Hellenic National Defense College

Strategic Decision Making and Game Theory

John A. Paravantis

Professor

Department of International and European Studies

University of Piraeus

October 2024

---

0. Preamble

0.1. Introductions

Who am I?

- Dr. John A. Paravantis
- Civil Engineering (Transportation, NTUA)
  MSc Transportation & PhD Environmental Health (Northwestern University, Chicago, IL, USA)
- Professor (*Energy, Technology and Environment in Global Politics*)
  Department of International and European Studies
  University of Piraeus
    - https://www.unipi.gr/en/people/paravantis-john/
- Among courses taught (since 2000)
    - Quantitative Methods
    - Decision Methods
    - Game Theory
    - Operations Research

    - Geopolitics of Energy
    - Simulation Methodology
    - Project Management
- Phone: +30 210 414-2771 & +30 697 3048824 (Viber, WhatsApp)
- Emails: jparav@unipi.gr & paravantis@gmail.com
- Would be happy to hold (virtual) office hours with you online (Google Meet)

Who are you?

- Where do you come from?
- Professional experience?
    - Any other educational experience abroad?
- What do you expect to gain from this course?

0.2. Course overview

What others in this study program have covered (before me)

- Academic Writing
    - Research Methods?
- Organizational Culture & Leadership
- Theory of War & Strategy
- Strategic Thinking
- Strategic Leadership
- Grant Strategy
- Sea Power
- Culture and Crisis Management
- Leader Communication

What others in this study program will cover (after me)

- Regional & Military Leadership
- Charismatic & Transformational Leadership

SL-6, Tuesday, September 24, 2024 (moved from Monday, October 7, 2024)

- Strategic Decision Making
    - Classical decision making
    - Bounded rationality
        - Influence, propaganda, judgment
    - SWOT analysis

    - PMESII-PT framework

SL-7, Tuesday, October 8, 2024

- Risk Analysis
    - Concept and psychology of risk
    - Strategic risk assessment
    - Assessing risk
    - Managing risk

SL-8, Wednesday, October 9, 2024

- Game Theory
    - 2×2 game of simultaneous moves
        - Coordination games
            - Pure coordination and coordination with assurance
            - Battle of the sexes
            - Leader
        - Games of cooperation, competition and conflict
            - Prisoner's dilemma
            - Stag hunt
            - Chicken
            - Deadlock
        - Zero-sum and repeated games
    - Sequential move games
        - Cuban missile crisis
        - Eastern Mediterranean game

Syndicate work (case studies, applications, group work) will be interwoven in all three lectures

---

0.3. Lecture notes and other educational material

Please visit https://esetha.army.gr/ and GUNet e-class (as a backup) to download

- To be set up after SL-6
- These notes in PDF and epub (ready to read on your cell phone) format
- Supplementary educational material

---

1. DECISION METHODS

A game theoretic approach of decision making

1.1. Warmup class activity: Strategic negotiation and deception in team formation

Let's break the ice with an in-class game

1.1.1. Scenario

In-class numbers game

- Every student receives a secret number
    - The number is a positive integer of unknown size
        - Students will know the lower limit = zero
        - Students will have no idea about the upper limit!
            - The highest number possible is unknown
    - The numbers must be kept secret until the instructor tells the students to reveal them
        - Each student will only know his own number
    - Students must
        - Memorize the number
        - Hide the piece of paper in their pockets
- The objective is for the students to form teams of two in order to attain the following two objectives

    (1) Achieve the highest team payoff
        - By summing up the payoffs of the two team members

    (2) Achieve the highest personal payoff
        - By agreeing with the other (prospective) team member how the team payoff will be divided between the two members
            - E.g. 50-50
            - 67% and 33%
            - Keeping the higher number of the two
            - Whatever else is agreed!
- With the numbers memorized and hidden, when the instructor says “Go!”, students start searching for a partner
    - Students must negotiate
    - Students are allowed to lie about their number

        - A student with a low number may want to deceive prospective teammates
            - By telling them that he has a big number
        - How would a student with a high number behave?
    - Shopping around for a teammate must take place
        - Without students revealing their number
            - Being free to lie about it
                - If it is to the students' strategic advantage
- When everybody has found a teammate
    - Students will sit near their chosen teammate
    - Students will then reveal their numbers
        - We shall all have a laugh!
    - We shall draw conclusions about winning and losing strategies for
        - Players with a high number
        - Players with a low number
            - But remember: Students don't know which is the highest number possible

https://www.amazon.com/Agile-Fusion-Corp-Hidden-Numbers/dp/B0095MVOMC

https://www.playmeo.com/activities/team-building-problem-solving-activities/number-shuffle/

1.1.2. Thoughts

Thoughts on the activity

- Engaging and insightful
    - Encourages the use of key aspects of game theory and real-world decision-making
        - Negotiations
        - Deception
        - Strategic thinking
    - Students will have to balance their interests
        - While operating with incomplete information
        - This mirrors many strategic scenarios in defense and diplomacy

Concepts worth exploring

- Bargaining power

        - How having a high number may give a player more leverage
            - Even without revealing it!
- Bluffing and trust
    - The dynamics of lying or appearing trustworthy during negotiations
- Risk assessment
    - How players weigh
        - Potential reward of pairing with a strong teammate
        - Risk of being deceived

Fascinating conclusions about strategies for both high and low number players

---

1.1.3. Lessons

How did the team with the highest team payoff form?

- How did the team with the lowest team payoff form?

How did the student with the highest personal payoff achieve this?

- Why did the student with the lowest personal payoff not do better?

Did any of these factors play a role in selecting a teammate?

- Friendship
- Class seating
- Background
    - Country of origin

Lessons learned

- Decisions are taken inside a complex system of many competitive decision makers
    - Decision makers are interacting agents (“players") in a complex system
- In taking decisions, the players' rationality is limited (“bounded")
    - Decision may be affected by other objectives, e.g. personal
    - Single people (“agents") are characterized by bounded rationality
    - But groups of people (“meta agents") tend to make more rational decisions
        - States
        - Supranational entities
            - European Union,

Questions to consider

- Which is the dominant strategy for a strong player?

- Which is the best strategy for a weak player?
- The game was about negotiations within a deadline
    - What if there were no time limit?
        - Odd or even number of players

1.2. Classical decision making model

Two is a company, three is a crowd

- `Single decision maker` ⇒ **decision theory**
- `Many interacting decision makers` ⇒ **game theory**

Rationality

- Will be defined through game theory
    - A rational player obeys his own payoffs

Please consider North Korea and think why it may be an irrational player

- Under the leadership of Kim Jong-Un

https://abcnews.go.com/Politics/reports-kim-jong-uns-health-spread-us-north/story?id=70264333

Let's examine some considerations

- North Korea has often made decisions that seem irrational from a traditional, rational-actor perspective
    - Particularly with its nuclear weapons program
- In particular, pursuing nuclear weapons development despite significant economic sanctions and international isolation
    - This might seem irrational
        - If the goal were purely economic or diplomatic gain
    - From North Korea's perspective, its behavior may be driven by factors such as
        - Regime survival
        - National pride
        - Ideological commitments
        - Overriding traditional cost-benefit calculations that a rational actor might consider.
- North Korea's actions are difficult to predict using typical rational actor models
    - The regime's decision-making often defies conventional geopolitical logic
    - This creates a perception of irrationality on the global stage

---

Rationality is often bounded

- Decisions are only in part rational
- We use the term **judgment** to refer to judgemental decision making

What I tell my students

- Everyday decision should be made with the mind
- Important decisions should be made with the heart
    - "I have to sleep over it"
        - *"A pillow is the best advisor"* (former Greek Minister of Foreign Affairs)
        - The best advice comes after a good night's sleep
    - The subliminal expert system takes over

Do you have any examples of your own on making decisions with bounded rationality?

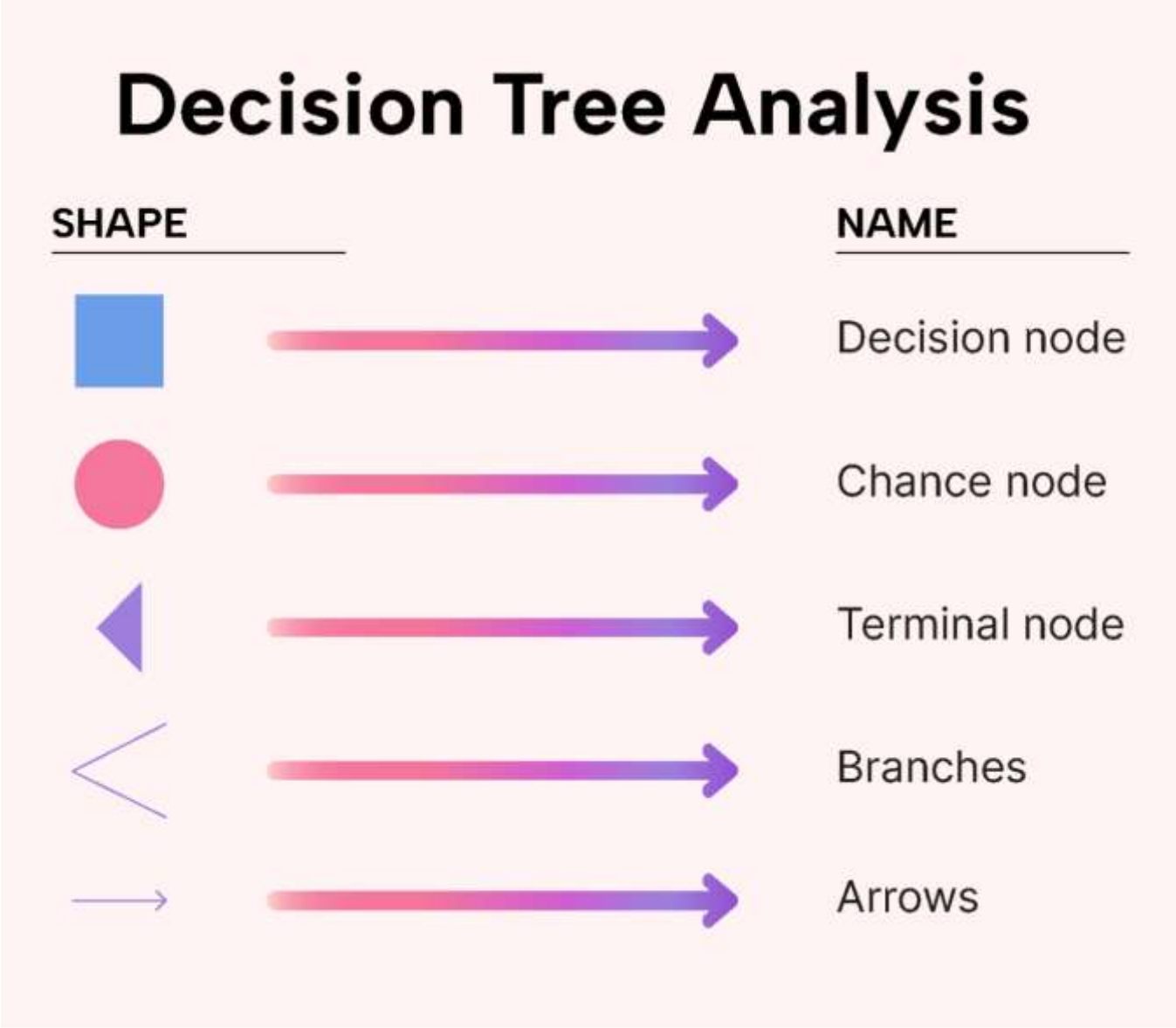
- Personal life
- Professional experience

In the classical decisions making model, decisions are considered to be taken

- Sequentially
    - Game theory allows the modeling of simultaneous decisions
        - Even hidden decisions
- Under uncertainty

The classical decision making process is depicted graphically in a **decision tree**

- Roots and branches
- Different symbols at the nodes of the decision tree below

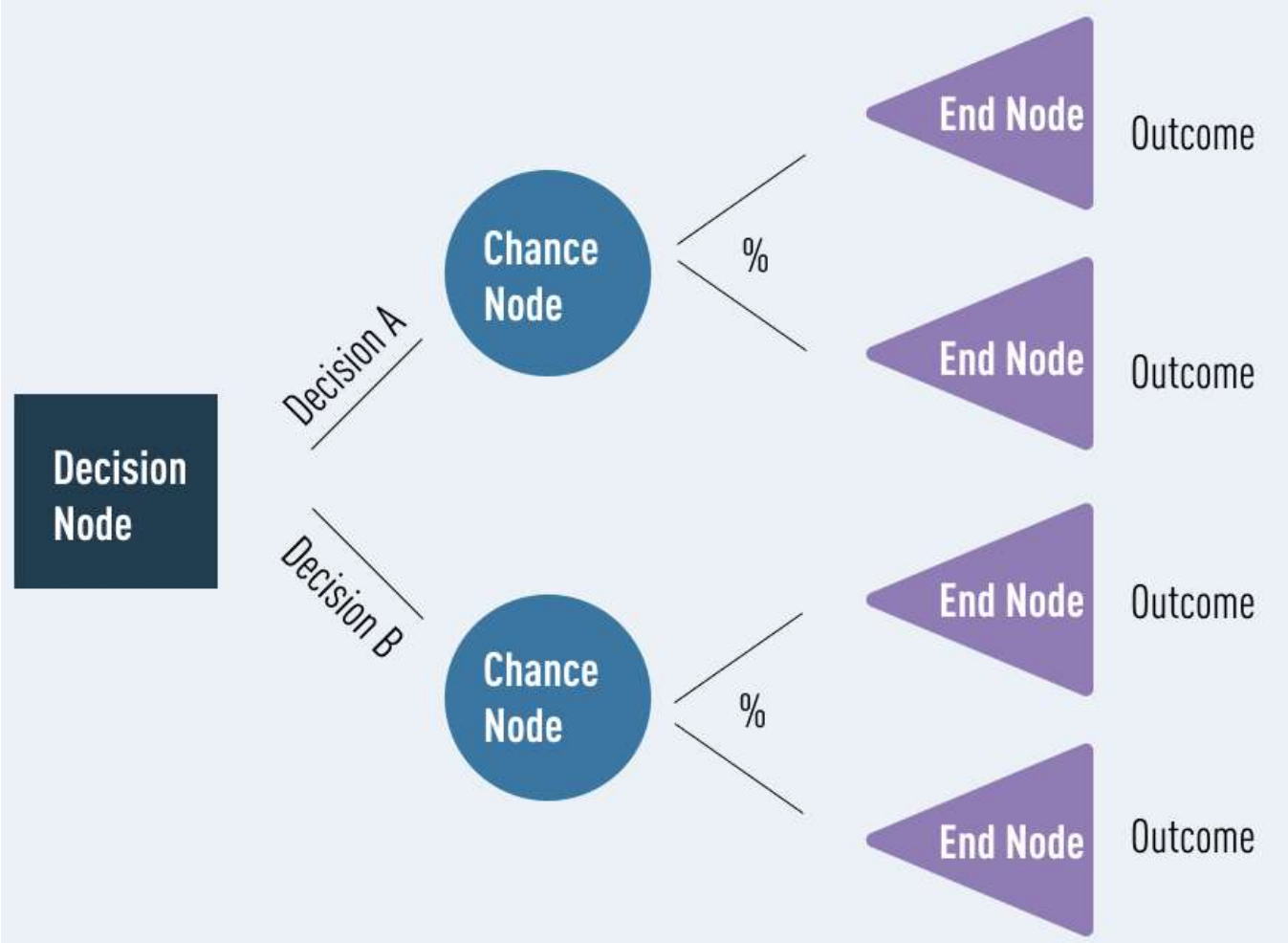


https://www.usemotion.com/blog/decision-tree-analysis

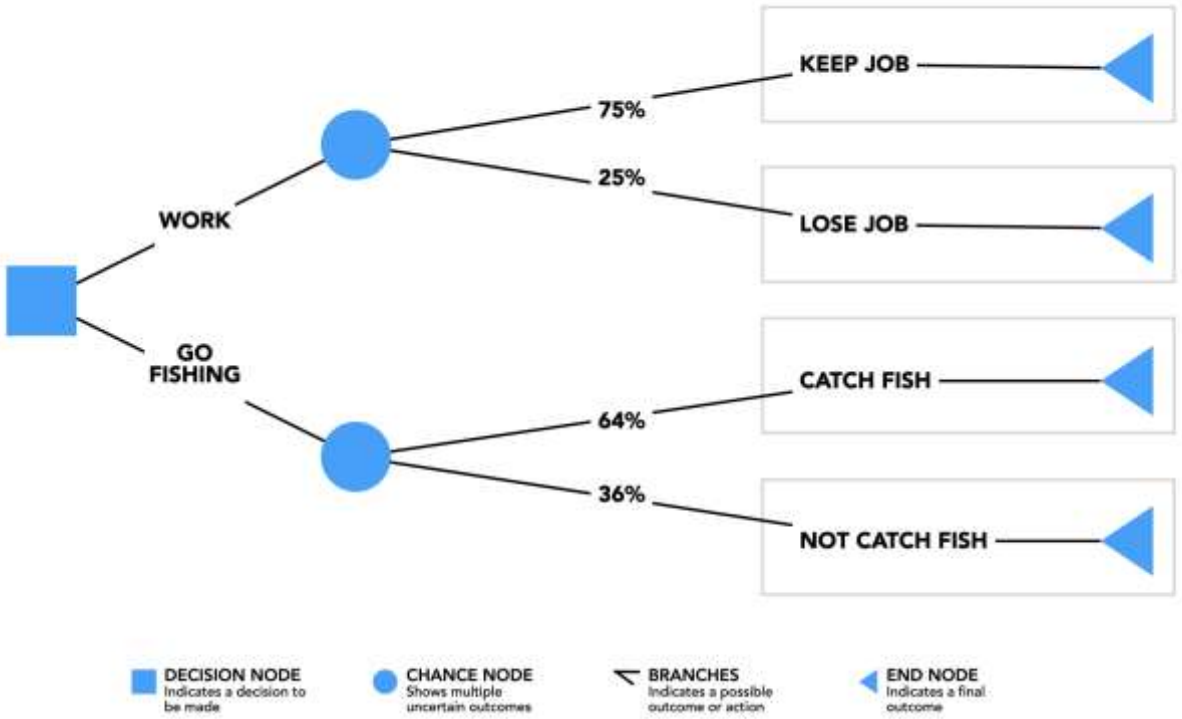
Characteristics of decision trees

- A decision tree is laid out in correct chronology
  - Chronology may be subjective (if complete information is lacking)
- **Decision nodes** are represented by squares
  - Decision nodes and branches represent the controllable factors of a decision problem
- **Chance or event nodes** are represented by circles
  - Chance nodes and branches represent uncertainty (the uncontrollable factors of a decision problem)
    - Branches emanating from a chance node are assigned probabilities
      - Probabilities vary from zero to one
      - Probabilities of events that include all the alternatives must sum up to unity

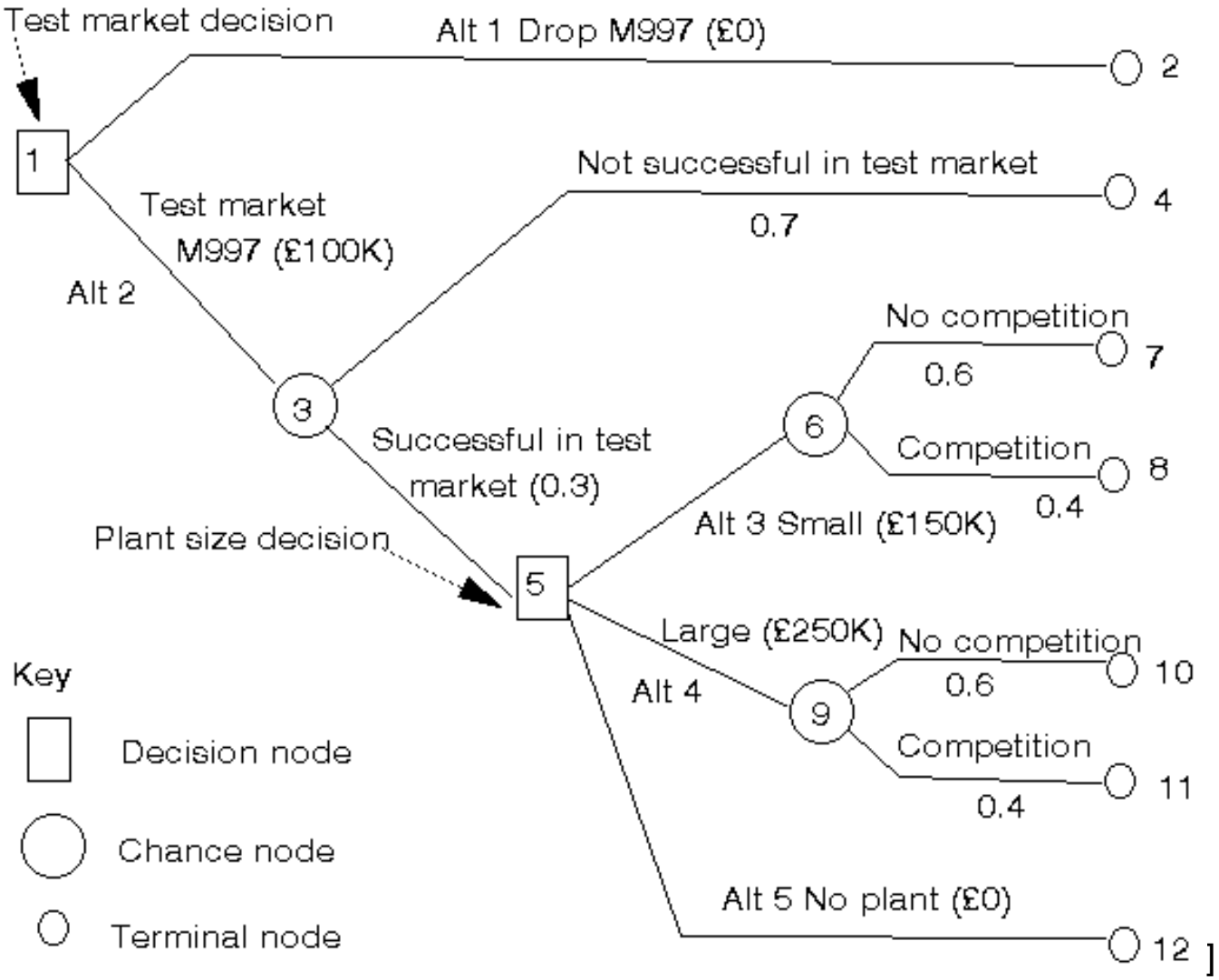
    - Each event is represented by a probability
        - Must be between zero (0) and (1)
        - The sum of all probabilities for an event must be 1 (one or unity)
- Both decisions and chance events are composed of alternatives that must be
    - Mutually exclusive
    - Collectively exhaustive
- **Terminal nodes** (the ends of the decision tree) represent **outcomes**
    - Outcomes are
        - At the endpoints of the scenario modeled by the decision tree
        - Combination of decisions and events
    - Each outcome is characterized by a numerical value that represents the utility of that outcome to the decision maker
        - We use the game-theoretic term for these values: **payoffs**



