

Problem solving and decision making

- The ‘queen’ of cognitive processes (traditionally: cognition/thinking in the narrow sense)
- Everybody’s interested in it: economists, politicians and clinical psychologists
- Continuum from “cold” to “hot” thinking
- Computer modeling

Games

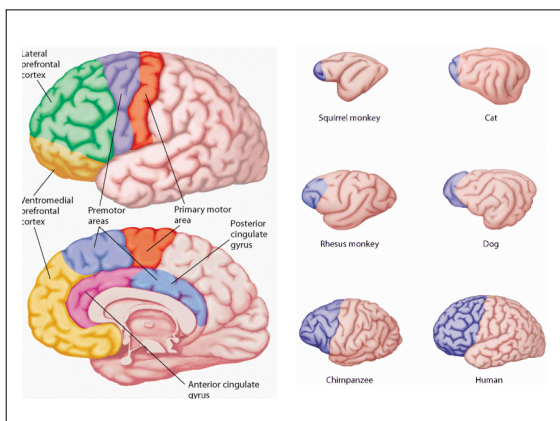
- Ideal toy models (rules, success, expertise are clear)
- Chess
 - Expertise in chess: Chase and Simon (1973), 50,000 “chunks”
 - BUT: AI can beat the world champion in chess (with brute force method + some built-in knowledge)
- Go
 - Less success

The rational decision-maker

- Evaluating expected value of each option, then choose the one with the highest value
- But: Sometimes the weights are not available: situations with uncertainty
- Biases (Herbert Simon: Bounded rationality, Kahneman & Tversky) - “cognitive illusions”

Can we avoid pessimism?

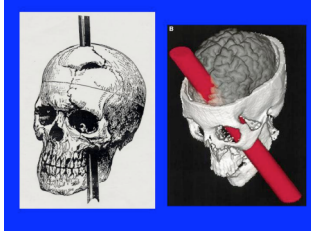
“The rational judge... will attempt to make his probability judgments compatible with his knowledge about the subject matter, the laws of probability, and his own judgmental heuristics and biases.” (Tversky & Kahneman, 1974)



Frontal cortex

- All high-level cognitive functions
- Not just executive functions, but e.g. working memory system
- Goal-oriented behavior
 - Planning and selecting an action
 - Control: e.g. when to switch, or inhibit a response (Wisconsin Card Sorting Task)

Phineas Gage,
1848



An simple logic problem

Rule: "If one side of the card has a vowel on it, the other side must have an even number on it."



Wason Selection Task

- Original results (Wason & Johnson-Laird, 1972):
 - 46% E and 4
 - 33% E
 - 4% E and 7
 - 17% other

Another simple logic problem

Rule: "Checks over \$30 must be signed to be valid."

