Thinking Rationally and Strategically

POSC 3610 – International Conflict

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Goal for Today

Introduce students to thinking rationally and strategically in world politics.

Introducing Rationality

Generally, we refer to behavior that is optimal toward solving a problem as “rational”.

- This definition (and my understanding) is more rooted in the economic tradition.

Outlining a Rational Actor Model

1. Identify problem.
2. Identify and rank goals.
3. Gather information (can always be ongoing).
4. Identify alternatives for reaching goals.
5. Analyze alternatives by considering consequences and effectiveness of each, weighted by probability.
    - This is **expected utility theory**, to be discussed shortly.
6. Select alternative with greatest expected utility.
7. Implement decision.
8. Monitor implementation and evaluate outcome.

A Comment on Rationality

We can qualify “rationality” in any number of ways.

- “Thick” vs. “thin”
- “Maximizing” vs. “satisficing”
- Bounded rationality, broadly stated

Generally, we think of rationality as instrumental amid these limitations.

Expected Utility Theory

Expected utility theory gives us a tool for understanding decision-making.

- **Expected utillity theory** states a decision-maker chooses between uncertain prospects by comparing the weighted sums obtained by adding the utility values of outcomes multiplied by their respective probabilities.

Theory states the decision-maker chooses the alternative that provides the most net benefits.

- i.e. the alternative that maximizes her expected utility.

Expected Utility Theory

Formally, this looks like:

$$EU = p_1(b_1 - c_1) + p_2(b_2 - c_2) + \ldots + p_n(b_n - c_n) \tag{1}$$

This can also be expressed as:

$$EU = \sum_{i=1}^{n}(p_i u_i) \tag{2}$$

Expected Utility Theory

In a pedagogical example, we typically consider just two outcomes: success or failure.

- Outcomes (b_i) are usually standardized to be 0 (failure) or 1 (success).

Thus:

$$EU(Decision) = p(1 - c) + (1 - p)(0 - c) \tag{3}$$

Clarifying Our Terms

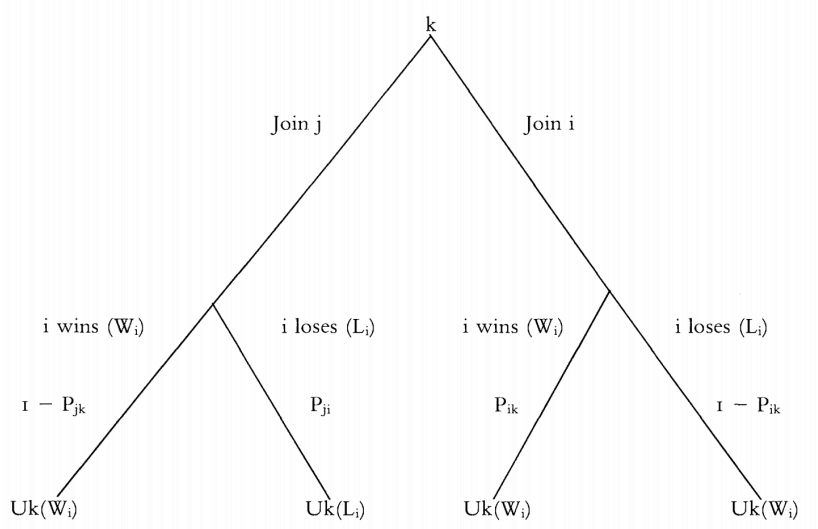
Let's make sure we're on the same page with our terms.

- **Probability** (p_i, where $0 < p_i < 1$) is the likelihood of an outcome.
- **Benefit** (b_i) is the gain in utility that may follow from a decision.
- **Cost** (c_i) is the disutility that may follow from a decision.
  - These commonly include transaction costs and opportunity costs.
- **Utility** (aka: value) is benefit minus cost (i.e. $u_i = b_i - c_i$).