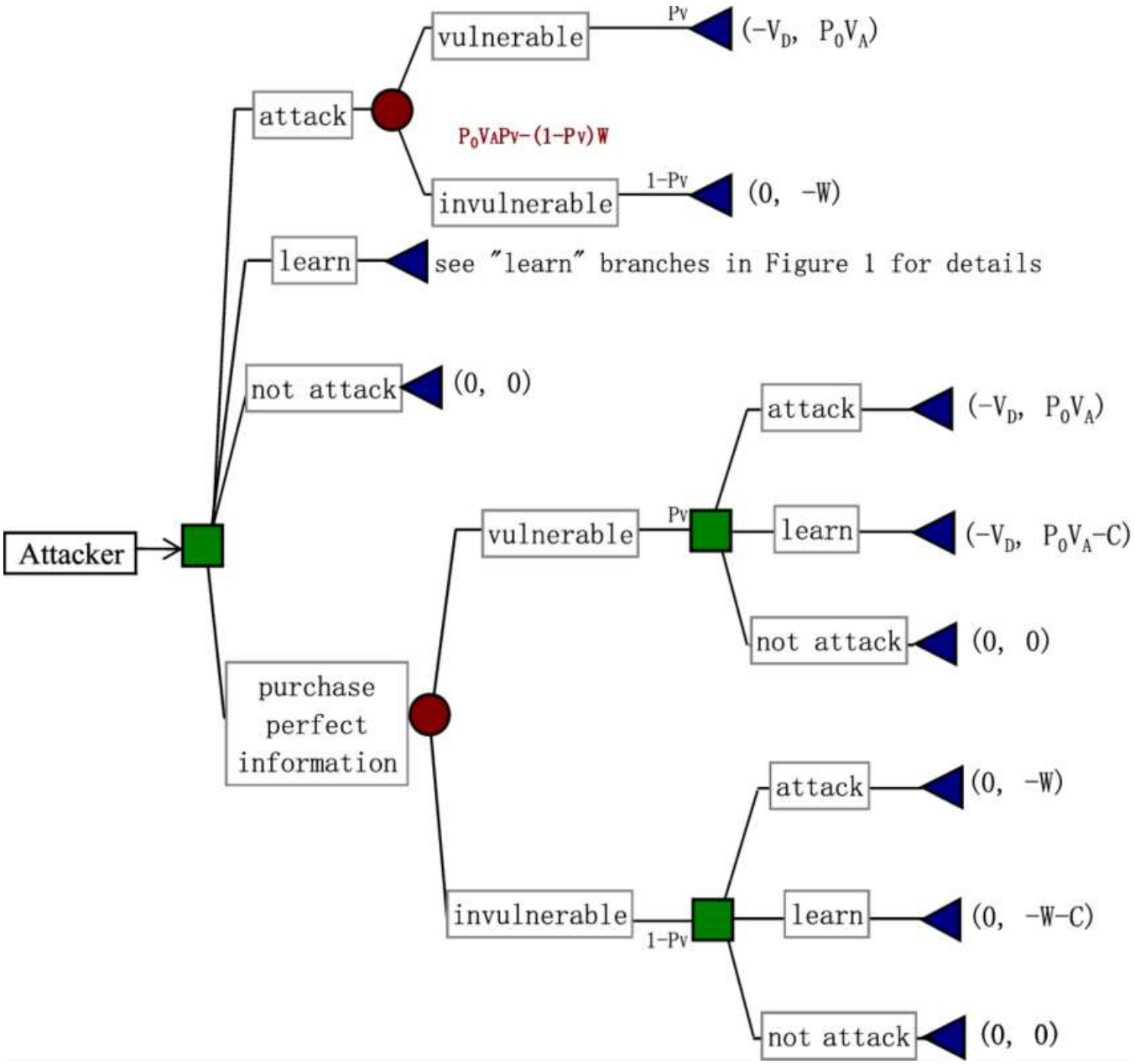
https://careerfoundry.com/en/blog/data-analytics/what-is-a-decision-tree/



https://thinkdev.org/blog/decision-trees



https://people.brunel.ac.uk/~mastjjb/jeb/or/dectree_ma3908.html



https://www.researchgate.net/figure/Decision-tree-under-the-option-of-purchasing-perfect-information_fig7_284839746

Figure 14.1 Nodes and Symbols

Type of Node	Written Symbol	Computer Symbol	Node Successor
Decision	square	square	decision branches
Event	circle	circle	event branches
Terminal	endpoint	triangle or bar	terminal value

https://treeplan.com/wp-content/uploads/introduction-to-decision-trees.pdf

Decision trees are efficient representations of textual descriptions of decision problems

- Of especial value is that we assign payoffs to outcomes
    - In the context of classical decision making, these payoffs usually are the sum of cash flow values on the branches leading up to the terminal node

- In the context of strategic decision making (our case), payoffs represent the utility of the decision maker as well as other (competitive) decision makers

Oftentimes

- The mere representation of the structure of a decision problem in graphical format significantly aids decision making
- Even payoffs may not be necessary

Decision trees that represent a single decision maker may be solved using the rollback method

- Also called backward induction (*"look ahead and reason back"*)

In reality, most decisions are taken by many interacting decision makers (players)

- Especially in conflict and war
- The decisions taken by a single decision maker (player) impact many others

Therefore, we will mainly consider rollback in the context of sequential games (2nd lecture, SL-7)

- But a simple example is forthcoming shortly

Game theory

- Interactive decision making
- The mathematical language of strategy

We shall look at an example of rollback in a little bit

- When we examine the concept of **expected value**

Occasionally, **decision tables** may be used instead of decision trees

Table 5.1 – A decision table for the food manufacturer

(Daily profits)	Demand (no. of batches)	
Course of action	**1**	**2**
Produce 1 batch	\$200	\$200
Produce 2 batches	–\$600	\$400

(Goodwin and Wright, 2004)

Here is an example presented in both tabular and tree format

Table 2.1

	Fire	No fire
Take out insurance	No house and $100,000	House and $0
No insurance	No house and $100	House and $100

(Peterson, 2017)

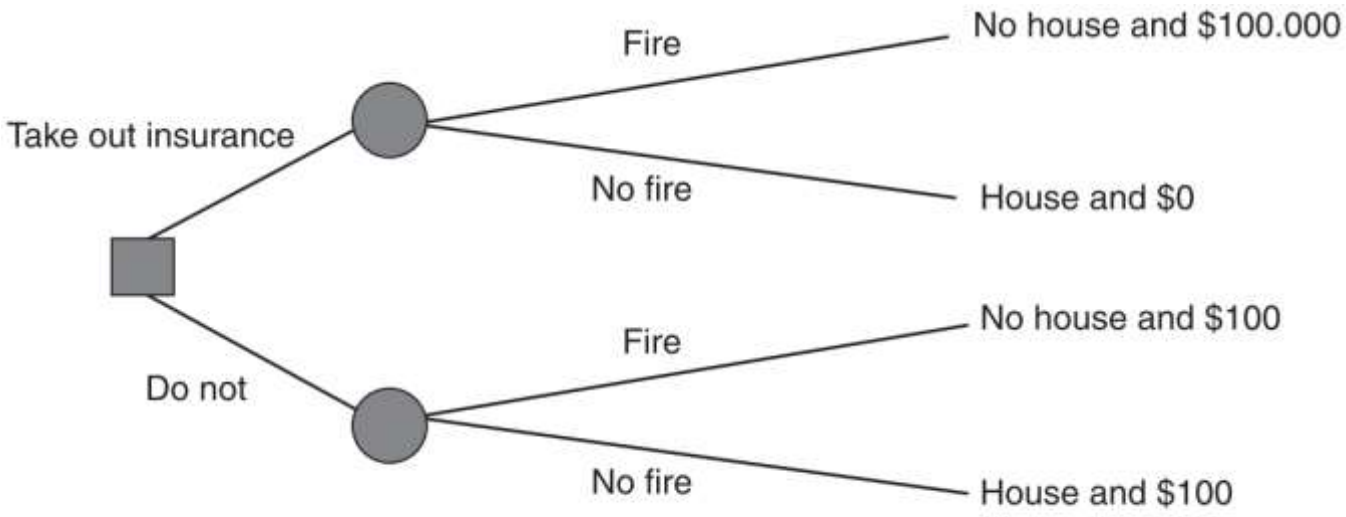


Figure 2.1

(Peterson, 2017)

In the above example

- If you don't know the probability that your house will burn down and you are offered fire insurance for free, it makes sense to accept the offer
  - This is called the **dominance** principle
  - We will discuss **dominant strategies** in game theory
- But fire insurance costs money
  - So a little bit of strategic thinking may be in order

Another consideration is that there may be multiple objectives

- Maximizing monetary gain may be a main objective
- But maximizing customer goodwill or market share may be secondary objectives
- Some of these objectives may even be conflicting!

What would some of those multiple objectives be in the case of conflict and war?

https://www.britannica.com/list/5-fascinating-battles-of-the-african-colonial-era

In the context of conflict and war, such multiple objectives may include

- Maximizing mission success
    - Primary military objectives
        - Securing a location
        - Neutralizing an important threat
- Minimizing casualties
    - Military
    - Civilian
    - This objective may be critical for troop morale and public support
- Preserving resources, e.g.
    - Ammunition
    - Fuel
    - Logistical supplies
- Maintaining strategic positioning
    - Control critical infrastructure
    - But don't compromise wider or long-term strategic advantages

        - Geopolitical influence
- Gaining intelligence superiority, e.g.
    - Prioritize actions that provide better intelligence about enemy intentions and movements
- Securing alliances and political support, e.g.
    - Taking actions that preserve or strengthen alliances and international political support
        - Demonstrating restraint
- Maintaining morale and discipline so that troops remain
    - Confident in their leadership
    - Motivated to continue the fight
- Minimizing collateral damage
    - Minimizing damage to civilian infrastructure and populations
    - Complying with international law
    - Maintaining humanitarian standards
- Adapting to the actions of the adversary with flexibility
    - Try to stay one step ahead
- Winning the information war
    - Managing the media narrative to ensure favorable public opinion (domestically and internationally)

Let's now put **risk** in the mix

- **Risk averse** decision makers (e.g. weak states) possibly faced with multiple objectives
    - Identify the worst possible outcome for each course of action
        - If multiple objectives, this may involve setting up multiple decision trees
    - Among those worst possible outcomes, choose the one that yields the best of these worst outcomes
        - This will represent the MAXimum of the MINimum possible payoffs = **maximin**
        - When the decision tree examines costs (disbenefits) rather than profits (benefits)
            - The maximin principle is referred to as minimax (because it minimizes the maximum cost)

Remember the table that we saw a little while ago?

Table 5.1 – A decision table for the food manufacturer

(Daily profits)	Demand (no. of batches)	
Course of action	**1**	**2**
Produce 1 batch	$200	$200
Produce 2 batches	–$600	$400

Course of action	*Worst possible profit*
Produce 1 batch	$200 – best of the worst possible outcomes
Produce 2 batches	–$600

(Goodwin and Wright, 2004)

Sometimes, the maximin principle can be wrong, for example consider the following choice

- Either receiving €1 (one euro)
- Or
  - Receiving €1,000,000 (one million) with a probability of 0.999 (i.e. 99.9%)
  - Paying €1 (one euro) with a probability of 0.001 (i.e. 0.1%)
    - Note that 0.999 + 0.001 = 1

The application of the maximin principle would select to receive €1!

- Such a case of extreme aversion to risk is (mostly) unrealistic
- In fact, we face a similar case every time we buy a lottery ticket or play at the casino
  - Considering the chances, casinos are a form of voluntary taxation!

Can you think of a real geopolitical example of extreme aversion to risk?

https://myjourney.packimpex.com/en/guides/living-in-switzerland/

I did give you a visual hint!

- Matterhorn, iconic peak in the Swiss Alps

Switzerland's long-standing policy of neutrality

- Since the early 19th century
    - Non-involvement in military conflicts
    - Avoided alliances that could entangle it in wars

Key Features of Switzerland's Risk Aversion

- Neutrality
    - Switzerland's constitution, policies, and federal laws encourage a policy of neutrality
    - Participation in armed conflicts between other states is avoided
    - The devastation of wars that have affected neighboring countries has been largely avoided
- Military preparedness
    - Despite its neutrality, Switzerland maintains a military for self-defense
    - Balance between avoiding military engagement and ensuring national security
- Diplomatic engagement

    - Switzerland often acts as a mediator in international disputes
        - Hosts diplomatic talks
    - This allows it to exert influence without taking sides
- Economic stability
    - By avoiding conflicts, Switzerland has fostered a stable economic environment
    - This attracts international businesses and finance
        - Further risk reduction

This extreme aversion to risk manifests in Switzerland's desire to preserve its sovereignty and avoid the uncertainties associated with military alliances or conflicts, which has contributed to its stability and prosperity over the years.

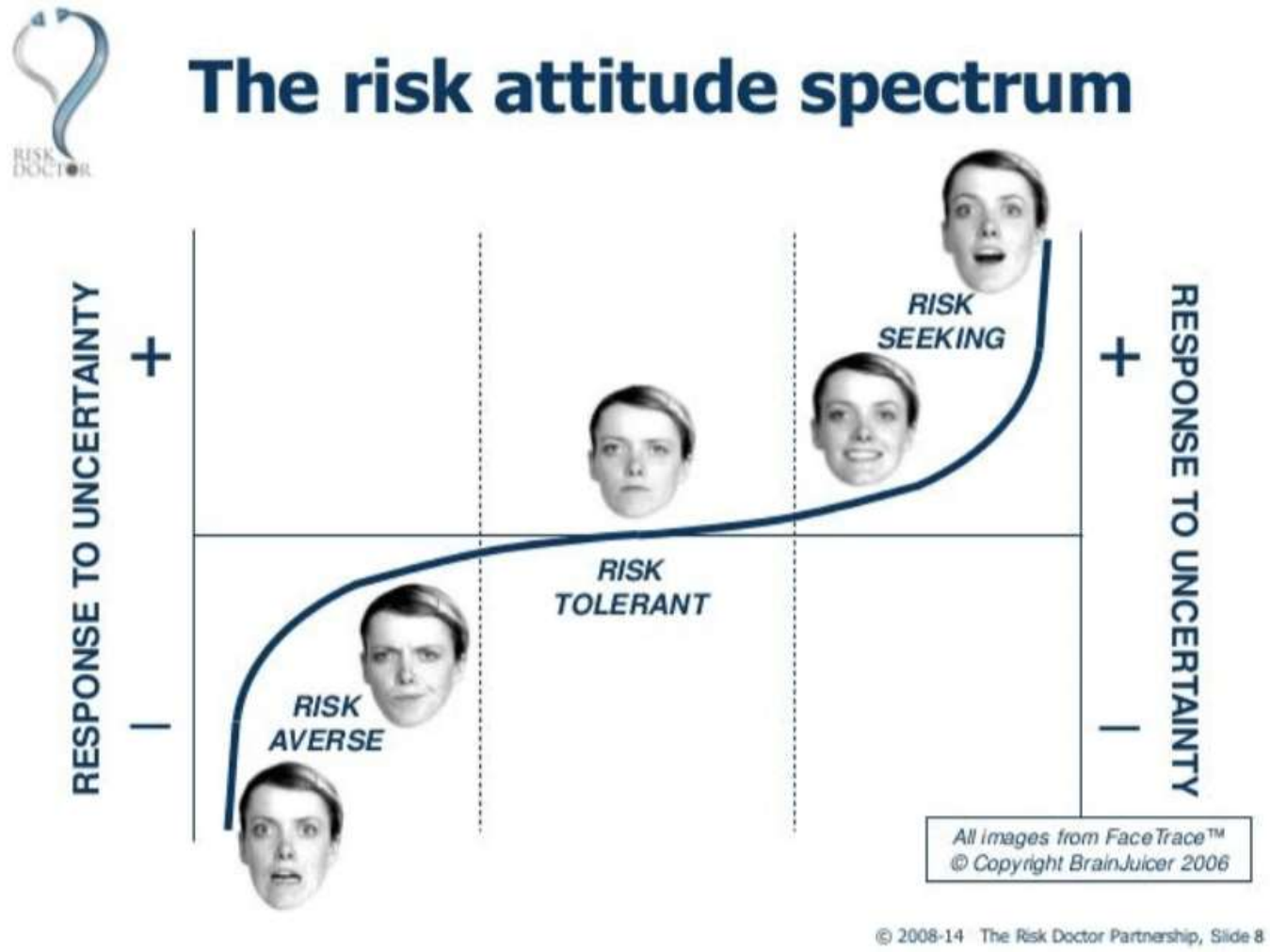
Taking risks may be occasionally rewarded very well

https://www.interaction-design.org/literature/article/extreme-aversion-bias-sometimes-the-risk-is-worth-the-reward

---

Are there cases when such an extreme aversion to risk may be appropriate?

- Beyond the geopolitical level



https://insidebe.com/articles/risk-aversion/

There are cases in which such an extreme aversion to risk is warranted

- Public safety
- Food additives that might kill people
- Irreversible environmental damage

1.2.1. Expected value criterion

The role of uncertainty is modeled using the concept of expected (i.e. average) value

- An expected value may be regarded as
  - The average outcome
  - If a process is repeated many times

When does a decision maker decide based on expected values?

- When the decision maker is **risk prone** (e.g. a strong state)
- A **risk averse** decision maker (e.g. a weak state) may consider expected values
  - When a course of action is repeated many times

When does a decision maker decide taking into consideration the least risky course of action?

- When the decision maker is **risk averse** (e.g. a weak state)
- Or when a course of action represents a single opportunity

In this context, we will discuss the **maximin** concept when we present game theory (Lecture 2)

Let's now consider the concept of **Expected value** (EV)

- EV = average payoff value which is obtained when a process is repeated many times (*"in the long run"*)
- Also called **Expected Monetary Value** (EMV) where appropriate

---

In the case of the previous example (all tables are repeated below for easy reference)

Table 5.1 – A decision table for the food manufacturer

(Daily profits)	Demand (no. of batches)	
Course of action	**1**	**2**
Produce 1 batch	\$200	\$200
Produce 2 batches	–\$600	\$400

(Goodwin and Wright, 2004)

Course of action	*Worst possible profit*
Produce 1 batch	\$200 – best of the worst possible outcomes
Produce 2 batches	–\$600

(Goodwin and Wright, 2004)

Table 5.2 – Another decision table for the food manufacturer

(Daily profits)		Demand (no. of batches)	
		1	**2**
Course of action	**Probability**	**0.3**	**0.7**
Produce 1 batch		\$200	\$200
Produce 2 batches		–\$600	\$400

(Goodwin and Wright, 2004)

Produce one batch:

$$\text{expected daily profit} = (0.3 \times \$200) + (0.7 \times \$200) = \$200$$

Produce two batches:

$$\text{expected daily profit} = (0.3 \times -\$600) + (0.7 \times \$400) = \$100$$

(Goodwin and Wright, 2004)

Let's examine a simple scenario with a decision tree solved via rollback with the calculation of expected values

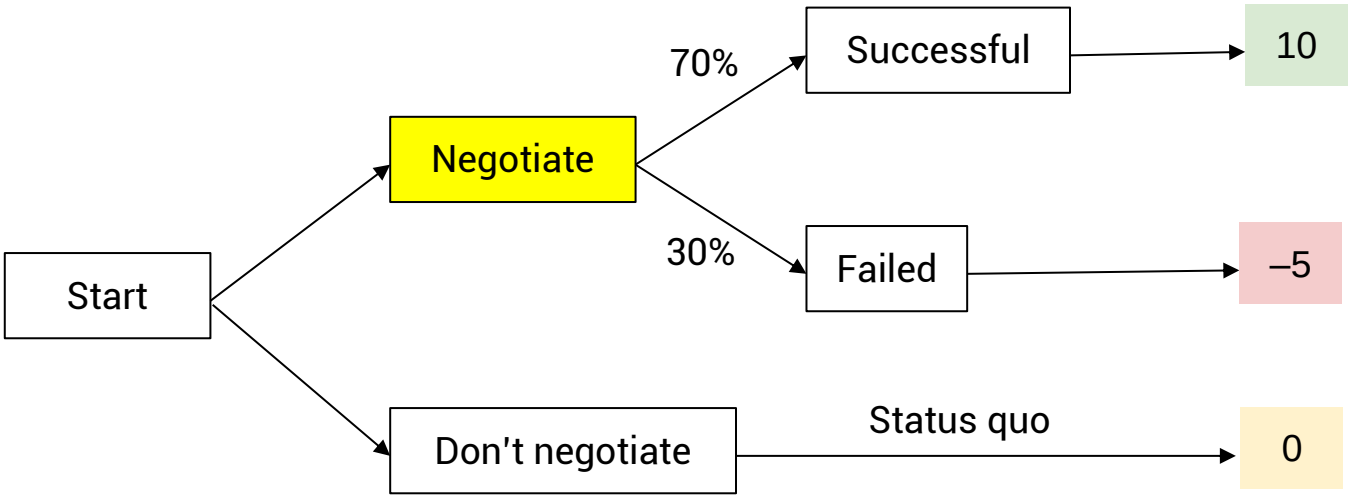
Country A decides whether to engage in diplomatic negotiations with a neighboring country, Country B

- Country A has two options
    - Negotiate
        - If Country A negotiates, there are two possible outcomes
            - Successful agreement (leading to a positive relationship and potential economic benefits)
            - Failed Negotiation (leading to heightened tensions).
    - Not Negotiate

Consider the following in order to draw the decision tree

- At the first decision node, Country A can either Negotiate or Not Negotiate
    - If they choose to Negotiate, the possible outcomes are
        - Successful agreement
            - Probability = 70%
            - Payoff = 10
        - Failed negotiation
            - Probability 30%
            - Payoff = −5

Remember that payoffs are (usually) dimensionless quantities



Calculate the expected values at the chance node (Negotiate)

- Successful agreement
  - 10 points with a 70% probability
- Failed negotiation
  - –5 points with a 30% probability

Expected value of negotiating:

$$EV_{Negotiate} = 10\times(70\%) + (-5)\times(30\%) = 0.70\times10 - 5\times0.30 = 5.5$$

Expected value of not negotiating:

$$EV_{Don't\ negotiate} = 0$$

because it's a certainty

Let's rollback to the decision node and compare the expected values

- $EV_{Negotiate} = 5.5$
- $EV_{Don't\ negotiate} = 0$

Make the optimal decision

- $EV_{Negotiate}$ (5.5) > $EV_{Don't\ negotiate}$ (0)
- Therefore, the best decision for Country A is to negotiate

Using rollback in this geopolitical example

- Country A determines that negotiating is the optimal choice
- Potentially leading to better diplomatic relations and benefits

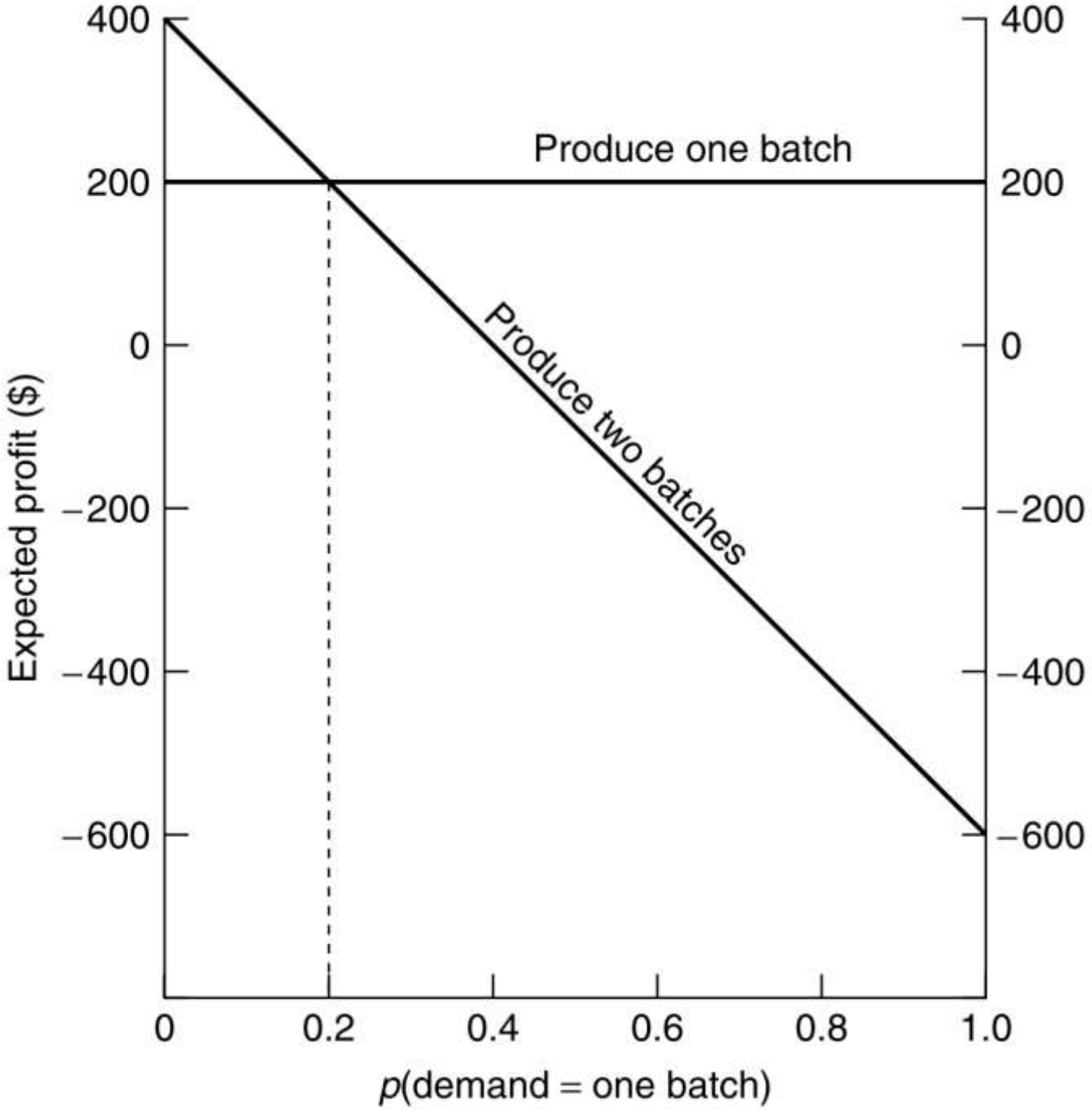
---

Don't forget that when estimating the expected value

- Probabilities and profits (payoffs) may be rough estimates
- Past data may not be reliable

