nothing.

-risk aversion for gains, risk-taking for losses

Subjective utility:

Loss aversion: gains considered less attractive than losses are considered aversive.

6. Are we rational?

Utility theory versus justification-seeking E.g., sunk costs.