Table 1: Interstate War Initiation and Expected Utility (*The War Trap*)

Expected Utility Score	**Initiator**	**Opponent**
Greater than or equal to zero	65	11
Less than zero	11	65

A Simple Third-Party Joiner Problem



A Simple Third-Party Joiner Problem

k's expected utility for joining the war is:

$$EU(k) = (p_{ik} * (U_k W_i) + (1 - p_{ik}) * (U_k L_i)) \\ -((1 - p_{jk}) * (U_k W_i) + p_{jk} * (U_k L_i)) \tag{4}$$

Questions:

- When will *k* join *j* against *i*?
- What factors influence that decision?

Thinking Strategically

The problem of international politics:

- Actors compete for scarce resources.
- They compete under conditions of anarchy.
- This makes all interactions fundamentally *strategic.*

Clarifying What We Mean

We're making two assumptions here worth clarifying:

1. Actors are *rational* the extent to which they have interests, rank possible outcomes, and work toward maximizing utility.
2. Actors are *strategic* because they must condition their choice based on the expected response of other actors.

The Prisoner's Dilemma

The **prisoner's dilemma** is one of the most ubiquitous pedagogical games in game theory.

- It's a useful description for most of international politics.
- In short: it's a situation when the mutually optimal outcome is individually irrational.
  - Much like the heart of international politics.
- Demonstrates individual-level pursuit of self-interest can have perverse group consequences.

The Situation

The players (Player 1, Player 2) have just robbed a bank.

- The police has insufficient evidence for a serious conviction.
- The fuzz has only enough evidence for a minor, unrelated conviction.

In custody, detectives isolate the criminals and try to coerce a confession.

- Assume there's a prior commitment from both criminals to clam up.
- However, this can't be enforced (noncooperative game theory).

The Situation and the Payoffs

The criminals have only two choices: cooperate (with each other, by clamming up) or defect to the police.

- If they both keep quiet: police can only pursue the minor conviction.
- If one defects while the other keeps quiet: the rat turns state's evidence, the other gets the books thrown at him.
- If they both rat on each other, they get a partial sentence for making things easy for prosecutors.

The Prisoner's Dilemma Payoff Matrix

	P2 Cooperates	P2 Defects
P1 Cooperates	-1, -1	-10, 0
P1 Defects	0, -10	-6, -6

Solving This Game

Solving this (or most any) game requires finding a **Nash equilibrium**.

- Definition: the outcome of a game when no player has an incentive to *unilaterally* change behavior.

How can you find this?

- Find best responses for each potential decision and highlight it for a specific player.
- The quadrant(s) where each payoff is highlighted is a Nash equilibrium.

The Prisoner's Dilemma Payoff Matrix

	P2 Cooperates	P2 Defects
P1 Cooperates	-1, -1	-10, **0**
P1 Defects	**0**, -10	**-6, -6**

The Implications of the Prisoner's Dilemma

In situations with payoffs structured like the prisoner's dilemma, the prospects for cooperation versus conflict look dim.

- Defect is a **dominant strategy**. Each player is better off defecting no matter what the other player does.
- Ideal payoffs per player: $DC > CC > DD > CD$.
  - *Ordinal* payoffs are all that matter in a single-shot game.
- The Nash equilibrium is **Pareto inferior**.
  - The "best" outcome is when no player can maximize her payoff without making some other player worse off is the **Pareto efficient** outcome.
  - Clearly, the Pareto efficient outcome is *CC*, though rational players won't choose *C*.

A Game of Chicken

Can you solve a game of Chicken (i.e. with $T > R > S > P$ payoffs)?

	P2 Cooperates	P2 Defects
P1 Cooperates	0,0	-1, 1
P1 Defects	1, -1	-10, -10

A Game of Chicken

	P2 Cooperates	P2 Defects
P1 Cooperates	0,0	**1, -1**
P1 Defects	**1, -1**	-10, -10

Conclusion

We can understand matters of war and peace as rational decisions amid strategic constraints.

- Actors are instrumentally rational.
- Actors make decisions under uncertainty by thinking about expected utility.
- Normal form games provide useful illustrations of strategic situations in IR.

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