Because of these uncertainties, it is wise to carry out **sensitivity analysis**

- A decision tree may be drawn for all eventualities



(Goodwin and Wright, 2004)

Conclusions drawn from the above sensitivity analysis

- Producing one batch will continue to yield the highest expected profit
    - As long as the probability of just one batch being demanded is greater than 0.2
        - Currently this probability is estimated to be 0.3

Considerations for the expected value approach

- EV is appropriate when a decision is repeated many times
    - In such a case, the long time average represented by the EV is relevant
- In the case of a one-off decision, the risks of a certain alternative may deter the decision makers

- Especially if the decision maker is risk averse

St. Petersburg paradox (in fact it's a gamble)

- A fair coin is tossed until a head appears (for the first time)
- What you may gain
  - If the head appears on the 1st throw, you receive €2
  - If it appears on the 2nd throw, you receive €4
  - If it appears on the 3rd throw, you receive €8
  - If it appears on the 4th throw, you receive €16
  - etc.

https://phys.org/news/2023-10-coin-tosses-slight-bias.html

In fact

- *"Want to get a slight edge during a coin toss? Check out which side is facing upwards before the coin is flipped –- then call that same side. This tactic will win 50.8 percent of the time, according to researchers who conducted 350,757 coin flips."*
  https://phys.org/news/2023-10-coin-tosses-slight-bias.html

Let's get back to St. Petersburg paradox

- How much would you be willing to pay to participate in this gamble?

https://www.betandskill.com/casino/games/crazy-coin-flip/

Can you calculate the expected returns to the gamble?

$$\begin{aligned} E &= \frac{1}{2}\cdot 2 + \frac{1}{4}\cdot 4 + \frac{1}{8}\cdot 8 + \frac{1}{16}\cdot 16 + \cdots \\ &= 1+1+1+1+\cdots \\ &= \infty\,. \end{aligned}$$

So, you are expected to make a very large (if not infinite) amount of money!

- Are you prepared to pay such a large amount of money?

Let's close with one more issue related to the expected value approach

- The EMV criterion assumes that the decision maker has a linear value function for money (or utility)
    - But an increase in returns from $0 to $1 million may be regarded by the decision maker as much more preferable than an increase from $9 million to $10 million
    - Nevertheless, the EMV criterion assumes that both increases are equally desirable!

1.3. Bounded rationality

Let's discuss the rationality (of lack thereof) of our decision

Four models that come from administrative theory can be particularly useful in appreciating the limits of rationality in decision making

1. **Institutional** model

- Oldest model
- Limited to examining the legal aspects of public policy
  - Focusing on institutions, laws and procedures
- Suitable for analyzing the interaction of reformers vs conservatives

2. **Systems** model
   - Inspired by the analogy between social and biological systems
   - Analyzes the behavior of an organism by examining inputs, outputs, as well as the internal processes that transform inputs into outputs
3. **Group process** model
   - Comes from the field of political science,
     - Dominated political science for much of the 20th century
   - Views interest groups as the unit of analysis, politicians as intermediaries who mediate competition between these groups, and politics as the product of that competition
   - Suitable for analyzing the confrontation between the wealthy Global North and the impoverished Global South
4. **Net benefits** model
   - Comes from the field of economics
   - Considers politicians as analysts who make those decisions that have the greatest benefit or utility for the society
   - Seems particularly suitable to explain the behavior of pollution havens
     - Pollution havens = (Usually poor) countries with looser environmental regulations, attracting industries from other (usually richer) countries that seek to lower costs by avoiding stricter environmental standards
       - Industries often relocate their production to pollution haven countries to reduce compliance costs
       - This leads to higher pollution levels in the host pollution haven

Pertinent to decision-making are the concepts of

- **Bounded rationality**
  - Decision-makers
    - Have limited cognitive resources (time, information, computational ability)
    - Cannot analyze all possible options
    - Make satisfactory (rather than optimal) choices based on the information available

        - Complex decisions are simplified
- **Gradual increase** (incrementalism)
    - Decisions are made
        - Through small, step-by-step adjustments
        - Rather than large, radical changes
    - This approach reduces risks by
        - Making minor modifications to existing policies or strategies
        - Gradually improving outcomes over time
- **Garbage can** model
    - Decision-making is seen as chaotic and non-linear
    - Problems, solutions, participants, and choices
        - Are disconnected
        - Often come together by chance
    - Decisions emerge randomly
        - As a result of organizational processes
        - Rather than through systematic analysis

These three approaches suggest that actual decisions are made in a regime of

- Limited rationality
- Partial access to information

Such approaches are confirmed by empirical findings in the fields of

- Social psychology
- Behavioral economics

At the individual level, decision-making is often done unconsciously

- This means that neither unbounded rationality nor complete information are suitable assumptions in interpersonal communication and negotiations

The is further complicated by the fact that communication is often blocked by

- The intensity of a conversation
- Much of the information is not included in the classical channels of (oral or written) communication
    - It is transmitted through body language

Such asymmetries are

- Especially created during communication between people of different sexes, ethnic origin, etc.
- Constitute additional communication channels

- Are referred to as metamessages

Some decisions

- May be formed subconsciously and in seconds
- Even so, they may be more informed than we tend to think!

Example (Lehrer, 2009)

- A soldier in the Persian Gulf War realized that his radar signal was an enemy missile (and not a friendly plane)
    - Immediately ordered it shot down …
    - … long before he realized that this was due to a very small but unusual delay in the appearance of the missile's dot of light!

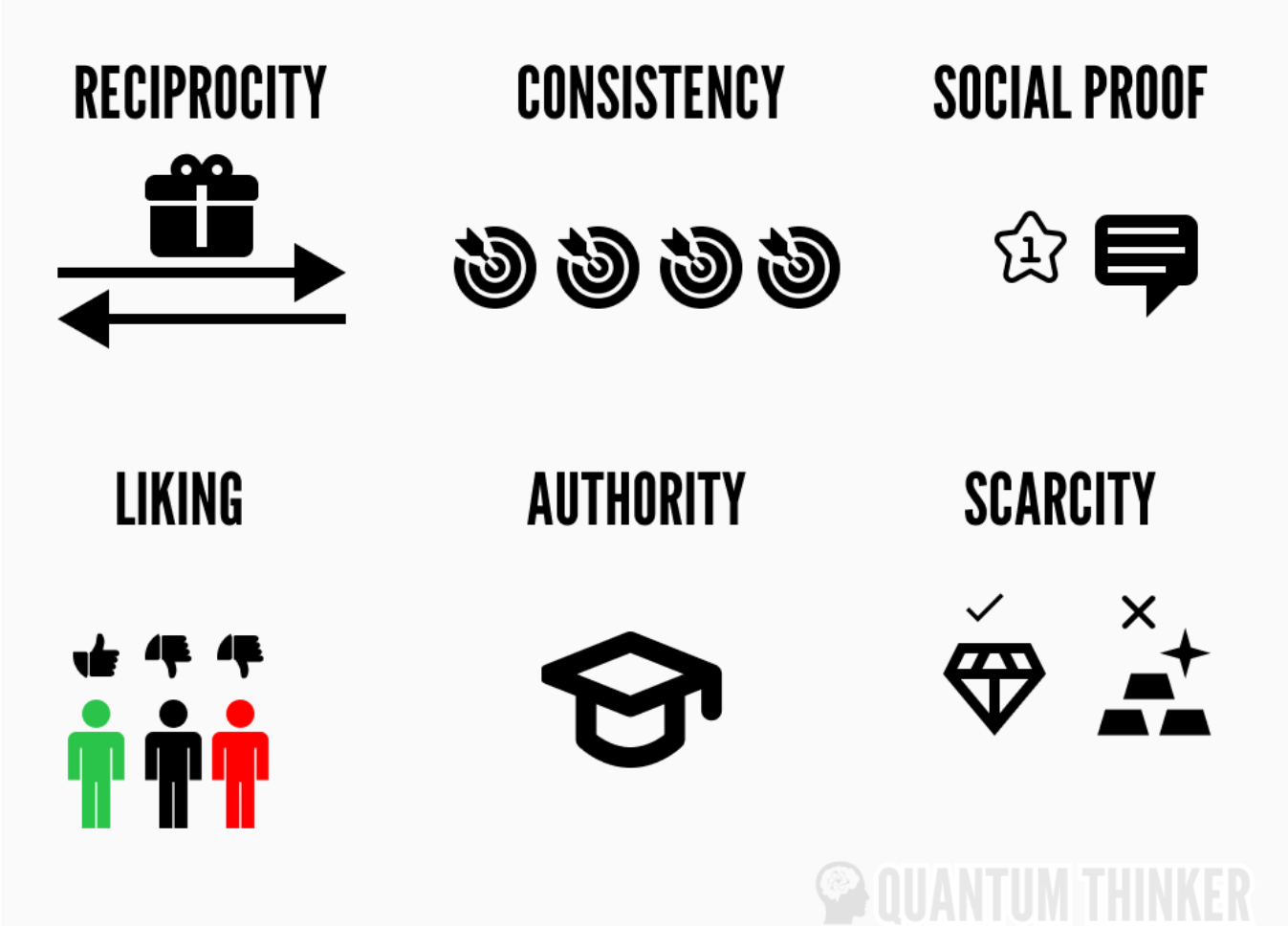
1.3.1. Influence science

The influence of individual decisions by external factors is highlighted by the science of persuasion (influence science)

- Rationality is limited by the existence of automatic reactions
- These concern not only the animal kingdom but also humans (as social beings)

Such automatic reactions are caused by six principles of persuasion (fixed action patterns)

1. **Reciprocity**
    - Give (a little) something to get (a little) something in return
2. **Commitment** and **consistency**
    - People want (to be given the impression that) their beliefs are consistent with their actions
3. **Conformity** to the practices of the wider society (**social validation/proof**)
    - You are like everybody (and everybody's like you)
    - There's nothing like being validated based on what others are doing
4. **Agreement** with our friends and those we like (**liking** and friendship)
    - The more you like someone, the more you will be persuaded by them
5. **Obedience** to what we perceive as **authority**
    - People follow the lead of people who are/appear to be credible and knowledgeable experts
6. Preference for what is rare and in deficiency (**scarcity**)
    - When you believe something is in short supply, you want it more



https://quantumthinker.medium.com/cialdini-principles-the-whole-world-is-driven-by-these-6-persuasion-exclusive-principles-e58cacca82f

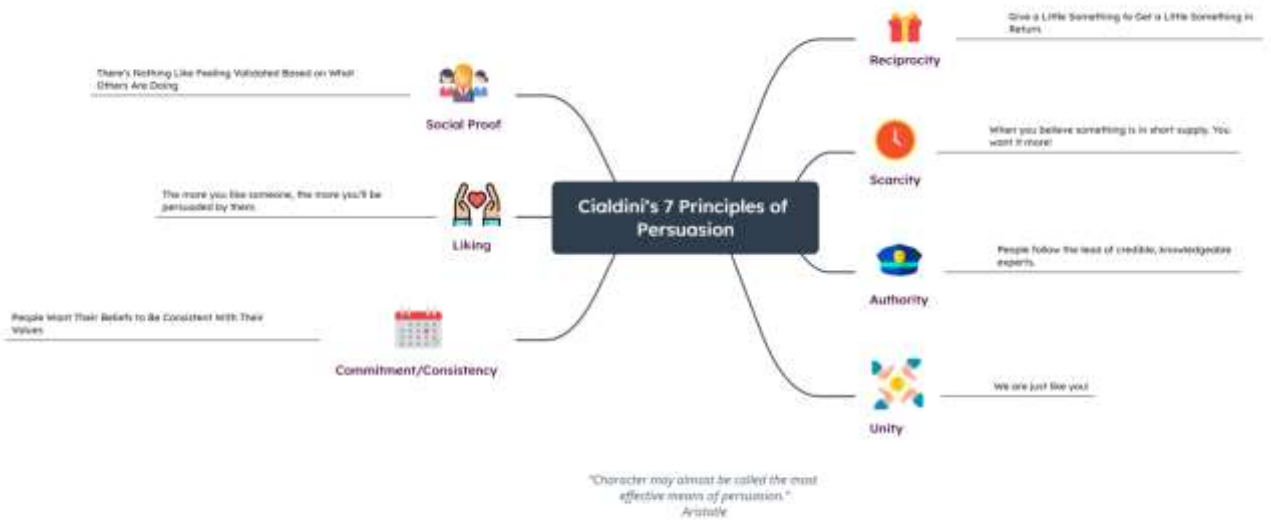
Six Universal Influence Principles

Robert Cialdini

- Reciprocity
- Scarcity 
- Authority
- Commitment
- Liking ("love bombing") 
- Social Validation 

Robert Cialdini home page:
http://www.asu.edu/clas/psych/people/faculty/rcialdini.html

https://slideplayer.com/slide/3487637/



https://www.linkedin.com/pulse/exploring-cialdinis-7-principles-persuasion-review-sundaramoorthy

Principle	Description	Application for L&D Professionals
Reciprocity	People feel obligated to repay, in kind, what has been given to them	Give what you want to receive, lend help to a colleague and you'll get his help back later
Scarcity	People typically overvalue things that are rare, dwindling in availability or difficult to acquire	Use exclusive information and potential losses to persuade others during your presentations
Authority	People are more easily persuaded by individuals perceived to be legitimate authorities	Don't assume your expertise is self-evident, establish it first in prior informal conversations or ideally have someone else introduce you
Consistency	People feel strong pressure to be consistent within their own words and actions	Make others' commitments real by asking for owned, actionable and publicly-declared commitments
Social Proof	People often look to the behaviour of similar others for direction about choices	Use peer power of lots of similar others to influence and persuade
Liking	People prefer to say yes to those they like	Influence others by pointing out how you are similar to them. Charm and disarm by offering genuine praise

https://x.com/ShaneAgronomy/status/1099694311669563392

These mechanisms of persuasion are also applied in negotiations

There may be a strategic use of falsehoods

- Contributes to making international negotiations games with incomplete information

The aforementioned deviations from classical conditions make us choose outcomes with suboptimal rewards

We not only commit such systematic errors but also repeat them in a predictable manner (Ariely, 2008)

1.3.2. Propaganda

Propaganda

- To shape opinion and behavior
    - In manipulative ways
- Exploits psychological and social dynamics

12 principles of propaganda (numerous sources)

- Often attributed to Joseph Goebbels, Nazi Minister of Propaganda
- In fact, Goebbels' propaganda principles are more elaborate (https://www.physics.smu.edu/pseudo/Propaganda/goebbels.html)

What principles of propaganda come to your mind?

I provide an answer in three tiers

(A) Abstracted ideas from a reputable source (Jowett & O'Donnell, 2012).

1. Avoid abstract ideas
    - Appeal to <u>emotions</u>
2. Constantly repeat just a few ideas

    - Use stereotyped phrases
3. Give only one side of the argument
4. Continuously criticize your opponents
5. Pick out one special enemy for vilification

(B) Here are the (purported) 12 principles of persuasion and propaganda in detail

1. The Big Lie
    - Tell a colossal lie
    - No one would believe that someone could have the impudence to distort the truth so brazenly
2. Repetition
    - Repeated exposure to a message makes it more likely to be accepted
        - The more a message is repeated, the more it becomes ingrained in the public's mind.
3. Appeal to emotions
    - Use fear, anger, pride, or other emotions to sway opinion
    - Do not use logical reasoning or evidence
4. Simplification
    - Simplify complex ideas and reduce them to clear and easily digestible messages
    - Pit "good" versus "evil"
5. Name-calling
    - Label opponents with negative terms
    - Dehumanize them
        - Make them easier to dismiss or vilify
6. Glittering generalities
    - Use vague, positive-sounding phrases or slogans
        - *"Freedom"*
        - *"Honor"*
        - *"Patriotism"*
    - Evoke approval without providing real substance
7. Transfer
    - Associate the propaganda message with symbols or images that evoke strong emotions
        - National flags
        - Revered figures

            - Gain legitimacy
8. Testimonial
    - Use endorsements from famous or authoritative figures
        - Gives credibility to the message
            - Even if the person isn't an expert on the subject
9. Bandwagon
    - Convince people that
        - "Everyone is doing it"
        - A particular point of view is widely accepted
    - Encourage conformity
10. Card stacking
    - Present only one side of the argument
    - Cherry-pick facts
        - Make your position appear stronger than it is
11. Plain folks
    - Convince the audience that the propagandist's views reflect the concerns and interests of common, everyday people
12. Fear appeal
    - Instill fear by emphasizing threats, either real or imagined
        - Manipulate people into supporting a particular course of action

(C) A selection of more detailed propaganda principles (Jowett & O'Donnell, 2012)

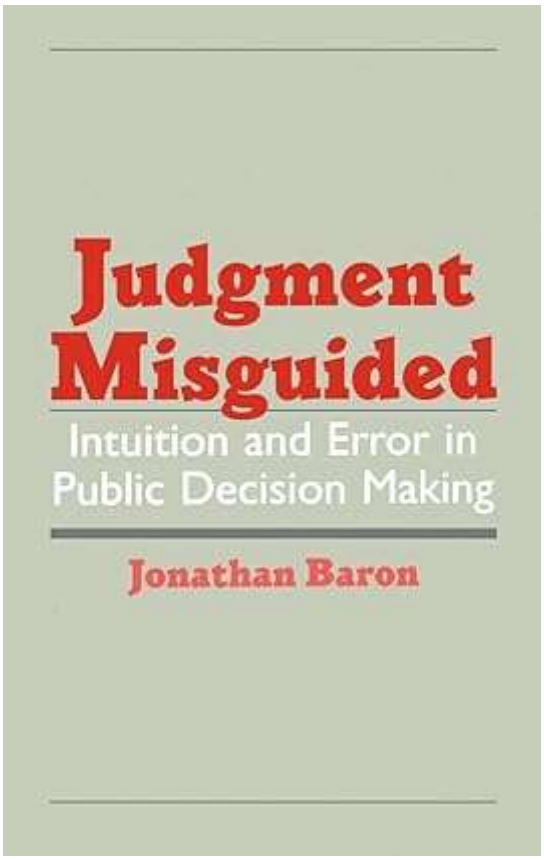
- To be perceived, propaganda must
    - Evoke the interest of an audience
    - Be transmitted through an attention-getting medium
- Black rather than white propaganda must be employed
    - When white propaganda is less credible or produces undesirable effects
- Propaganda may be facilitated by leaders with prestige
- Propaganda must be carefully timed
    - The communication must reach the audience ahead of competing propaganda
    - A propaganda theme must be repeated
        - But not beyond some point of diminishing effectiveness
- Propaganda must label events and people with distinctive phrases or slogans
    - They must evoke responses which the audience previously possesses

    - They must be capable of being easily learned
    - They must be utilized again and again
        - But only in appropriate situations
    - They must be boomerang-proof
- Propaganda to the home front
    - Must prevent the raising of false hopes
        - These can be blasted by future events
    - Must create an optimum anxiety level
        - Reinforce anxiety concerning the consequences of defeat
    - Must diminish the impact of frustration
- Propaganda must facilitate the displacement of aggression
    - Specifying the targets for hatred

1.3.3. Judgemental decision making

Are systematic errors of individual judgment transferred to the collective level?

