Realistic Rationality

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Economic Rationality

Prescriptive: arrives at the optimal solution.

Assumes knowledge of options, probabilities, and payoffs.

Can maximize expected value.

That is the rational choice.

Behavioral Economics - Simon

Herbert Simon showed that decision making can require excessive computational resources. Instead of **optimal rationality,** Simon proposed **bounded rationality,** accounting for resource constraints.

Behavioral Economics - Tversky and Kahneman

Tversky and Kahneman ran psychology experiments to test assumptions of economic decision theory.

Proposed **Prospect Theory** to address anomalies, including:

- Loss Aversion
- Anchoring
- Framing effect
- Status-quo bias
- Confirmation bias

An Alternative: Cognitive Model of Decision Making

Assumptions

- Agent has many goals with varying importance.
- Agent executes plans to achieve goals.
- Agent has limited resources (time, money, skills, knowledge, memory)
- Different agents have different goals. Goals are subjective.
- Agent allocates resources to achieve her preferred goals.

Cognitive Model of Decision Making

An agent is not irrational if she fails to achieve a goal from lack of knowledge.

If an agent prefers car A to car B, but cannot afford car A, then it may be rational for the agent to purchase the less expensive car B instead.

Suppose that she could have negotiated a better price for car A, but did not. Her behavior was not irrational if she was not aware of the negotiating option.

Cognitive Model of Decision Making - Emotions

Emotions are a reflection of the state of goal pursuit.

Roseman (1982) proposed a taxonomy of emotions (affect) based on the following dimensions:

- Goal Success [happiness or pride] vs failure [frustration or hate]
- Certainty (future [hope] vs known [joy])
- Agency (self, others, circumstances)
- Deservedness (assignment of credit [pride] or fault [guilt])
- Importance of underlying goal - people are more passionate about important goals.

While watching the Olympics, check out the emotions of the athletes.

Cognitive Model of Decision Making - Relations

An agent has relationships, positive and negative, with other agents, and with varying strengths, analogous to the importance of goals.

- **Personal**: family, friends, colleagues
- **Professional**: employees, customers, investors, regulators, and competitors
- **Unilateral**: celebrities, sports figures, authors, musicians.

Agents adopt goals through these relationships that become part of the decision making process.

Example: buying a ticket to a Taylor Swift concert or donating money to a political candidate.

Cognitive Model of Decision Making - Explanations

Decisions require justification.

- Choices may not be optimal.
- Others may be adversely affected by your choice.
- Others may need to understand why you did what you did to model your motivations.
- The decision itself may hinge on the explanation. That is, the explanation might drive the choice.
- You may give different explanations to different audiences.
- All of you decided to come to Yale. How did you explain that choice to different people?

Computational Model of Decision Making - VOTE

VOTE simulates Congressional roll-call voting.

(vote ‘udall ‘hr-2978)

Morris K Udall votes against bill HR-2978 the flag desecration bill. After weighing the implications, he believes that provisions of this bill are not constitutional. He completely supports the United States Constitution and the Bill of Rights. Udall readily endorses the right of freedom of speech. Even so, Udall realizes that members of the Democratic party oppose the right of burning the American flag in protest.

Computational Model of Decision Making - VOTE

VOTE comprises the following object-oriented databases:

- **MEMBERS**, e.g., Udall. These are the agents with goals and relationships.
- **ISSUES**, e.g., gun control or abortion. These are goals.
- **GROUPS**, e.g., NRA or ACLU. They have relationships with MEMBERS who adopt the group's goal agenda.
- **BILLS**, e.g, HR-2978. These are the decisions. There are different consequences for voting FOR or AGAINST a bill.
- **STRATEGIES**, e.g. good for the country. These are the explanations that drive the decision and the English (or French) explanation.
- **DECISIONS**. VOTE keeps track of the decisions it makes.

Computational Model of Decision Making - VOTE

Assumptions of the VOTE model:

- **Many goals**. Members have personal goals (credo), adopted goals through relationships with groups, and implicit goals from past voting record.
- **Limited resources**. A member has just one vote to cast.
- **Subjective decisions**. Different members arrive at different votes, even though they have shared knowledge of the bills, issues, and groups.
- **Allocate resources to achieve preferences.** Members try to vote in line with their issue preferences.
- **Adopt goals through relationships.**
- **Explain decisions**.

Computational Model of Decision Making - VOTE

We claim that VOTE's decisions are rational, even if not optimal.

It is hard to say what optimal would mean in this context. In fact, it would be hard to define optimal for most of life's choices (food, clothing, friends, marriage, career, housing)

Future work: Multi-agent Interaction

VOTE is a social decision making model based on the adoption of goals through interpersonal relations. The model may be extended to other tasks:

- **Advice**: can provide an agent with new information about the options or issues

- **Persuasion**: May try to inform the agent of other consequences or relationships, as well as bargain (or threaten).

- **Negotiation**: bilateral persuasion.

Realistic Irrationality

Are all decisions rational? How can you have rationality without irrationality? Is there good without evil?

Differing frames of reference. Maximize profits. The Ten Commandments.

Is it irrational for an executive to steal from or kill her competitor? See No Other Choice.

- What other options are available?
- What other goals or relationships are relevant?
- What are the expected consequences?
- What explanations are appropriate?
- What other agents are affected by the decision?

Conclusion: VOTE as a computational cognitive model

- Allocate scarce resources to achieve preferred goals.
- Use emotions to communicate goal states.
- Adopt goals through interpersonal relationships.
- Justify decisions.

This is a realistic model of rational decision making.