- Yes, according to social psychology (Baron, 1998)



https://www.amazon.com/Judgment-Misguided-Intuition-Public-Decision/dp/0195111087

- Various intuitive rules
    - Which we rely on to make decisions at the individual level

    - Also have implications at the level of society and politics
- For example
    - We prefer inaction to actions that may have highly unlikely but adverse consequences
        - Even if those actions are much more likely to bring us significant benefits, e.g. vaccines
    - We also avoid disturbing the status quo
    - We favor nations, “tribes”, or other groups to which we belong
        - Without caring if this harms others

The incorrect application of these intuitive rules

- Affects public life
- Leads to suboptimal collective decisions

Such errors are involved in the management of issues such as

- Equality
- Religious conflicts
- Resistance to change
- Nuclear energy
- Global environmental problems such as overfishing and global climate change

In particular, Baron (1998) discusses

- The tragedy of the commons (to be discussed in game theory)
    - Overfishing
    - Global warming
    - Nationalism
    - Religion and cults
    - Opposition to reform
    - Drugs and vaccines
        - Public vs experts
    - Birth control

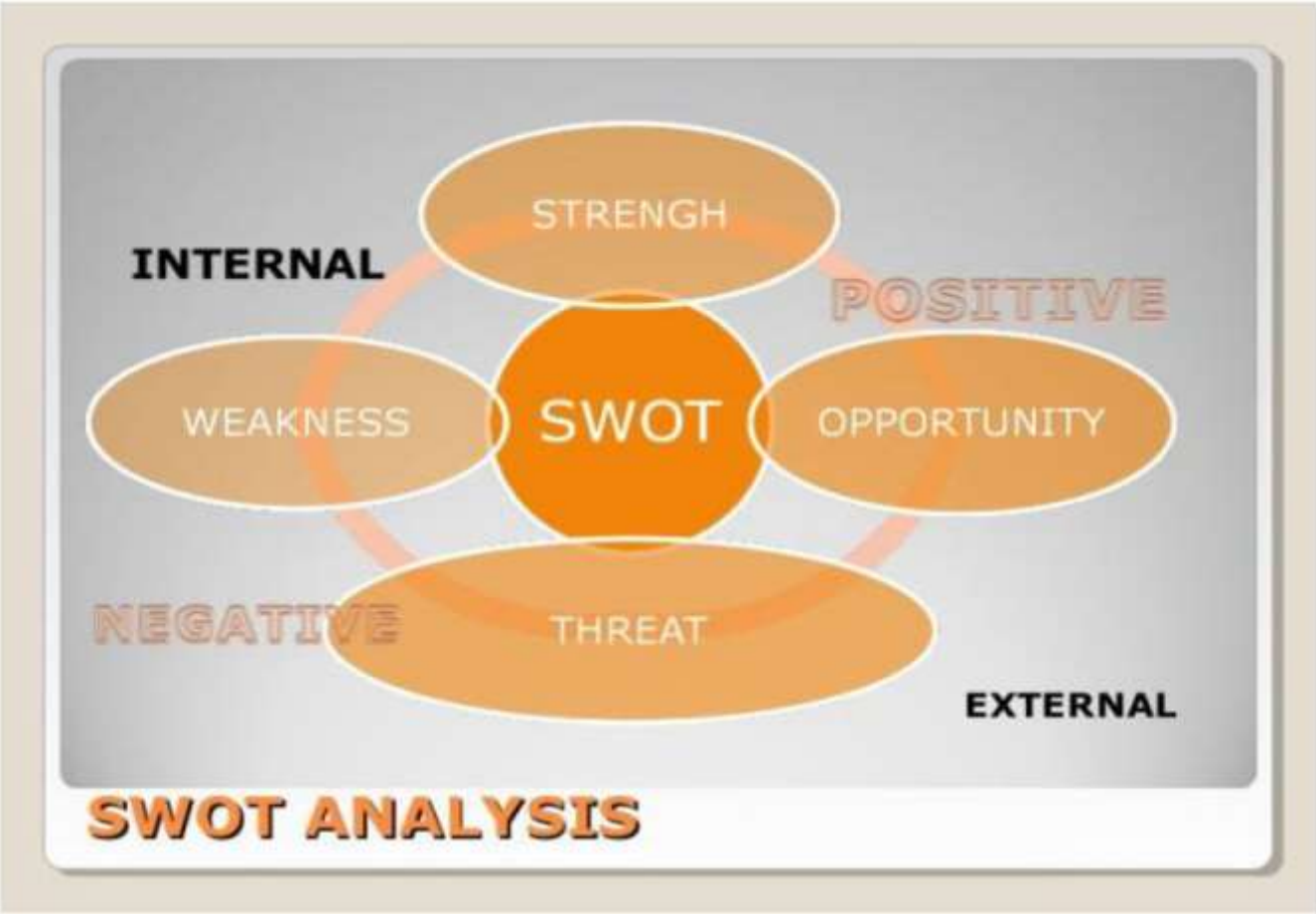
1.4. SWOT analysis

SWOT (**S**trengths, **W**eaknesses, **O**pportunities, **T**hreats) analysis

- Strategic planning tool
    - In the context of business decision-making (but not only)

SWOT helps dissect the internal and external environment of an organization (or any examined entity)

- Internal
  - Strengths
  - Weaknesses
- External
  - Opportunities
  - Threats



(Mashudi et al., 2023)

SWOT analysis

- Establish short-term, medium-term and long-term goals
- Formulate the most appropriate strategy for the future

SWOT plans should outline specific steps for

- Leveraging strengths
- Addressing weaknesses
- Pursuing opportunities
- Mitigating threats

Typical applications areas for SWOT analysis

- Career planning
    - Strengths: skills, experience
    - Weaknesses: knowledge gaps
    - Opportunities: networking, training, education
    - Threats: job competition
- Corporate strategy, e.g. expansion plans
- Marketing, e.g. customer needs, market trends, competition
- Product development, e.g. market opportunities
- Healthcare, e.g. hospitals, diagnostic labs, health institutions
- Public health initiatives, e.g. disease prevention, collaboration opportunities, regulatory challenges, funding opportunities
- University planning, e.g. funding limitations, new technologies, competition, changes in regulatory framework
- Sustainability, e.g. climate change policies, green initiatives, renewable energy adoption
- Conservation, e.g. habitat protection, poaching, deforestation
- Crisis management, e.g. natural disasters, pandemics
- Public policy, e.g. climate change, energy transition, innovation
- Defense strategy, e.g. geopolitical risks, emerging threats, building alliances

---

For practice, please construct an outline of a SWOT analysis based on your experience taking my Decision Methods and Game Theory seminar

Here is one possible such outline

- **Strengths**
    - Relevance of topics

        - The seminar covers critical areas of strategic decision-making and game theory
        - These are applicable to strategic, government, and organizational contexts
    - Diverse perspectives
        - The students come from various regions (Europe, Middle East, Africa)
        - The different viewpoints and experiences help enrich discussions
    - Instructor experience (or lack thereof)
        - The instructor brings expertise in strategic decision-making and game theory
        - But the instructor has little experience in defense-related fields
    - Interactive learning
        - Syndicate/group work (sufficient?)
        - Class activities, e.g. negotiation games, providing hands-on learning experience
    - Tailored content
        - The seminar is tailored to a defense context
        - The material is practical for the students' professional roles
- **Weaknesses**
    - Time limitations
        - Condensed format
        - No time for an in-depth exploration of all concepts
            - Especially true for game theory
    - Diverse backgrounds
        - Varied educational backgrounds among the students
        - Might create different levels of familiarity with parts of the material
    - Limited focus on regional specifics
        - No time to address the distinct challenges faced in certain regions, e.g. Middle East or Africa
        - Also, possibly insufficient know-how on behalf of the instructor
        - Limitations arising from the need to approach contentious issues with sensitivity, particularly when participants are from countries with complex political and historical relationships
    - Language barriers

        - English is not the first language (not are language skills the same) for most students as well as for the instructor
        - Comprehension or participation may be affected
- **Opportunities**
    - Application of concepts
        - Officers can apply decision-making and game theory principles to real-world scenarios in their own countries and organizations
    - Collaboration and networking
        - The seminar provides an opportunity for officers from different regions to build professional relationships and exchange strategies
    - Adaptation of learning
        - Participants can adapt seminar learnings to their own cultural and organizational contexts, potentially leading to innovative approaches in decision-making
    - Further education
        - The seminar could inspire officers to pursue further learning or research in decision theory, game theory, or strategic planning
- **Threats**
    - Relevance of content
        - Some officers might find certain aspects of the seminar less relevant to their specific roles, particularly in non-strategic contexts
    - Differences in implementation
        - Officers may face institutional or political challenges when trying to implement decision-making frameworks learned during the seminar in their home countries
    - Competing priorities
        - Officers may be distracted by other professional responsibilities or obligations, reducing their focus on seminar content
    - Post-seminar follow-up
        - Without structured follow-up or ongoing support, participants might struggle to retain or apply the knowledge effectively

---

Please elaborate for the following steps for a hypothetical SWOT analysis for military personnel

1. Gather relevant data about the military personnel

2. Identify the strengths of military personnel by considering
3. Determine weaknesses of military personnel by identifying areas for improvement or limitations
4. Identify the opportunities available to military personnel (enhance skills, career prospects, overall performance)
5. Evaluate potential threats or challenges that military personnel may face in their roles
6. Outline action plans with specific steps for each military personnel

---

Let's break down the steps for such a hypothetical SWOT analysis for military personnel

1. Gather relevant data about the military personnel
    - Experience
    - Skills
    - Training
    - Performance records
    - Feedback from superiors or colleagues
2. Identify the strengths of military personnel by considering
    - Exceptional skills
    - Qualifications
    - Accomplishments
    - Positive characteristics such as
        - Leadership abilities
        - Technical expertise
        - Physical fitness
        - Adaptability
        - Teamwork
3. Determine weaknesses of military personnel by identifying areas for improvement or limitations
    - Lack of experience in certain areas
    - Inadequate training
    - Poor communication skills
    - Difficulty working under pressure
4. Identify the opportunities available to military personnel (enhance skills, career prospects, overall performance)

    - Specialized training programs
    - Leadership development courses
    - Overseas assignments
    - Promotions
    - Involvement in new initiatives
5. Evaluate potential threats or challenges that military personnel may face in their roles
    - Budget constraints
    - Changes in technology
    - Geopolitical tensions
    - Shifting operational requirements
6. Outline action plans with specific steps for each military personnel
    - Leveraging strengths
    - Addressing weaknesses
    - Pursuing opportunities
    - Mitigating threats

Now please carry out a SWOT analysis of using surveillance aerostats as a means of countering terrorism

https://www.airborne-industries.ltd.uk/persistent-ground-surveillance-systems/

Here is a published case study

- Analysis of Using Aerostats for Surveillance in Counter Terrorism (https://www.japcc.org/articles/strength-weakness-opportunity-and-threat-swot/)

https://www.lockheedmartin.com/en-us/news/features/history/ptds.html

Strengths

- Cost effective
    - Much cheaper than other Unmanned Aerial Vehicles (UAVs)
- Easy installation
    - Small sized aerostats take 4 hours to make ready for operation
- Minimal crew
    - 2 to 5 staff members (depending on aerostat size)
- Long-time persistent performance
    - Stay aloft for days or weeks
        - UAVs stay aloft for hours
- Advanced sensors and surveillance systems
- Wide variety of tasks and missions supported

Opportunities

- Sensor innovation and integration
- Composite material innovation

    - New fabrics (High Strength Laminated Aerostat Material, HSLAM)

Weaknesses

- Limited useful payload
    - Payload capacity increases with aerostat volume
    - However, ceiling altitude and endurance time decreases with the payload carrying capacity.
    - Small aerostats will have to use smaller sensors
        - Surveillance is less effective
- Limited altitude
    - Ceiling altitudes are low and middle-level altitudes
        - Aerostats cannot reach the required altitude in extremely hilly and mountainous territories
            - Ineffective at surveillance in such environments
        - Increased possibility of staying within the range of light arms fire

Threats

- Poor weather conditions
    - Damage due to strong winds or heavy rain
    - Data cables, fiber or steel cables that connect tethered aerostats to the ground may stretch and set the aerostat free
        - Aerostat will be uncontrollable and will be lost and uncontrollable
    - Sensors may sustain damage, resulting in problems with data transfer and surveillance
- Limited survivability
    - Smaller aerostats used at lower altitudes may stay within the range of small arms fire
    - Terrorist elements could easily disrupt or destroy small, low altitude aerostats

---

1.4.1. Indonesia's national defense industry

From a SWOT analysis of Indonesia's national defense industry that showcases internal and external factors (Mashudi et al., 2023)

Table 1. I

Strengths	
1. Abundant Human Resources 2. Abundant natural resources 3. Government policies are very supportive 4. Formation of industrial cluster 5. Formation of industrial holding 6. The defense budget is getting bigger 7. Guaranteed security situation	1. Low quality of human resources 2. Management of natural resources that are not optimal 3. Defense industry support capability is still low 4. Uncertainty in the continuity of defense industry product orders 5. Socio-economic conditions affected by Covid 19

Table 2. External factor Identification

Opportunities	Threats
1. Clear defense industry market 2. The independence of the defense industry is a priority for the state 3. Is an industry that can absorb a lot of workers 4. The creation of great economic opportunities	1. Natural disasters 2. Technology that destroys the nation's morale 3. Covid 19 pandemic

Table 5. SWOT Diagram of Potential Development of Indonesia's Defense Industry

No	Strategy	Symbol
1	Improving the quality of human resources in the defense industry in terms of mastery of technology by collaborating with universities	SO (1)
2	Support the formation of industrial clusters to improve the defense industry ability to ensure product quality according to user's needs.	SO (2)
3	Support the establishment of industrial holdings to ensure continuity of product orders in the defense industry	SO (3)
4	Manage regularly utilization of the defense budget the can be captured to improve the defense industry in terms of the production of military equipments	SO (4)
5	Encouraging the improvement of quality of human resources in defense industry	WO (1)

6	Optimizing the management of natural resources to support the capability of the defense industry. Encouraging the certainty of ordering products for defense industry military equipments	WO (2)
7	Encouraging economic improvements due to Covid 19 pandemic to ensure the sustainability of defense industry	WO (3)
8	Encouraging the certainty of ordering products for defense industry military equipments	WO (4)
9	Improving the quality of human resources in the defense industry to deal with world technological developments than can damage morale	ST (1)
10	Support industrial holdings to minimize the impact of natural disasters	ST (2)
11	Encouraging the use of defense budget to minimize the impact of Covid 19	ST (3)
12	Improving the ability of defense industry to support equipment related to Covid 19 mitigation	ST (4)
13	Encouraging the improvement of the quality of human resources to minimaize the impact of natural disasters	WT (1)
14	Carry out training and increase the mastery of defense industry	WT (2)

1.4.2. South China Sea dispute

Background

South China Sea dispute

- Roots in colonial and post-colonial territorial claims following World War II
- Region claimed by China, Vietnam, the Philippines, Malaysia, and Brunei
    - China asserts a historic claim on a large portion of the sea, based on the “nine-dash line” (“eleven-dash line” by Taiwan)
- Tensions escalated in the late 20th century because of economic interests in fishing, oil, and natural gas resources
- In 2009, China scaled up its assertiveness by submitting a controversial map to the United Nations
    - International controversy lead to confrontations with neighboring countries
- The dispute intensified in the 2010s
    - China constructed artificial islands and military installations
    - The US and its allies expressed concerns about freedom of navigation and regional stability

Please carry out a SWOT analysis of the situation

https://www.pmfias.com/ten-dash-line-and-nine-dash-line/

Analysis

Here follows a SWOT analysis of the South China Sea dispute

Strengths

- Strategic importance
    - The South China Sea is a critical shipping route
        - A significant percentage of global trade passes through it

        - Two important straits are at its edges
            - Taiwan straits
            - Malacca straits
    - Control of the area is strategically valuable
- The region is believed to contain valuable resources providing strong economic and geopolitical incentives
    - Substantial oil and natural gas reserves
    - Rich fishing grounds
- Military capability
    - China, one of the claimants of the area, has significant military capabilities
        - China can assert its claims and deter potential adversaries

Weaknesses

- Complexity of overlapping territorial claims
    - Confusion and conflict among nations
    - Complicated diplomatic resolutions
    - Heightened tensions
- International law ambiguities
    - Legal frameworks, such as the United Nations Convention on the Law of the Sea (UNCLOS), are often contested
    - This leads to challenges in resolving disputes through legal means
- Economic dependencies
    - Regional economies are heavily dependent on trade routes through the South China Sea
    - This makes prolonged conflict economically damaging for all parties involved

Opportunities

- Diplomatic engagement
    - Potential for multilateral negotiations and dialogue among claimants and external powers
    - Opportunity to
        - Seek peaceful resolutions
        - Establish guidelines for resource sharing
- International cooperation

    - Collaborative efforts for maritime security can foster goodwill and reduce tensions
        - Protection of the natural environment is a good foundation upon which to build goodwill
        - More when we examine game theory and talk about coordination games
- Economic development
    - Joint development agreements could be pursued for shared resource exploitation, benefiting all parties and promoting stability in the region.

Threats

- Escalation of tensions
    - Increased military presence and confrontational actions
    - These could lead to accidental clashes
        - In turn, these could escalate into wider conflicts
- Geopolitical rivalries
    - The involvement of external powers such as the US and its allies, could
        - Heighten tensions
        - Complicate resolution
        - Leading to broader geopolitical struggle
- Environmental concerns
    - Ongoing militarization and resource extraction pose risks to marine ecosystems
    - These could have long-term consequences for regional economies and stability

Conclusions

This SWOT analysis of a strategically important region (and not of an state or other geopolitical agent)

- Highlights the multifaceted nature of the South China Sea dispute
- Emphasizes the challenges and potential pathways for resolution

---

Further research directions

How would you conceptualize a chokepoint resilience index?

To give you an idea, here is an energy security index (from the doctoral dissertation of Ms N. Kontoulis, supervised by Professor Paravantis)

1. Physical availability of energy, i.e. energy surety, the historical bedrock of energy security, containing the components of
    - security of supply
    - self-sufficiency
    - energy diversification (in particular inclusion of renewable energy in the mix)
2. Technology development
    - maturity (of infrastructure)
    - energy (and grid) efficiency, energy conservation
    - transportation systems
    - decentralization, i.e. diffusion of small scale systems
    - research (intensity), development and innovation
3. Economic affordability
    - affordability of electricity and gasoline prices (in Purchasing Power Parity)
    - stability (i.e. lack of price volatility) and predictability of prices
    - competition, subsidization (per capita), profitability
    - energy intensity (i.e. electricity use per capita and monetary unit of GDP) and fuel economy of passenger vehicles
    - investment and trade, e.g. energy exports
4. Social accessibility, i.e. social stewardship
    - dependency (i.e. imported energy per capita)
    - electrification, i.e. percent of population with (reliable) access to grid
    - energy democracy, e.g. percent of households that are fuel poor
    - social equity, e.g. percent of households relying on traditional energy sources (such as wood) for cooking and heating
    - consumer education and attitudes, e.g. towards renewable energy sources
5. Governance
    - type of polity (democracy or otherwise); both small and big polity entities (countries) may be doing well in respect to energy
    - political stability, e.g. years since previous regime change
    - geopolitics, interconnectedness and (international) governance (e.g. as depicted in worldwide governance rating)
    - data quality and intelligence (which, may be a separate dimension [IK])
    - military power

- transparency and accountability (i.e. lack of corruption)
- regulation and "fit" energy policies, e.g. catering to all societal energy tribes

6. Manmade threats to energy infrastructure
    - perhaps include war to the governance dimension or ignore war (its effect is included in availability)
    - perhaps include only asymmetric/paramilitary/nonconventional threats (conducted by actors other than nations, like organizations) in this dimension e.g. Iranian revolution, Arab Spring?
    - accidents caused by human error
    - durability and safety (of infrastructure)
    - terrorism incidents, including cyber threats
7. Natural environment
    - (existence of) tragedy of the energy commons, resource curse
    - environmental pollution, e.g. SO2 emissions (per capita) and their mitigation
    - global climate change, e.g. CO2 emissions (per capita) and their mitigation
    - forest cover, land use (management)
    - water availability, i.e. quality and quantity, (lack) of water stress and scarcity, population access to improved water
    - environmental (sustainability) management
    - human health issues and fatalities caused by environmental threats, e.g. (high concentration of) toxic substances
    - black-swan type of natural disasters

Let's compare with a Chokepoint Resilience Index (from the work of G. Smailis, a bright graduate student whose thesis I supervise) with details of dimensions and components

1. Geopolitical and governance resilience
    - Military presence, piracy actions, terrorist attacks
    - Political system and instability
    - International sanctions and diplomatic competition
2. Economic and trade resilience
    - Daily vessels and energy volumes traffic
    - Oil & gas exports and imports

        - Destinations/dependency
    - Shipping delays and rerouting costs
    - Energy price implications
    - Insurance costs
3. Alternative routes
    - Economic importance
    - Technological efficiency
    - Geopolitical content
    - Environmental impact
4. Geomorphological and technological resilience
    - Size and depth
    - Transport capacity
    - Operational capacity and surveillance systems
    - Contingency plans
5. Historical resilience
    - Frequency of military conflicts
    - Incidents of piracy and terrorism
    - International sanctions and diplomatic conflicts
6. Environmental resilience
    - Natural disasters
    - Extreme weather events
    - Pollution

https://www.ajot.com/premium/ajot-global-maritime-choke-points

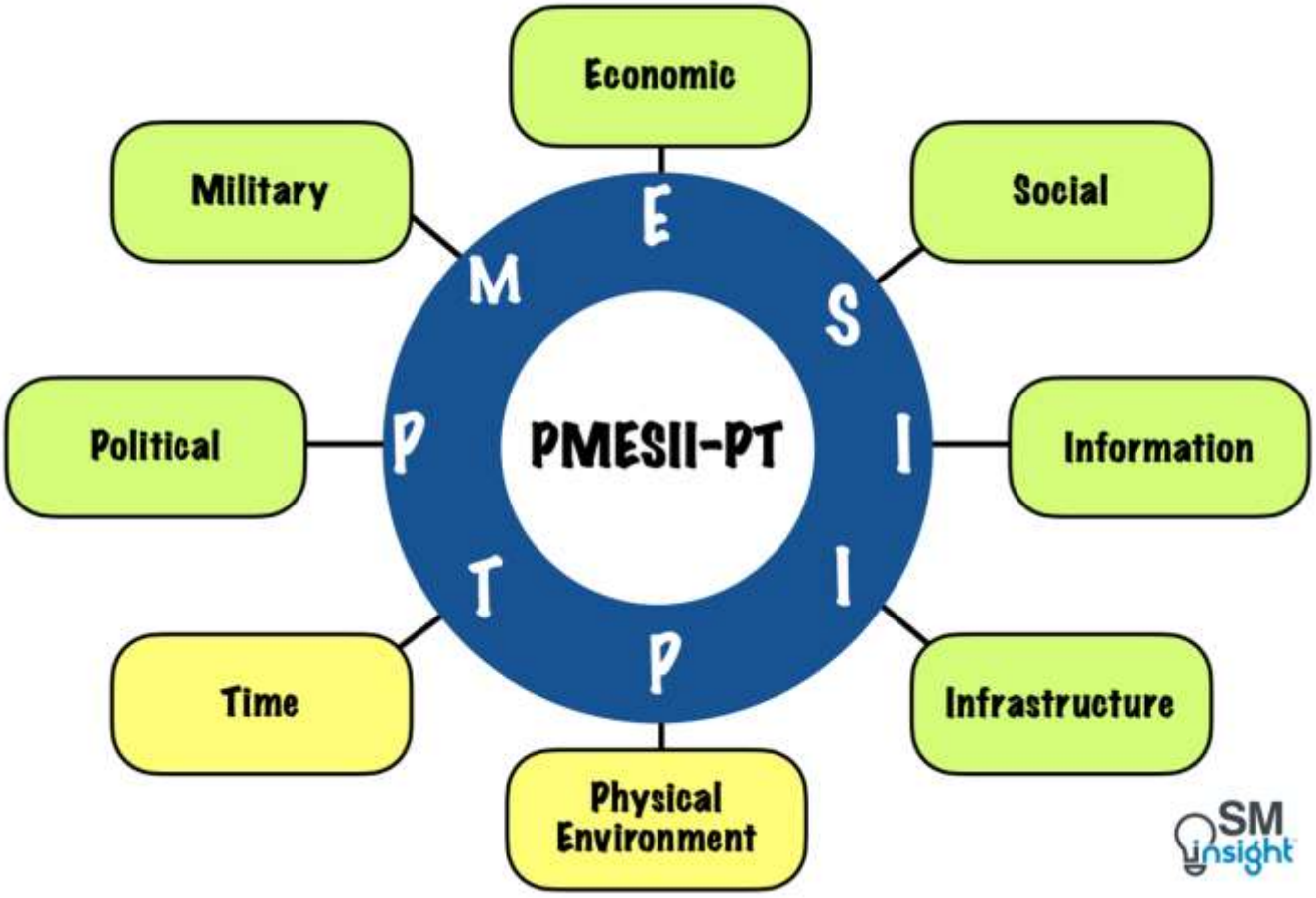
1.5. PMESII-PT framework

PMESII-PT

- Planning and operational framework
    - In strategic and military contexts

PMESII-PT

- **Political**
    - Decision-making based on governmental, legal, and policy considerations
- **Military**
    - Role of military forces, capabilities, and strategies
- **Economic**
    - Impact of resources, economy, and trade
- **Social**
    - Cultural and societal dynamics
- **Information**
    - Role of intelligence, communication, and media
- **Infrastructure**
    - Critical infrastructure, e.g. transportation, energy, communications
- **Physical environment**
    - Geographical and environmental conditions
- **Time**
    - Timing of operations and strategic decisions



https://strategicmanagementinsight.com/tools/pmesii-pt/

The PMESII-PT framework can frame the analysis of conflict or defense scenarios such as

- Military operation
- Humanitarian crisis
- Peacekeeping mission

1.5.1. Operation Barbarossa (1941)

Here's an example of using the PMESII-PT framework to analyze the decision behind Operation Barbarossa

- Nazi Germany's invasion of the Soviet Union in 1941

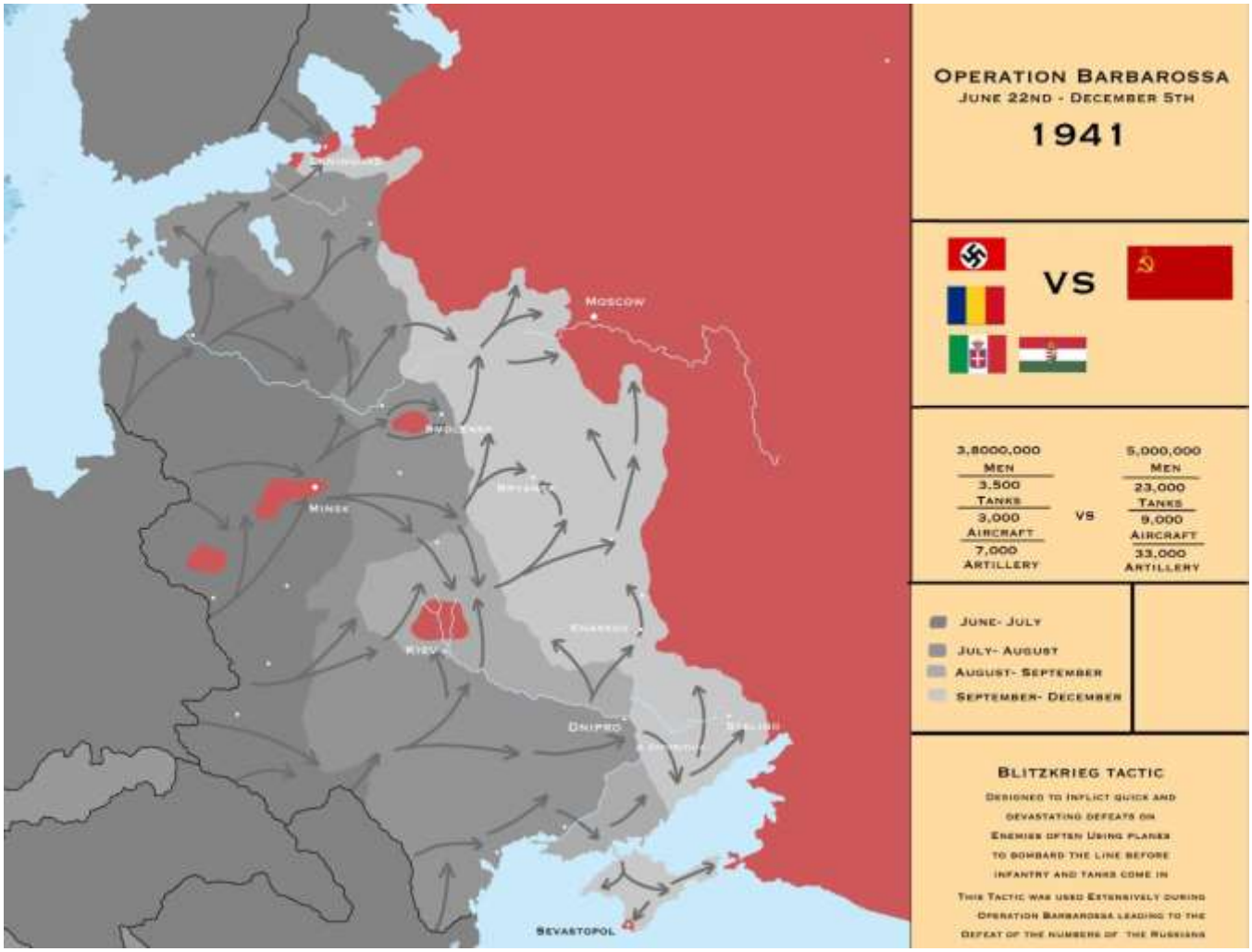
Background

Operation Barbarossa

- Nazi Germany's invasion of the Soviet Union
    - Launched on June 22, 1941
        - Too late in the calendar year
    - Aimed to quickly defeat Soviet forces and secure territory for “Lebensraum" (living space)

- Initially, German troops achieved rapid successes
    - Many Soviet soldiers were encircled and captured
- As winter approached, the offensive stalled outside Moscow due to
    - Harsh weather
    - Logistical problems (stretched supply lines)
    - Soviet counter offensives
- December 1941
    - Soviets launched their own counteroffensive
        - This launched a prolonged and brutal conflict on the Eastern Front
    - Ultimately the Germans suffered significant defeats
        - The war's momentum shifted in favor of the Allies
- Many historians view Operation Barbarossa as
    - A significant strategic blunder
        - Overreach of Nazi Germany
    - The beginning of the end of WW2

You are asked to construct a PMESII-PT framework for Operation Barbarossa



https://www.reddit.com/r/MapPorn/comments/108w358/map_of_operation_barbarossa_the_largest_invasion/

Analysis

Let's look at one such tentative analysis

Scenario

- Operation Barbarossa (1941)

Decision

- Hitler's decision to launch a large-scale invasion of the Soviet Union to
  - Secure living space (*"Lebensraum"*)
  - Defeat Bolshevism
  - Acquire resources

PMESII-PT Framework Analysis

1. **Political**

- Germany
  - Hitler viewed communism as a mortal threat
  - The Nazi ideology aimed to eradicate the Soviet regime

    - By defeating the Soviet Union, Germany hoped to
        - Expand its influence
        - Secure resources
        - Create a vast empire in Eastern Europe
- Soviet Union
    - Stalin's regime was politically centralized
        - Absolute control over the state
    - The Nazi-Soviet non-aggression pact (Molotov-Ribbentrop Pact, 1939) was a temporary political convenience
        - Stalin was wary of Hitler's intentions
    - The Soviets were politically unprepared for an immediate, large-scale invasion

2. **Military**
    - Germany
        - The Wehrmacht had seen massive success in previous campaigns
            - Blitzkrieg tactics in Poland and Western Europe
        - Hitler believed that the Soviet military was inferior and disorganized
            - This would make conquering the USSR quickly possible
    - Soviet Union
        - The Red (Soviet) army was vast
        - But the Red Army was poorly organized after Stalin's purges of the officer corps in the late 1930s
            - These had severely weakened its military leadership
        - Still, the Soviets could mobilize
            - Immense manpower
            - Corresponding industrial potential
3. **Economic**
    - Germany
        - The invasion was partially motivated by economic factors
            - Germany needed vast natural resources, particularly oil from the Soviet Union, to sustain its war machine
            - Control over Soviet agriculture (Ukraine) and raw materials (oil in the Caucasus) was crucial for long-term German sustainability in a prolonged conflict
    - Soviet Union

    - The Soviet Union had vast natural resources, which were critical
        - For its own defense
        - As potential war spoils for Germany
    - The Soviet economy
        - Was heavily industrialized
        - Could be mobilized and transformed into a war economy quickly

4. **Social**
    - Germany
        - The Nazi regime believed that the Slavic people were inferior and should be subjugated
        - This racist ideology fueled the decision to treat the Eastern Front
            - For the Nazis it was more than a military campaign: it was a war of annihilation
            - The aim was to create “Lebensraum” (living space) for the Germans (which were considered a superior race)
    - Soviet Union
        - The Soviet society was authoritarian but highly mobilized
        - The initial shock of the invasion led to confusion and disarray
            - The harsh treatment of Soviet civilians by German forces later fueled Soviet resistance and patriotic unity under Stalin's leadership
            - The Nazi invasion was framed as the “Great Patriotic War”

5. **Information**
    - Germany
        - Hitler's intelligence on Soviet military strength was flawed
        - He underestimated
            - Soviet industrial capacity
            - The ability of the Soviets to endure prolonged conflict
        - The Nazi leadership
            - Expected a quick victory
                - Perhaps like Putin's Russia in the Ukraine war
            - Did not anticipate a long war of attrition
    - Soviet Union
        - The Soviets received intelligence reports warning of a German invasion
        - Nevertheless, Stalin chose to ignore many of them

        - He could not bring himself to believe that the Germans would violate the non-aggression pact so soon
    - This misjudgment left the Soviet Union vulnerable to the surprise attack

6. **Infrastructure**
    - Germany
        - German logistics were stretched thin
            - Distances in the Soviet Union were vast
        - The road and rail networks in the USSR were poorly developed
            - This made it difficult for the Germans to supply their advancing troops
            - This difficulty grew bigger as the Germans penetrated deeper into Soviet territory
    - Soviet Union
        - The USSR's industrial infrastructure was concentrated in the west
            - This was quickly overrun
        - Stalin had a policy of relocating key industries to the Ural Mountains and beyond
            - This allowed the Soviet Union to rebuild its war production capabilities
                - Far from the front lines

7. **Physical environment**
    - Germany
        - The Germans were unprepared for the harsh conditions of the Soviet winter
        - The initial phase of the campaign (summer and fall) went well
            - As winter set in, the Germans lacked
                - Proper equipment
                - Clothing
                - Supplies for winter warfare
        - In addition, the vast size of the Soviet Union stretched German supply lines to the breaking point
    - Soviet Union
        - The Soviet terrain worked to the advantage of the defending Red Army
            - Vast distances, morphology
            - Poor infrastructure

        - Extreme weather
            - Muddy roads in autumn
            - Freezing cold in winter
    - The environment became a significant factor in slowing down the German advance

8. **Time**

- Germany
    - Hitler believed that a rapid victory was essential
        - He expected the Soviet Union to collapse in a few months
            - Similar to Germany's previous campaigns in Europe
    - Hitler miscalculated
        - The resilience of the Soviet forces
        - The impact of the Soviet winter
    - The longer the campaign lasted, the more difficult it became for Germany to sustain its offensive
- Soviet Union
    - Time was on the Soviet side
        - The initial invasion caught them off guard
        - As the war dragged on, the Soviets could mobilize their vast reserves of manpower and industrial resources
        - Winter gave them a critical advantage
            - Halting the German advance
            - Allowing the Soviets to regroup

Conclusion

Used the PMESII-PT framework to analyze Operation Barbarossa

- Hitler's decision was driven by
    - Political motivations
    - Military motivations
    - Economic motivations
- Hitler underestimated several key factors
    - Politically, the invasion aimed to eliminate Bolshevism and expand German territory
        - It overestimated Soviet weakness
    - Militarily, Germany's initial success was undone by

        - Logistical challenges
        - The vastness of Soviet territory
    - Economically, the operation was designed to secure vital resources
        - The long-term economic cost of a protracted war was ignored
- The harsh physical environment and the inability to achieve a quick victory turned the operation into a drawn-out disaster for Germany

The PMESII-PT framework highlights how misjudgments in these areas led to

- The eventual failure of Operation Barbarossa
- The beginning of Germany's decline in World War II

1.5.2. Falklands War (1982)

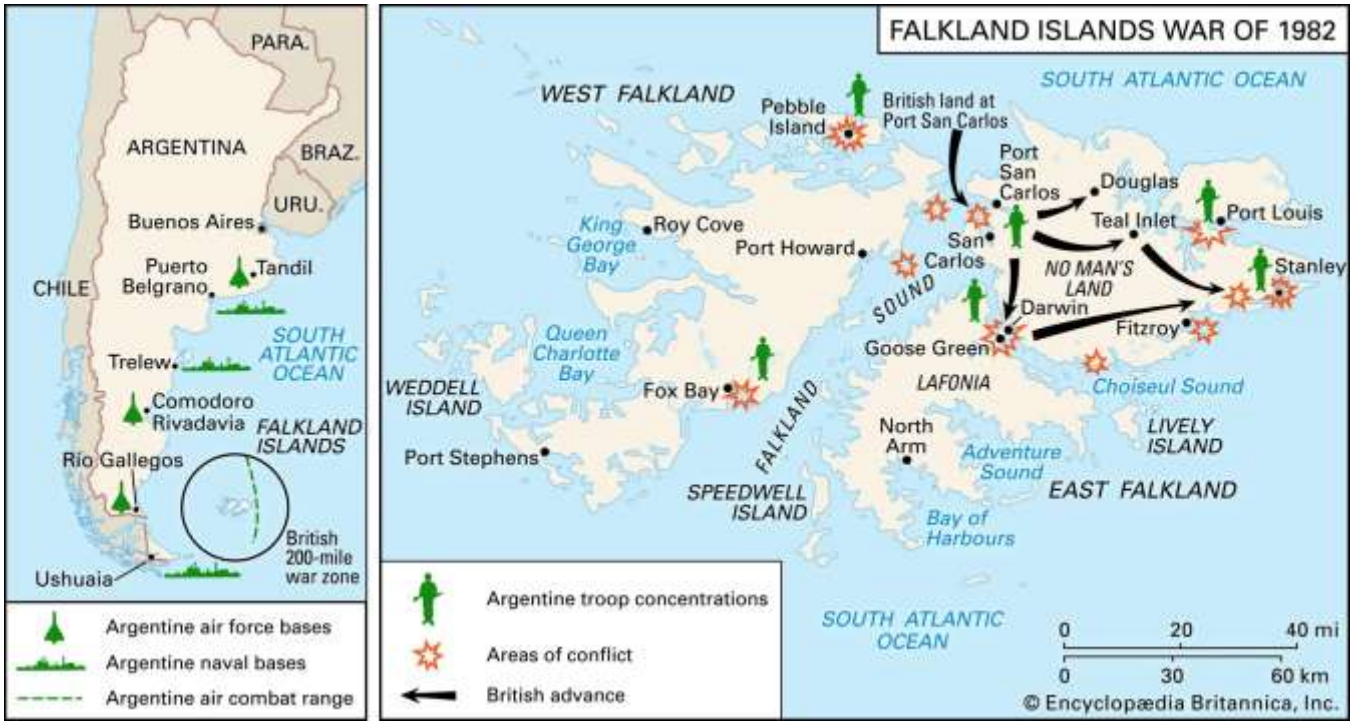
Background

The Falklands War

- Fought between April and June 1982
- Conflict between Argentina and the United Kingdom
    - Over the disputed Falkland Islands (Malvinas)
- On April 2, Argentina's military junta
    - Claimed the Falklands as part of its territory
    - Invaded them
- In response, the UK
    - Mobilized a naval task force to reclaim the islands, asserting
        - Its sovereignty
        - The rights of its citizens
- After intense naval and aerial engagements
    - British forces successfully retook the islands
    - The Argentinian troops surrendered on June 14, 1982
- The war resulted in
    - Significant casualties on both sides
    - Had lasting political repercussions
        - Strengthened British resolve
        - Contributed to the eventual downfall of the Argentine junta

---

Please, construct a PMESII-PT framework for the Falklands War



https://www.britannica.com/event/Falkland-Islands-War

Analysis

Applying the PMESII-PT framework to analyze the Falklands War (1982) between Argentina and the United Kingdom:

Scenario

- Falklands War (1982)

Decision

- Argentina's decision to invade the Falkland Islands (Malvinas) on April 2, 1982
- Subsequent British decision to reclaim them

PMESII-PT Framework Analysis

1. **Political**
   - Argentina
     - The claim to the Falklands was a long-standing nationalistic issue
     - The military junta in Argentina sought to
       - Bolster national pride
       - Distract from domestic issues
         - Economic problems
         - Human rights abuses
   - United Kingdom
     - The UK was determined to

        - Uphold its sovereignty over the islands
        - Protect its citizens there
    - This aligned with broader geopolitical interests
        - Maintaining its influence in the South Atlantic

2. **Military**
    - Argentina
        - The Argentine military believed that a quick takeover of the islands would deter a British response
            - A relatively strong naval and air force was deployed to execute the invasion
    - United Kingdom
        - The UK had a military presence in the region
        - The decision to send a task force to retake the islands required
            - Rapid mobilization
            - Logistical planning
            - Overcoming the distance from Britain

3. **Economic**
    - Argentina
        - Control over the islands was seen as economically beneficial due to
            - Potential fishing rights
            - Oil resources
        - The invasion aimed to
            - Solidify Argentina's claims
            - Boost national morale
    - United Kingdom
        - Economic stakes were lower than in other regions
        - Still, losing the Falklands would damage British prestige and influence
            - Especially in the face of growing nationalism in the region

4. **Social**
    - Argentina
        - The invasion was popular among many Argentinians
            - It was viewed as reclaiming national territory
        - The military junta used the conflict to
            - Rally public support

        - Distract from internal issues
- United Kingdom
    - The British public initially had mixed feelings
    - Support grew as the conflict progressed, driven by
        - A sense of national pride
        - A desire to defend British citizens on the islands

5. **Information**

- Argentina
    - The Argentine government used propaganda to justify the invasion
    - The invasion was framed as a patriotic endeavor
        - They junta controlled the narrative to
            - Bolster domestic support
            - Minimize dissent
- United Kingdom
    - The British government emphasized the need to
        - Reclaim the islands
        - Protect British citizens
    - Media coverage was used to rally public support for military action


Daily Mail

CUP FINAL SPECIAL

19 Argentine planes destroyed, five British ships hit, casualties on both sides as Marines establish a firm bridgehead

THE BRITISH ARE BACK!

THE BRITISH are back in force on the Falkland Islands—seven weeks to the day after the Argentine invasion.

DOWNED ... 9 Mirages

DOWNED ... 5 Skyhawks

DOWNED ... 3 Pucaras

Troops liberat first villag

https://www.tilleysvintagemagazines.com/source/product_data.php?prodid=32181

https://pastdaily.com/2017/05/24/may-24-1982-falkland-islands/

6. **Infrastructure**
   - Argentina
     - The islands were lightly defended
     - The Argentine military quickly established control over the key installations
       - The infrastructure was limited for sustained military operations.
   - United Kingdom
     - The UK needed to establish a logistics chain to support its task force
       - Repairing and maintaining ships and aircraft over long distances
7. **Physical Environment**
   - Argentina
     - The Falklands' geographic location posed challenges for resupply and reinforcement

    - Initial control over the islands allowed Argentina to leverage local advantages
- United Kingdom
    - Difficulties for military operations
        - Harsh weather
        - Rugged terrain
    - The British military
        - Was well-trained for such conditions
        - Adapted quickly

8. **Time**

- Argentina
    - The Argentine leadership believed that a swift takeover would prevent a strong British response
        - Aimed for a quick victory to solidify their claims
- United Kingdom
    - The UK had to respond rapidly to prevent Argentina from consolidating its control
        - Delays in mobilization could have allowed Argentina to
            - Reinforce its positions
            - Fortify defenses

From a US Naval War College **Analytical Hierarchy Process** (**AHP**) analysis of the Falklands crisis (Korosek, 1993)

NAVAL WAR COLLEGE
Newport, R.I.

THE ANALYTIC HIERARCHY PROCESS: ENHANCING OPERATIONAL LEVEL DECISION MAKING

by

Barbara M. Korosec

Lieutenant Commander, U. S. Navy

A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

Signature: Barbara M. Korosec

10 March 1993

Paper Directed by
Captain H. W. Clark, Jr., U.S. Navy
Chairman, Department of Joint
Military Operations

https://apps.dtic.mil/sti/pdfs/ADA264148.pdf

"When first faced with a complex problem, we may be overwhelmed by its size and by the amount of detail involved. Our first instinct is to decompose the problem into smaller and more manageable parts; we then subdivide those parts into smaller parts, and so on. This, in essence, gives rise to a hierarchy. Hierarchies are thus a consequence of the effort of the human mind to seek understanding."

Courses of Action

1. Do nothing and allow Argentina to keep the islands
2. Send the fleet and force Argentina to reopen negotiations
3. Send the fleet and retake the islands

Benefits

1. Save the islanders' lives
2. Save Thatcher's career
3. British national prestige
4. Peace
5. No casualties
6. Hold islands
7. Teach Argentina a lesson
8. Maintain options

Costs

1. Political costs
2. Fuel and maintenance costs
3. Argentine sovereignty
4. Possible war
5. Casualties and ammunition
6. Potential for naval defeat

Furthermore, pitfalls and limitations in systems analysis and policy planning (quoted from E. S. Quade)

- Under emphasis on problem formulation
- Inflexibility in the face of evidence
- Adherence to cherished beliefs
- Parochialism
- Communication failure
- Over concentration of the model
- Excessive attention to detail
- Neglect of the question
- Incorrect use of the model
- Disregard of the limitations
- Concentration on statistical uncertainty
- Inattention to uncertainties

- Use of side issues as criteria
- Substitution of the model for the decision maker
- Neglect of the subjective elements
- Failure to reappraise the work

Conclusion

The PMESII-PT analysis of the Falklands War highlighted how

- Argentina's decision to invade was influenced by
  - Political motives
  - Nationalistic fervor
- UK's response was driven by the need to protect
  - Sovereignty
  - National pride
- The initial Argentine success was undermined by
  - Logistical limitations
  - British determination
- Ultimately the conflict
  - Reinforced British resolve
  - Lead to a decisive military victory
  - Re-established British control over the Falkland Islands

---

2. RISK ANALYSIS

Risk assessment (broader) = Risk analysis (narrower) + Risk management

Risk assessment

- The *"comfort level that senior planners experience as they assess key variables"*

2.1. Risk

Risk

- The possibility that something bad could happen (Fullerton, 2018)

Risk management

- The process of identifying, understanding and addressing risks in order to achieve the objectives of an organization

- Is the potential reward worth the potential risk?

Useful key terms in a more general context of risk analysis

- Hazard
  - Anything that has the potential to cause harm or injury
    - A wet floor on which someone may slip and suffer an injury
- Likelihood
  - Probability of a hazard causing harm or injury
- Accident
  - An unplanned or uncontrolled event
    - Has led to, or could have caused harm or injury
  - A lighter or near accident may be called an incident
- Impact
  - The severity of the outcome if the hazard is realized
  - Impacts can be
    - Low/minor i.e. cuts & bruises
    - High/major i.e. multiple injury or fatality
- Control measures
  - Something that has been implemented or installed to remove or reduce the likelihood of a hazard causing an accident

Let's now review key terms and concepts useful in risk analysis in reference to a strategic conflict setting

- **Risk**
  - Potential for loss, damage, or any negative impact
  - Arising from a specific threat or hazard, e.g. threats to

        - Military operations
        - Mission success
        - National security
- **Threat**
    - Any potential danger or adversarial action that could negatively impact the success of a mission or strategic goal
        - Political instability
        - Cyberattacks
        - Environmental hazards
        - Enemy forces
- **Hazard**
    - A condition or factor that can potentially cause harm or a dangerous situation
        - Bad weather
        - Terrain
        - Malfunctioning equipment
            - Threatened by cyber attacks
        - Careful how you read a threat leading to a hazard
            - April 17 to 19, 2011
                - Major cyber attack on Sony
                - Compromised personal details from 77 million accounts and prevented users of PlayStation 3 and PlayStation Portable consoles
                - Made clear that cyber vulnerability constitutes an important concern for energy security!

https://phys.org/news/2011-04-sony-reveal-playstation-hack-probe.html

- August 15, 2012
  - Cyber attack (Shamoon virus) on 30,000 computers of Aramco, the Saudi Arabian oil company
  - Aramco supplied 10% of the global demand for oil
  - Biggest computer hack in history
    - Alerted the world to the terrifying possibility of a cyber Pearl Harbor

No IT payment systems, no Gas

https://en.wikipedia.org/wiki/Shamoon

- **Incident**
  - Specific event that causes or could have caused an undesirable outcome
    - Equipment failure
    - Skirmish
  - Incidents are often minor or localized but can escalate
- **Accident**
  - Unplanned event leading to unintended consequences
    - Injury
    - Loss
    - Operational failure
  - Accidents are usually not deliberate actions by opposing forces
    - Can have serious impacts in military settings
- **Likelihood** (**Probability**)
  - Probability or chance that a specific event, threat, or risk will occur
  - Key factor in risk assessments
    - Helping prioritize which risks need the most attention
- **Impact** (**Consequence**)
  - Potential effect or result of a risk materializing

        - Political destabilization
        - Mission failure
        - Loss of life
        - Loss of equipment
        - Loss of territory
- **Vulnerability**
    - Weakness or gap in
        - Defense
        - Systems
        - Strategies
    - Can be exploited by adversaries
    - Increase the likelihood of a risk materializing (becoming a reality)
- **Mitigation**
    - Actions or strategies designed to reduce the severity or likelihood of a risk
        - Fortifying defenses
        - Pursuing diplomacy
        - Enhancing intelligence operations
- **Severity**
    - A measure of how serious the consequences of a risk event will be if it occurs
    - Higher severity risks could involve
        - Loss of life
        - Key strategic failures
        - Significant military setbacks
- **Risk tolerance** (also referred to as **risk appetite**)
    - Level of risk that a nation, organization, or military force is willing to accept in pursuit of its goals
        - How much loss or disruption is deemed acceptable for an operation
    - In a given strategic context, it reflects the balance between
        - Risk-taking
        - Caution
    - Risk prone vs risk averse
        - We will discuss these concepts in the context of Game Theory

Titan submersible accident

https://www.bbc.com/news/world-us-canada-66014565

- Stockton Rush's (CEO of OceanGate) controversial interview remark that reflected his disregard for conventional safety regulations
    - *"At some point, safety is just pure waste. I mean, if you just want to be safe, don't get out of bed. Don't get in your car. Don't do anything"*
    - This statement was made before the Titan submersible accident
        - Highlighted his belief that over-regulation and traditional safety measures stifled innovation and exploration
        - This attitude has since been heavily criticized
            - In light of the tragic accident that occurred during an expedition to explore the Titanic wreck.

https://www.1news.co.nz/2024/09/20/titans-goal-was-to-make-dreams-come-true-mission-specialist/

- Jay Bloom (prospective customer of OceanGate https://edition.cnn.com/videos/us/2023/06/23/submersible-titan-father-son-turned-down-seats-ebof-bts-vpx.cnn and https://www.businessinsider.com/titanic-sub-stockton-rush-flew-experimental-plane-visit-reluctant-passengers-2023-6)
    - Bloom said that Rush came to visit him after he and his son expressed concerns about the trip
    - After he questioned why Rush was landing at North Las Vegas Airport rather than one of the city's other airports, Rush said
        - He was *"coming in on a two-seater experimental plane that he built"*
    - *"And I started to think about it: He's coming in on a two-seater experimental plane to pitch me to go on a five-seater experimental sub that he built down to the ocean floor to see the Titanic"*
    - Bloom said he understood that Rush had *"a different risk appetite than I do. I'm a pilot, I have my helicopter pilot's license, I wouldn't get into an experimental aircraft"*
    - Bloom's son said *"I just didn't think it could survive going that low into the ocean"*
    - His father agreed with his concerns
        - When they tried to ask Stockton questions *"he kind of brushed it off a little bit"*

    - Their seats went to another father and son, Shahzada and Suleman Dawood, who died on board when the submersible imploded
- Rush obviously had an adventurous nature and willingness to embrace significant personal and operational risks
    - These later became a subject of concern regarding OceanGate's safety practices with the Titan submersible

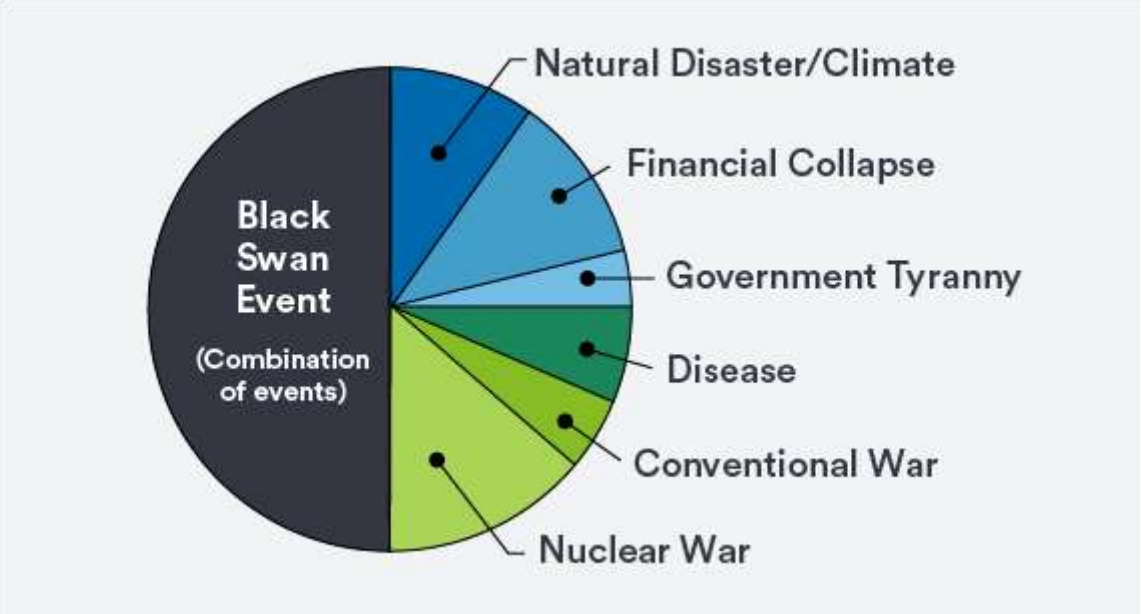
---

- **Contingency planning**
    - Preparing alternative courses of action to
        - Manage risks
        - Deal with unexpected events
    - Ensures flexibility in response to evolving threats or incidents
- **Criticality**
    - Importance of following in achieving strategic goals
        - Resource
        - Asset
        - Mission objective
    - High-criticality elements
        - Are essential
        - Need risk mitigation or protection

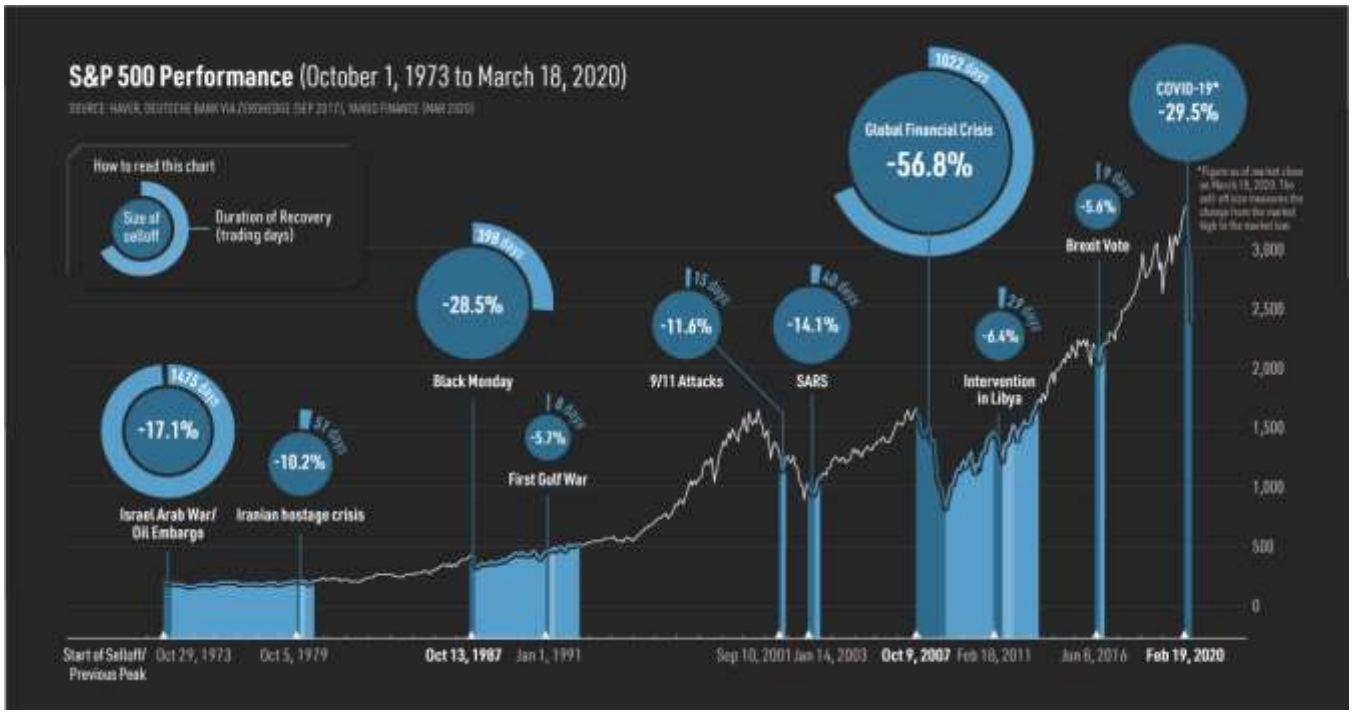
(Fullerton, 2018)

- **Resilience**
    - Ability to recover and adapt after a disruptive event
        - Military defeat
        - Equipment failure
        - Political unrest
    - Planning for how to maintain operations under stress

- **Intelligence**
  - Information gathering and analysis to understand
    - Threats
    - Risks
    - Strategic landscape
  - In conflict situations, intelligence reduces uncertainty and informs risk analysis
- **Scenario analysis**
  - A method used to evaluate different possible outcomes
    - By analyzing various hypothetical situations
  - In a conflict situation, it helps understand the risks associated with different strategies
- **Risk matrix**
  - Tool used to visually assess and prioritize risks based on their
    - Likelihood
    - Impact
  - Helps in decision-making by categorizing risks from low to high
- **Black Swan event**
  - An event that
    - Is highly improbable
    - Is unpredictable
    - Has massive impact
  - Conflict scenarios
    - Unexpected alliances
    - Revolutions
    - Terrorist attacks
    - Technological breakthroughs
    - Environmental disasters
      - Earthquake



https://www.protolabs.com/resources/blog/preparing-for-the-next-black-swan-event/



https://advisor.visualcapitalist.com/black-swan-events/

- **Collateral damage**
  - Unintended harm, damage, or loss caused by military operations
    - Typically affecting civilians or non-military targets
  - Reducing collateral damage is often a key consideration in risk analysis

---

2.1.1. Risk assessment

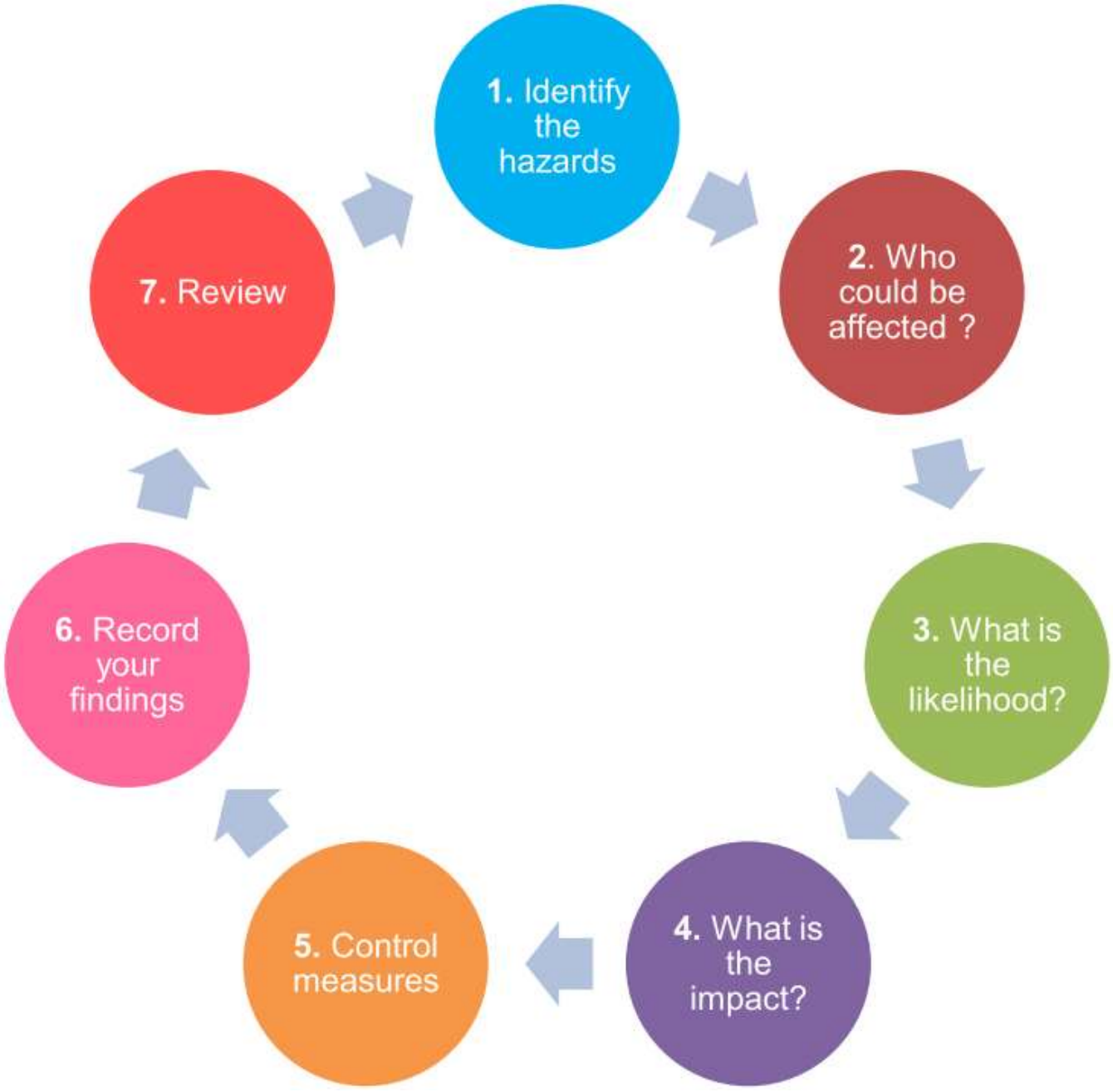
Basic questions in risk assessment (Fullerton, 2018)

- What is the likelihood something bad will happen?

- How bad will it be if it does?

Mission-based risk management

- Is what we are doing (or proposing to do) supporting and/or helping us achieve our mission?



https://www.edwindoran.com/wp-content/uploads/2023/04/Step-by-step-guide-to-risk-assessment.pdf

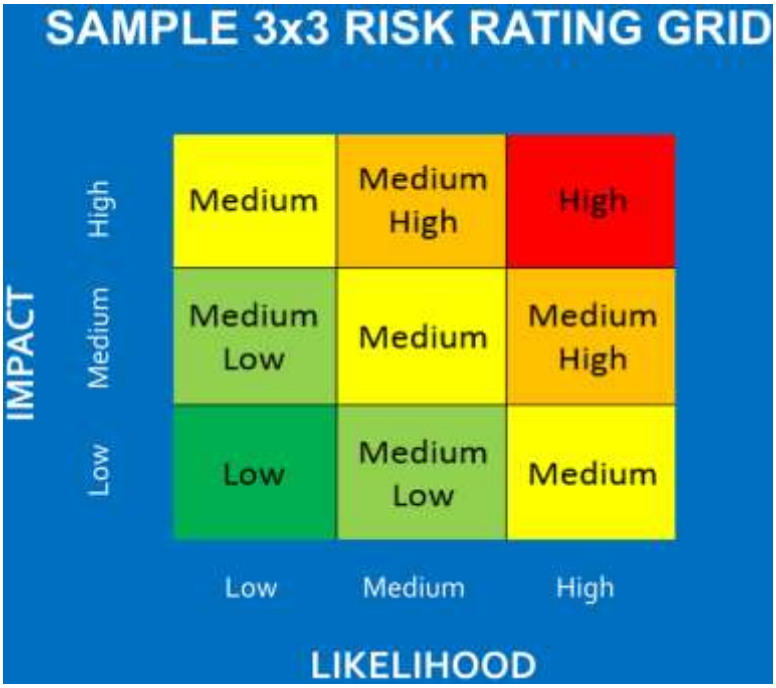
Steps in risk assessment

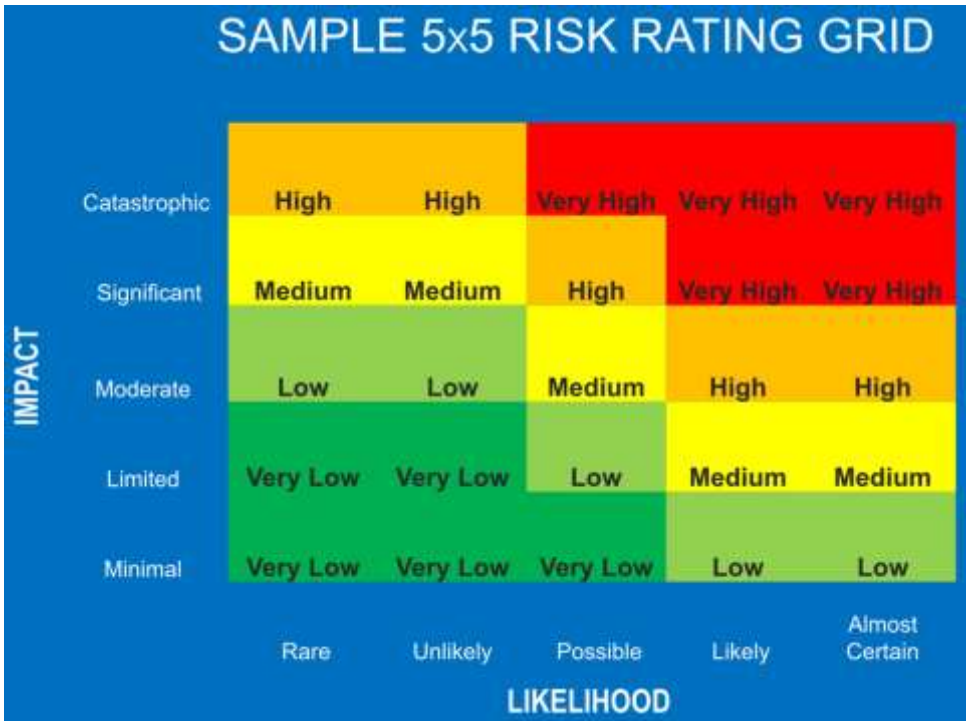
1. Identify the hazards
2. Who could be affected?
3. Assess the likelihood
4. Determine who will be affected
5. Evaluate the impact

6. Develop control measures

Impact vs likelihood tables

- Usually in either 3×3 or 5×5 format





Rating risk

(Fullerton, 2018)

Consequences

Score	1	2	3	4	5
Description	Insignificant	Minor	Moderate	Major	Catastrophic
Example	Minor injury, no first aid required	Harmful injury (first aid required, under 3 days recovery time)	Serious injury, medical assistance required. Injury must be reported.	Major injury, urgent medical assistance required.	Fatality

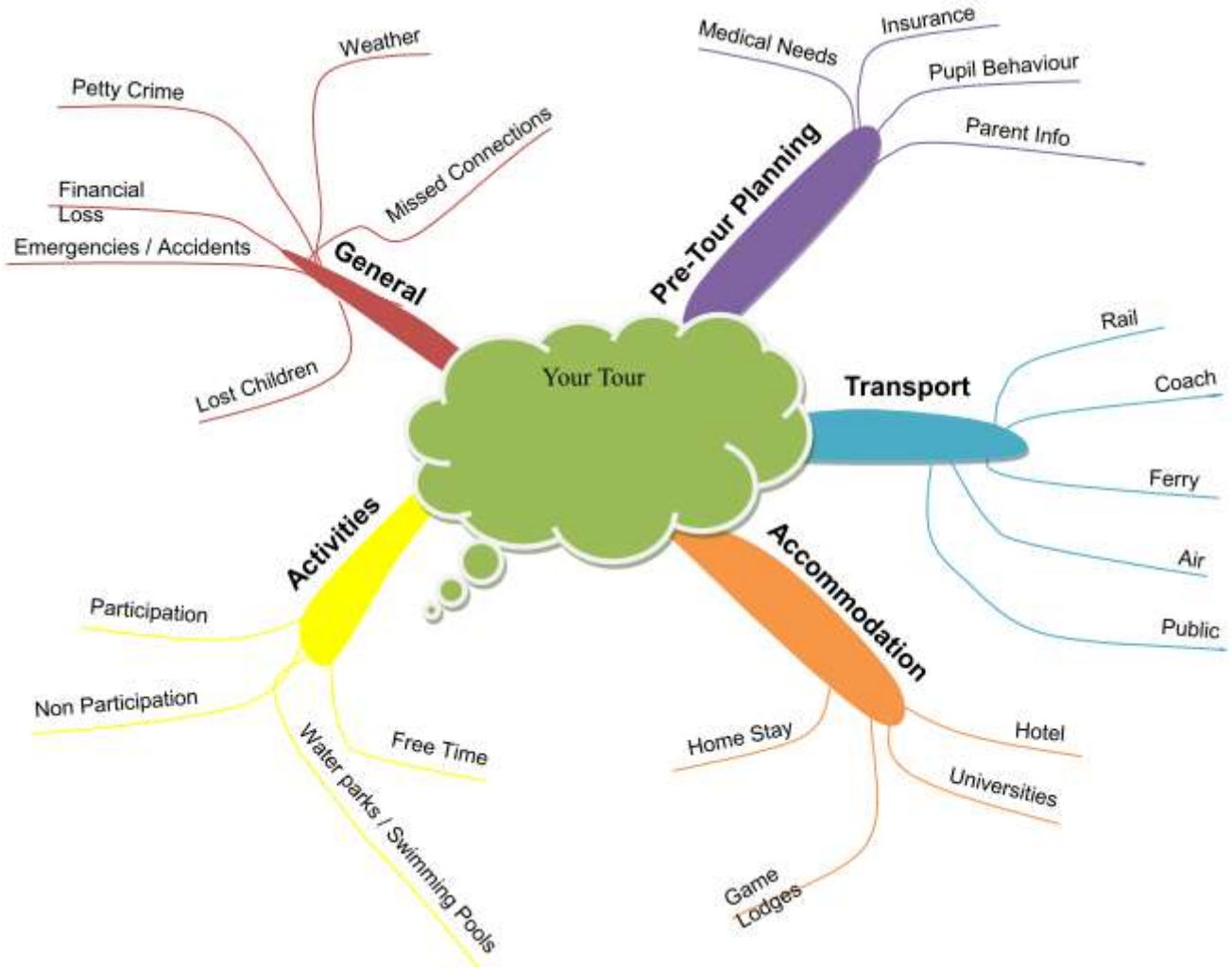
Likelihood

1	2	3	4	5
Rare	Unlikely	Possible	Likely	Almost Certain

Consequences/ Impact						
	Catastrophic	5	5	10	15	20	25
	Major	4	4	8	12	16	20
	Moderate	3	3	6	9	12	15
	Minor	2	2	4	6	8	10
	Insignificant	1	1	2	3	4	5
			1	2	3	4	5
			Rare	Unlikely	Possible	Likely	Almost Certain
Likelihood/ Probability							

Risk assessment guidelines version 2
August 2016

Risk mind maps may also be used



https://www.edwindoran.com/wp-content/uploads/2023/04/Step-by-step-guide-to-risk-assessment.pdf

After rating risk

- **Avoid** the risk
  - The activity is too risky
  - There are no reasonable ways to reduce risk to an acceptable level

- **Transfer** the risk
  - The level of risk to our organization is too high
  - Therefore, we will transfer the risk to another party
- **Reduce** the risk
  - The level of risk is at a higher level than we are comfortable accepting
  - Action is required to reduce the level of risk (either likelihood or impact)
- **Accept** the risk
  - The level of risk is low enough

Risk analysis of a petroleum refinery tour

Please carry out a risk analysis of a petroleum refinery tour

https://www.najah.edu/en/academic/academic-news/2023/05/18/an-najah-facilitates-educational-visit-to-jordan-petroleum-refinery-for-chemical-engineering-professors-and-students/

For reference, let's take a look at a risk analysis of an education visit (of graduate students) to a petroleum refinery

Index	Hazard	Likelihood (1-5)	Impact (1-5)	Risk rating
1	Student photos/videos creating confidentiality issues/GDPR violations	4	3	12

2	Worker accident	2.5	3.5	8.75
3	Health effects on students, e.g. noxious odors and fumes	3	2.5	7.5
4	Student accident onsite	2	3.5	7
5	Access of a student to a restricted area	2.5	2.5	6.25
6	COVID-19 dispersion (catching and giving it)	4	1.5	6
7	Infrastructure accident: Explosion	0.5	5	2.5
8	Infrastructure accident: Fire	0.5	5	2.5
9	Infrastructure accident: Leakage	0.5	5	2.5
10	Terrorist activity from external sources	0.5	4.5	2.25
11	Terrorism or illicit activity from student body	0.5	4.5	2.25
12	Extreme weather causing accident (e.g. lighting, windy)	0.5	4	2
13	Earthquake	0.5	4	2
14	Traffic accident of the bus	0.5	3	1.5
15	Protestors not allowing entrance to refinery	0.5	2	1
16	Student tripping from/to bus	0.5	1.5	0.75
17	Bus malfunctioning	0.5	1	0.5

2.1.2. Psychology of risk

Cognitive bias (Fullerton, 2018)

- Recency/primacy effect
    - People tend to remember best the information they hear first (and last)
- Zero risk bias
    - People tend to favor reducing a small risk to zero over a greater reduction in a larger risk
- Confirmation bias

    - Tendency to listen/give weight to only that information which supports our existing position/beliefs
- Ostrich effect
    - Tendency to avoid or ignore negative information
- Availability heuristic
    - Tendency to overestimate the importance of the information that is available to us

Dread factors

1. Scale
2. Immediacy
3. Imaginability
4. Personal control
5. Lack of choice
6. Unfairness
7. Children involved
8. Lack of familiarity
9. Untrustworthy origin
10. Media coverage

"People who don't take risks make about two BIG mistakes a year. People who do take risks make about two BIG mistakes a year."
Peter Drucker

https://strategiesforinfluence.com/peter-drucker-coaching-tips/

(Fullerton, 2018)

2.2. Strategic risk

John Collins on Risk

- *"Discrepancies between ends, which we have identified as interests and objectives, and means—available resources—create risk, which can rarely be quantified"*
- *"Ends-means mismatch"*

B. H. Liddell Hart

- *"Strategy depends on success … on a sound calculation and coordination of the ends and the means … An excess may be as harmful as a deficiency"*

Strategic risk

- The probability of failure in achieving a strategic objective at an acceptable cost.

Art Lykke's model

1. **Ends** = objectives

2. **Ways** = concepts, options of courses of action for achieving them
3. **Means** = resources

Means = resources, e.g.

- Personnel
- Money (“treasure”)
- Equipment
- Political will
- Time

Three-legged stool (strategy)

If the three legs of the stool (ends, ways, means) are not of equal length, the stool (and the strategy) is unbalanced

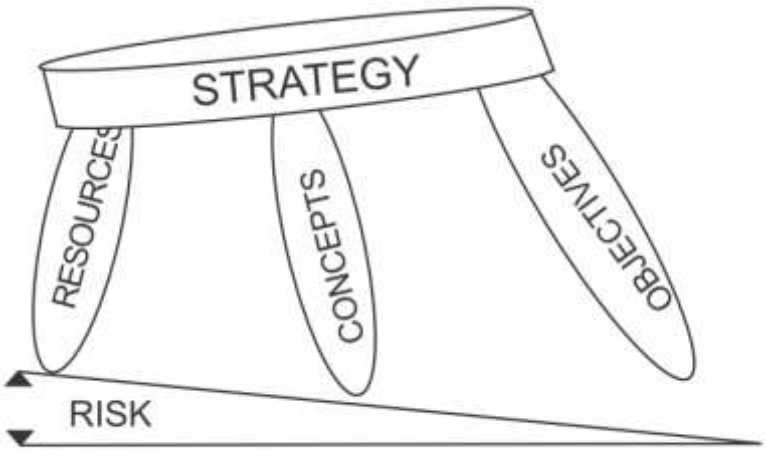


Figure 3-3. The Lykke Model.

This conceptual model applies to all strategy aspects

- National security (grand) strategy
- Defense
- Military or theater strategies
- Business strategy
- Personal strategy

Example situation

1. Identify, accurately and adequately
    - Objectives to be achieved (ends)
    - Resources to be provided (means)
2. Courses of action (ways) to achieve them are not in balance
3. Result Risk of failure to achieve the strategic objective

Risk = degree of lopsidedness (i.e. imbalance)

Strategy is a dynamic process

- All three elements are variable and subject to change over time and circumstance

Decision theory helps formulate effective strategies

- Constant quest to ensure balance among the variables

2.3. Strategic risk assessment

War and conflict = relationship between thinking adversaries

- Ambiguity, uncertainty, risk
- Thus the use of game theory

Clausewitz on **uncertainty**

- *"Chance"*
- *"Luck"*
- *"Uncertainty"*
- *"Probabilities"*

Clausewitz on **war**

- *"Duel on a larger scale"*
- *"Pair of wrestlers"*
- *"Commerce"*
- *"Collision of living forces"*
- *"Game of chance"*
- *"Animate object that reacts"*

Figure 1-4. The Continuum of War.

The horizontal and vertical plane of strategy

Levels of Strategy

Overlapping Boundaries Between Strategic and Operational Levels of War

- National Security Strategy
- National Defense Strategy (OSD)
- National Military Strategy (CJCS)
- Theater Strategy & Campaign Planning (COCOM)
- Operational (JTF)
- Tactical (Divisions & Corps)

Natural Determinants

- Geography
- Population
- Natural Resources

Social Determinants

- Economic
- Military
- Political
- Socio-Psychological

Actor Structures

- Individual
- Leadership
- Groups
- Organizations
- Institutions
- Interagency/Bureaucracy
- Movements
- States
- International Business Organizations
- Private Organizations
- International Governmental Organizations
- Society/Culture

Dimensions of Strategy[25]

- People
- Society
- Culture
- Politics
- Ethics
- Economics and Logistics
- Organization
- Administration
- Information and Intelligence
- Strategic Theory and Doctrine
- Technology
- Operations
- Command
- Geography
- Friction/chance/uncertainty
- Adversary
- Time

Strategy definition by Andre Beufre

- *"Art of the dialectic of two opposing wills using force to solve their dispute"*

As we climb up the strategic ladder

- Moral factors gain primacy over material ones
- Ambiguity and uncertainty increase

Clausewitz

- *"At this point, then, intellectual activity leaves the field of the exact sciences of logic and mathematics. It then becomes an art in the broadest meaning of the term—the faculty of using judgment to detect the most important and decisive elements in the vast array of facts and situations."*

Why is strategic risk assessment difficult?

- Strategic risk assessment is difficult because it has to do with strategy
- Strategy is difficult because it has to do with war
- War is difficult because it is the most complex of human undertakings
- On top of that, war is filled with unknowns
- The strategic student is adrift in a strategic sea of uncertainty

The effective strategist

- Strives for the "*closest approximation of the truth*"
- Is aware of the fact that complete knowledge is impossible

Clausewitz spoke of

- "*... first, an intellect that, even in the darkest hour, retains some glimmerings of the inner light which leads to truth;*"
- "*... second, the courage to follow this faint light wherever it may lead.*"

Von Moltke the Elder

- "*... to discover the situation, such as it is, in spite of its being surrounded by the fog of the unknown;*"
- "*… then to appreciate soundly what is seen, to guess what is not seen, to take a decision quickly, finally to act with vigor , without hesitation*"

What can help find the closest approximation to the truth?

- Intellect and courage cannot be easily taught
- Theoretical uncertainties are inherent in war, conflict, strategy, and policy
- Education in strategic studies
- Continuous historical study
- Experience
    - Through exercise
    - Actual experience

(Grand) strategy is

- Guessing what is not seen
- Guessing well

Essence of the challenge of strategic risk assessment

- Relating ends to ways and means

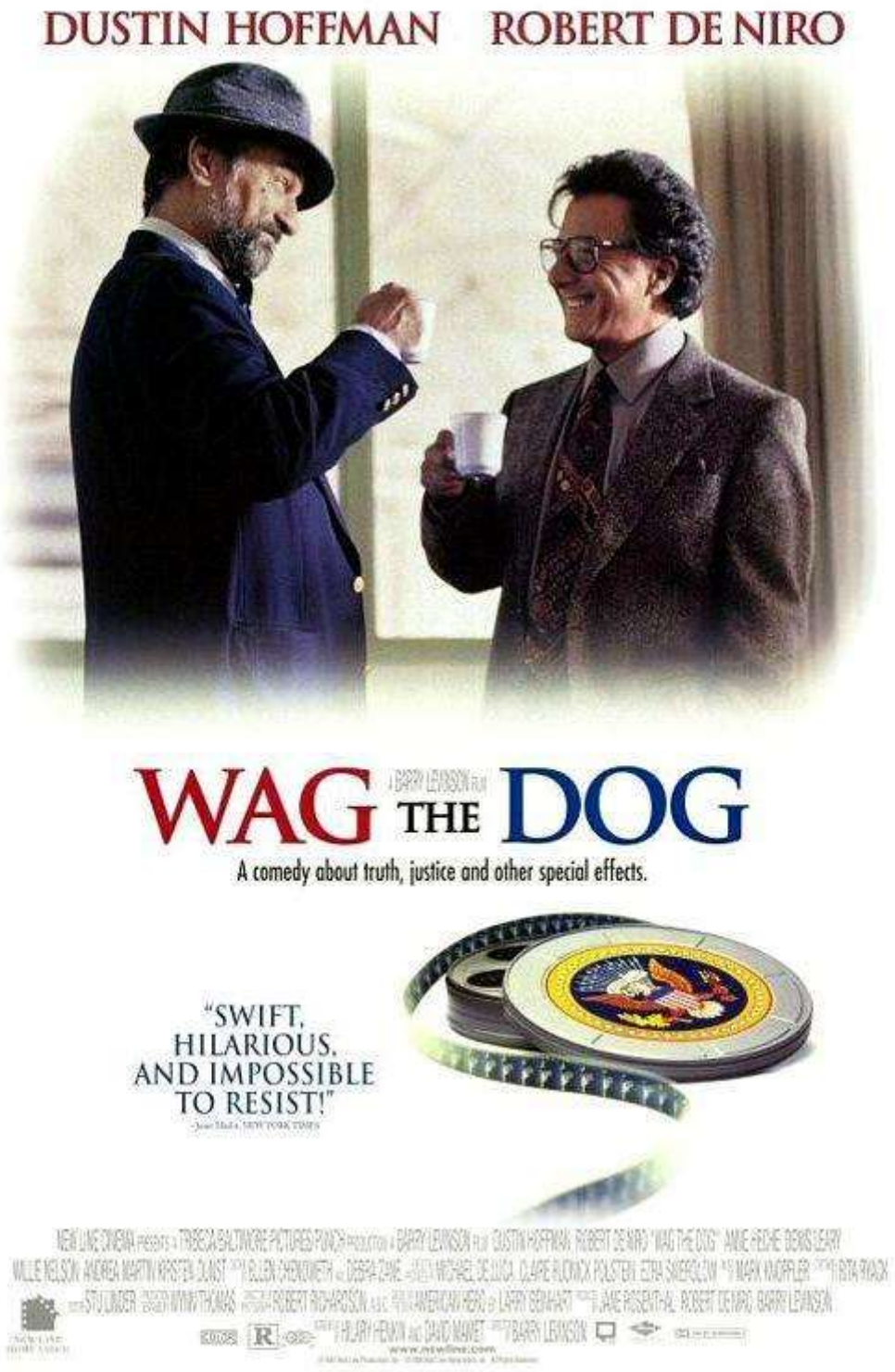
    - The ends are usually abstract
    - The ways and means are usually well defined
- Translate *"obtuse, politically couched"* objectives into specific actions

Managing risk helps achieve clarity in political objectives

- Especially given the multiplying crises regionally and globally

Potential pitfall for the grand strategist

- The tail wagging the dog
    - The means can in fact *"deflect the direction of ends"*
    - Michael Howard: *"... the strategy adopted is always more likely to be dictated rather by the availability of means than by the nature of the ends"*
    - Strategy = what gets funded
        - What one has the capability of doing ends up being what gets done
    - Strategy can become a function solely of material factors



2.4. Determining risk

Simple definition of risk

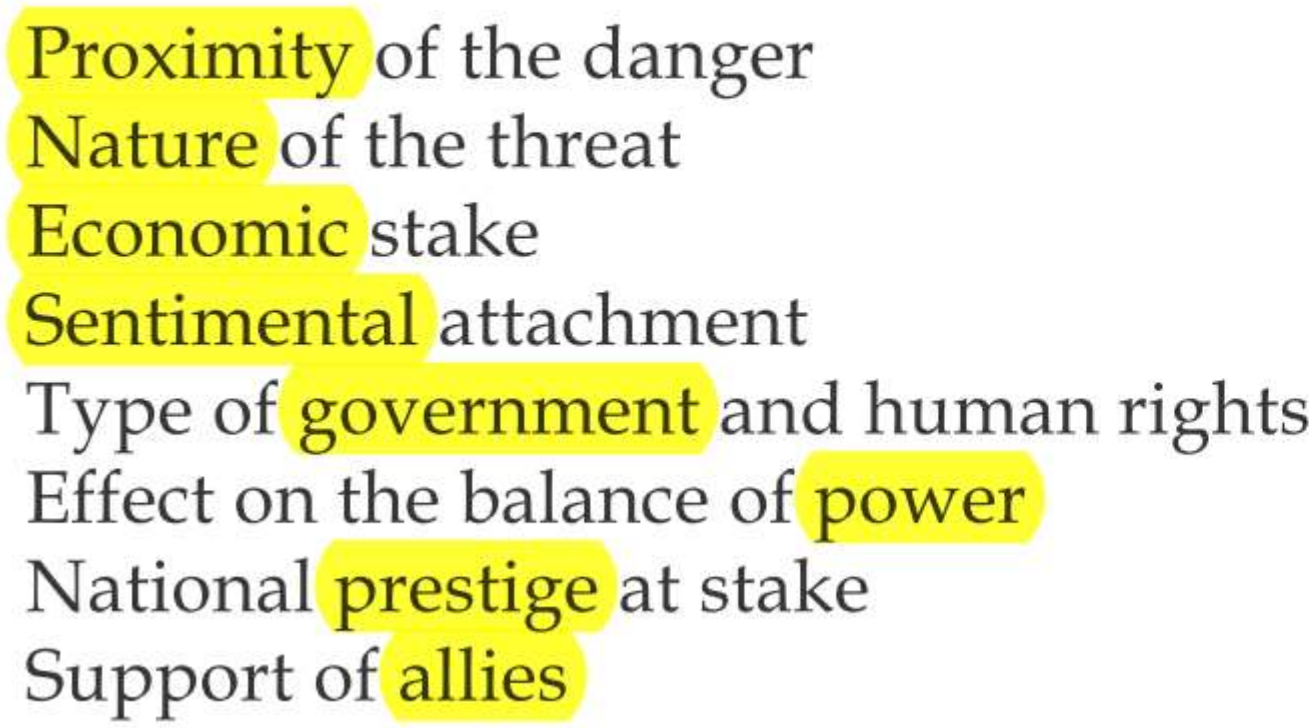
- An imbalance in ends, ways, and/or means

But how do we measure the degree of risk in a strategic endeavor?

Criteria for assessing a particular issue as a vital interest

1. Value factors
2. Cost/Risk factors

Value Factors



These factors can be

- Rated high, medium, low
- Assigned numerical scores
- Weighted or prioritized

Scores can be summed up

Such a method lacks a scientific basis but

- *"... provides for systematic analysis of specific foreign policy issues; it should therefore lead to better judgments about levels of interest … and, one would hope, to wiser policies than would otherwise be the case."*

2.4.1. Calculating risk

Admiral J.C. Wylie's mathematical approach

- Intended to ridicule early whiz kids
    - More when we analyze the Cuban Missile Crisis

Symbols used by Admiral Wylie

- C_f: cost of attempt that fails
- C_n: cost if not attempted
- C_s: cost of attempt that succeeds
- P: profit if successful

- S: probability of success

Wylie defines risk R (an index of sorts) as the ratio of potential profit (P) divided by the cost of a failed attempt (C_f)

$$\text{Risk} = P/C_f$$

If this ratio is

- Greater than 1, the strategy is encourages
- Less than 1, the strategy is discouraged

Furthermore

- $P \times S$ = Profit if successful × the probability of success
    - Represents the potential benefits
- $C_f \times (1-S)$ = Cost of failure × the probability of failure
    - Represents the potential costs

Therefore, we may write the following determining equations

$$\text{If } P \times S < C_f \times (1-S) \text{ then no go}$$

$$\text{If } P \times S > C_f \times (1-S) \text{ then go}$$

In addition, the cost of a failed attempt over the cost of a successful attempt must be less than the probability of success divided by the probability of failure

$$C_f/C_s < S/(1-S)$$

Wylie only wanted to intrigue and inspire the readers

- *"To ensure success in its use, there is only one condition that must be met: the factors involved must never be expressed in arithmetic quantities. That would blunt the fine edge of judgment and obscure the true balance of intangibles."*

Other useful admonitions by Wylie

- *"... plan for a complete spectrum of strategies in order to have a 'reserve' of strategies for the inevitable changes that will occur."*
- *"... the player who plans for only one strategy runs a great risk simply because his opponent soon detects the single strategy—and counters it … "*
    - *"... planning for certitude is the greatest of all military mistakes …"*
- Reserve of strategies = conceptual hedging for uncertainty (with its inherent risk)

2.5. Managing risk

Risk assessment

- Constant effort to identify and correct imbalances among key variables

- Risk variables are in constant flux
- Recognizing when variables change is an important strategic ability
- Other variables must be adjusted to account for changes (the "delta")

Risk management options for the strategist

1. Modify ends
2. Modify means
3. Modify ways
4. Reassess risk

(1) Modifying **ends**

- When
  - The price of achieving a particular objective is too high
  - The ability to affect the center of gravity is limited
- What
  - Reduce the overall objective to more realistic terms
- Historical examples
  - Forego a cross-channel attack in 1942 in favor of North Africa
  - Accept a lesser objective than the unification of the Korean peninsula after the Chinese invasion
  - Attempt to ensure that Afghanistan does not become a sanctuary for terrorists
    - Rather than establishing a viable and self-sustaining democracy

(2) Modifying **means**

- Reallocate or increase resources
  - Resources include unpredictable and changeable elements
    - Such as public support of a particular policy or strategy
- Examples
  - Failing to adequately modify means by calling up reservists and generating sufficient public support in Vietnam
  - Early failure to recognize the nature of the insurgency in Iran resulting in insufficient counterinsurgency forces
- *"Failure to provide adequate resources … risks a longer conflict, greater casualties, higher overall costs, and ultimately, a critical loss of political support. Any of these risks, in turn, are likely to result in mission failure."*

(3) Modifying **ways**

- Multiple ways to achieve the desired end state

- Using political, military, economic, information national power in different combinations
- Kosovo example
    - Initially Milosevic endured extended bombing but showed no intention of withdrawing
    - Then came a combination of both threats and actions
        - Deployment of Task Force Hawk
        - Planning for possible ground options by the Allied Command Europe Rapid Reaction Corps (ARRC)
        - Expanded targeting
    - In the end, Milosevic decided to withdraw forces
- Afghanistan example
    - Target Al Qaeda in its sanctuaries
    - Conduct a classic counterinsurgency campaign

(4) Reassessing the risk

- Over time
    - Additional information becomes available
    - Gaps of knowledge are filled
- Some assumptions may prove to be invalid
- The 100% solution will always be elusive due to *"ephemeral factors"*
- The process is dynamic
    - Both material and psychological data must be synthesized
    - One man's risk is another man's certitude

2.5.1. Strategic patterns

Five patterns

1. Ends moderate, means large
    - Strategy of direct threat
        - Example: nuclear deterrence
2. Ends moderate, means limited
    - Pattern of indirect pressure
        - Useful when freedom of action is limited
    - Emphasizes political, diplomatic, economic elements of power
    - Deemphasizes direct military action

    - Example: US and Soviet Union avoiding direct confrontation
3. Ends important, ways limited, means limited
    - Low freedom of action
    - Combination of direct threat and indirect pressure
    - Appropriate to nations strong defensively but with limited resources
4. Ends important, ways unlimited, means inadequate
    - High freedom of action
    - Strategy of protracted war but at a low level of military intensity
    - Example: Mao Tse-Tung's theory of protracted struggle
5. Ends important, means unlimited
    - Violent conflict aiming at military victory
    - Example: Napoleonic era
        - Principle theorist: Clausewith

Example of how to balance the strategic equation by Collins

1. Eliminate waste = modifying ways and/or means
2. Compress objectives = modifying ends
3. Adjust strategy = modifying ways
4. Augment assets = modifying means
5. Reduce ends and increase means = modifying ends and means
6. Bluff = adversary misinterprets your ends, ways, means
    - Game theory
7. Give up on the objective = the ultimate modification of ends

---

2.5.2. Risk and readiness

McNamara's era

- Introduction of systems analysis to defense planning

What systems analysis brings to strategy

- Help to guess well

Strategic risk is closely related to readiness

2.6. Closing remarks on risk

Assessing and managing strategic risk is an inherently inexact process

- Combine material and moral inputs

    - Defying empirical resolution
- Weigh these inputs
    - Identify possible outcomes
    - Plan for uncertainty

True mark of strategic genius

- Account for potential changes
    - Recognize actual change in a timely manner
- Adjust strategic variables

Colin Gray

- *"In historical practice, uncertainty, chance and risk assuredly attend war and warfare, but they are simply conditions under which strategically educated leaders must labor."*

The essential elements of strategic risk are unchanged through the ages

- Proper balancing of ends, ways, and means to achieve the desired strategic outcome

Risk = *"guessing well"* through

- Study
- Exercise
- Experience

---

3. GAME THEORY

Two types of games

- Simultaneous games
- Sequential games

3.1. Simultaneous games

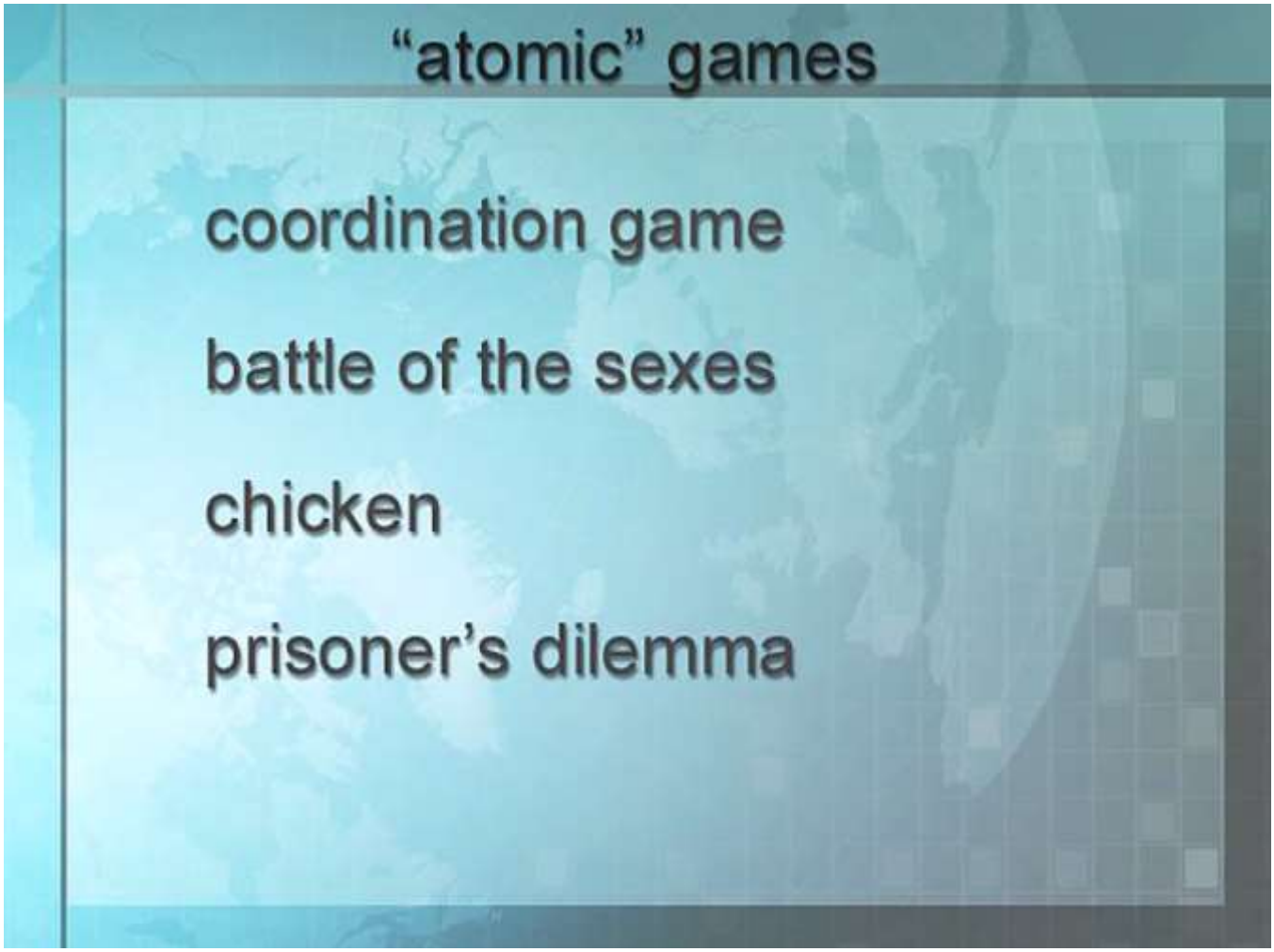
Warmup

Atomic games

Take a look at some important games using a dating scenario (*"atomic"* games; Stevens, 2008)

https://www.istockphoto.com/photos/couple-italian-restaurant

4 atomic games



Coordination game

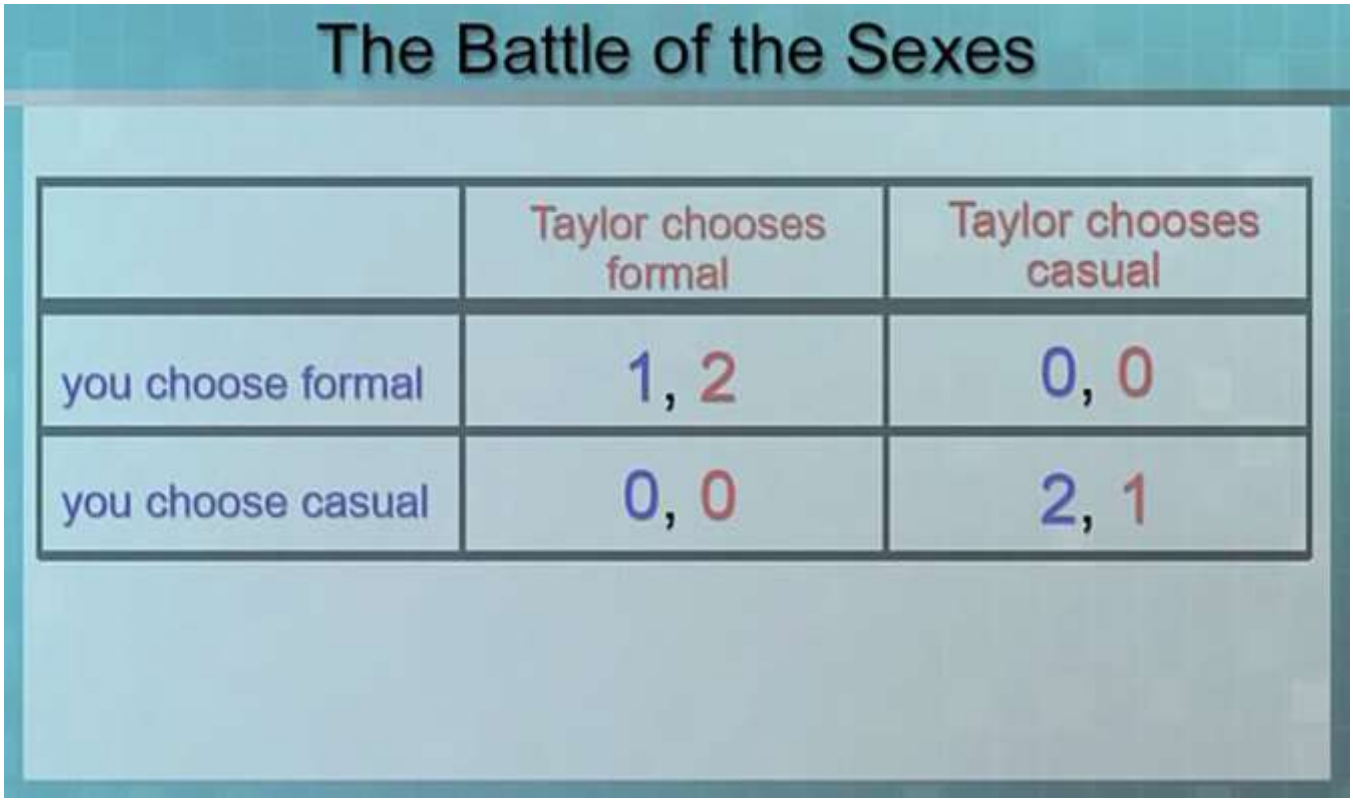
	Taylor chooses formal	Taylor chooses casual
you choose formal	2, 2	0, 0
you choose casual	0, 0	1, 1

Nash equilibria in the coordination game

- No dominant strategies
- 2 Nash equilibria
    - 1 is Pareto optimal

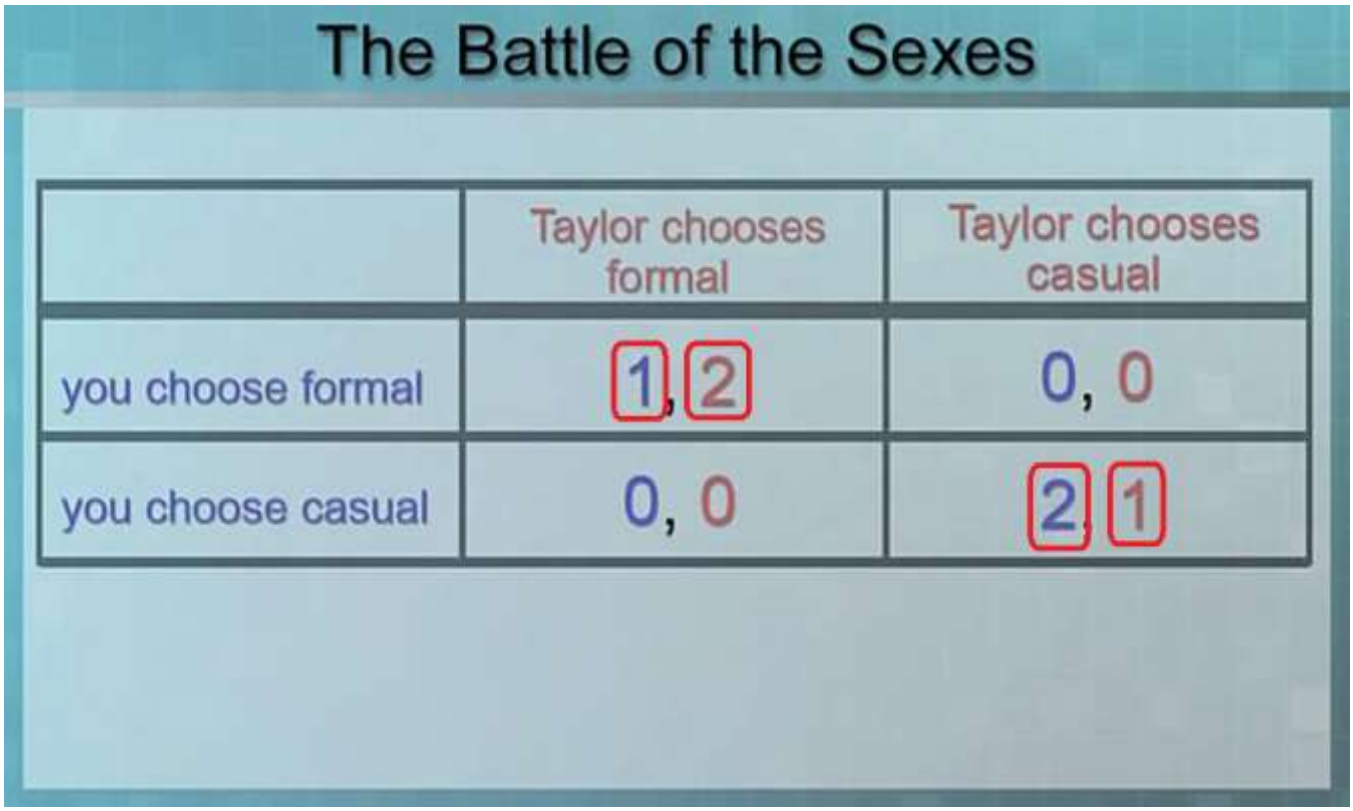
	Taylor chooses formal	Taylor chooses casual
you choose formal	2, 2	0, 0
you choose casual	0, 0	1, 1

Battle of the sexes

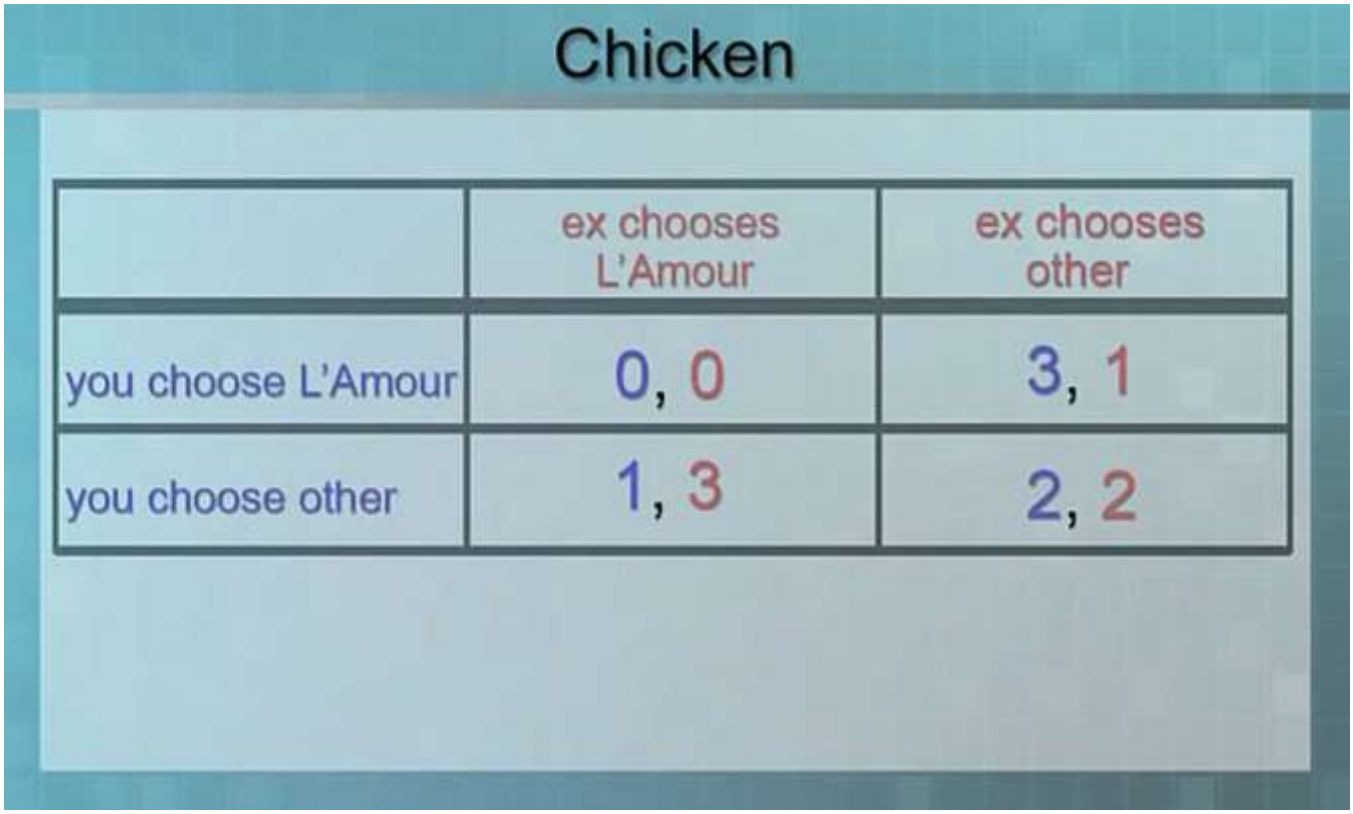


Nash equilibria in the battle of the sexes

- No dominant strategies
- 2 Nash equilibria

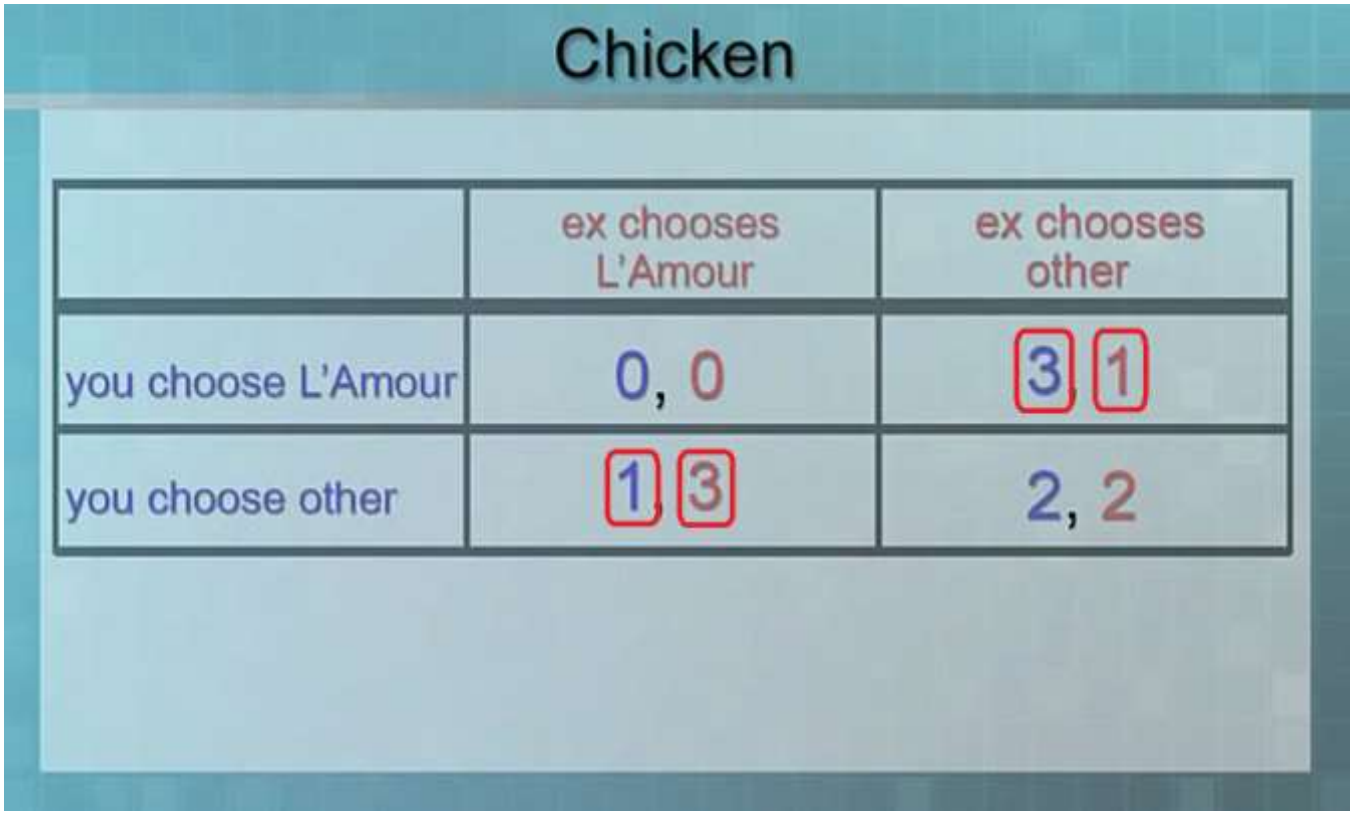


Chicken game

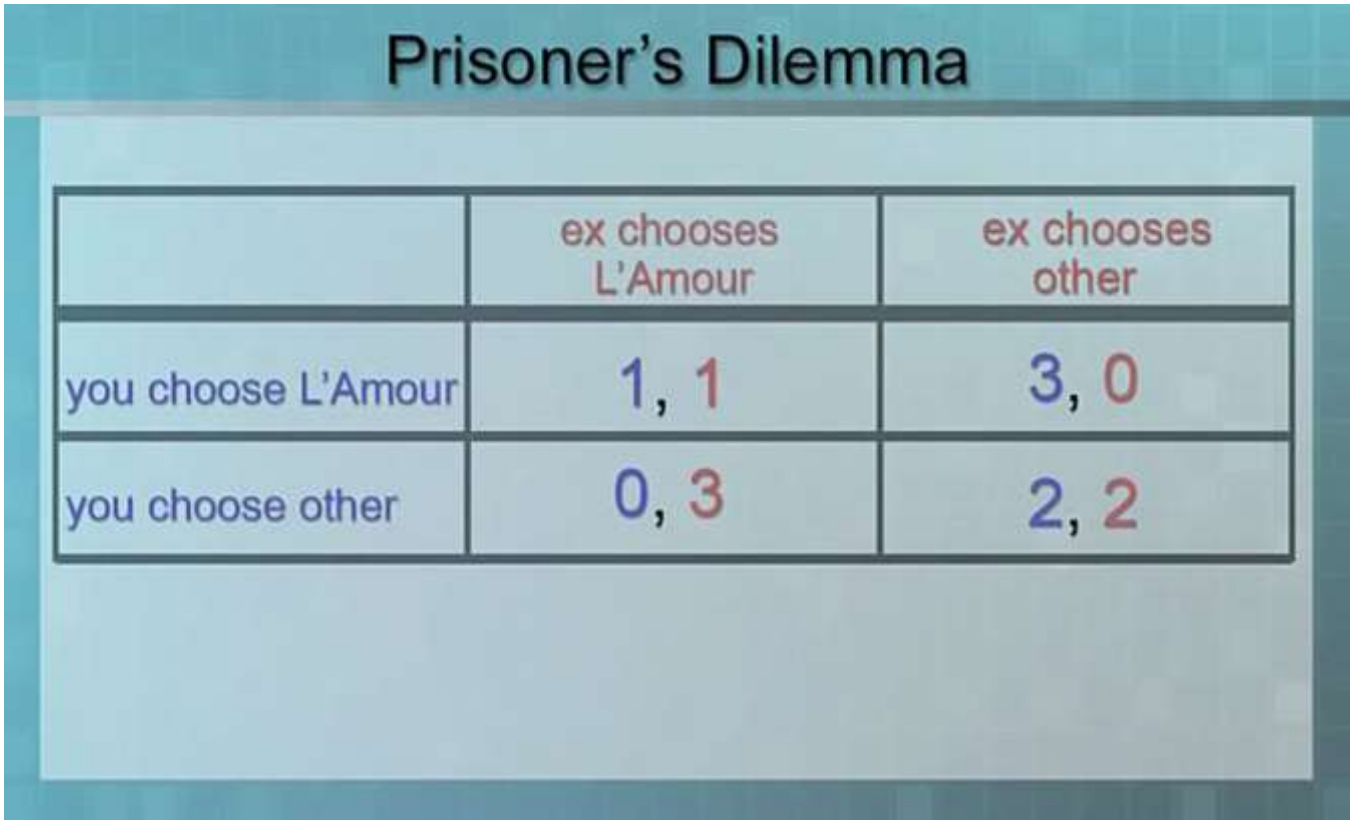


Nash equilibria in the chicken game

- No dominant strategies
- 2 Nash equilibria
- Maximin strategies

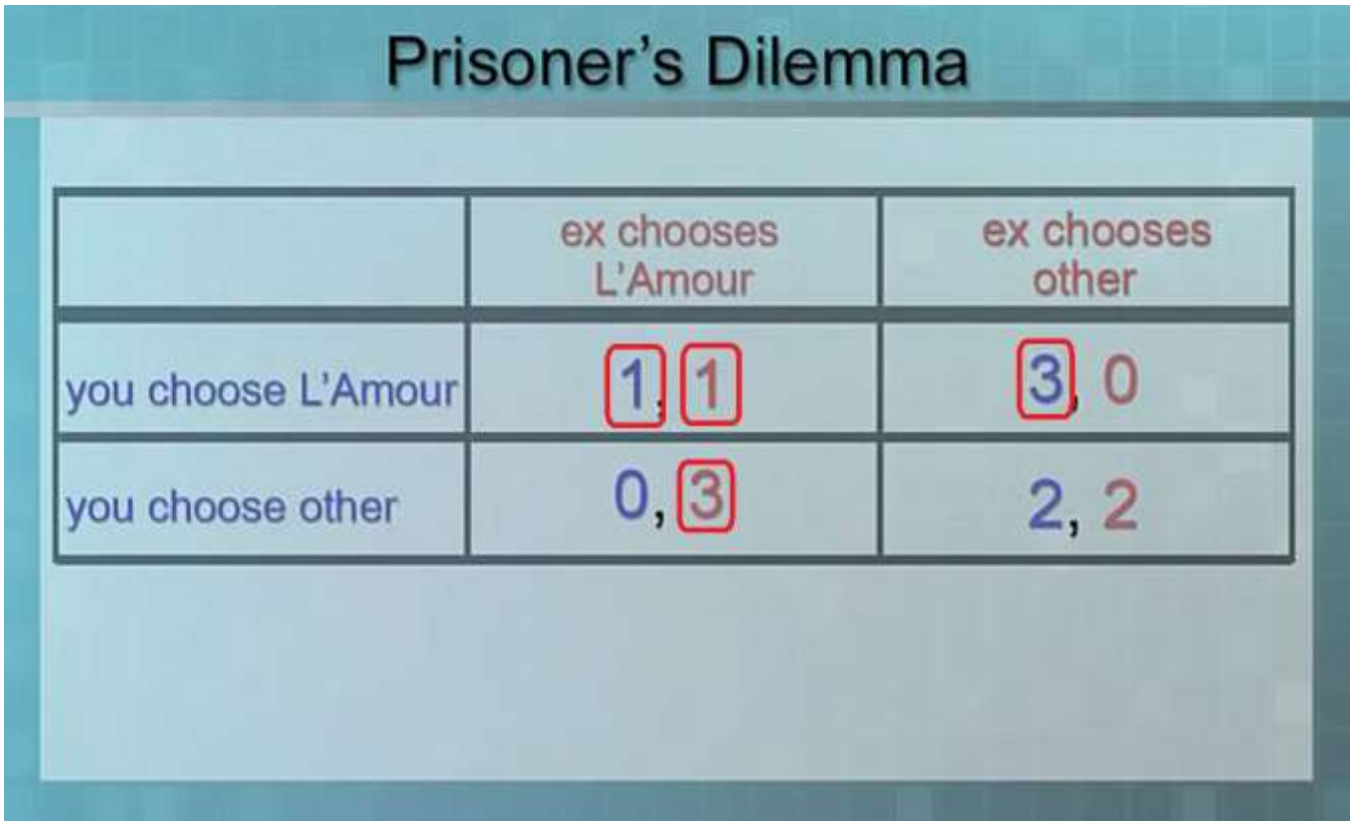


Prisoner's dilemma



Nash equilibrium in the prisoner's dilemma

- Dominant strategies for both players
- 1 Nash equilibria
- Maximin strategies
- Cooperative solution



3.1.1. Pure coordination

4 students have a flat tire

- Simplify to 2 students

		Student B			
		Front left (driver)	*Front right*	*Back left*	*Back right*
Student A	*Front left (driver)*	1, 1	0, 0	0, 0	0, 0
	Front right	0, 0	1, 1	0, 0	0, 0
	Back left	0, 0	0, 0	1, 1	0, 0
	Back right	0, 0	0, 0	0, 0	1, 1

Coordination is different from collaboration

- By coordinating, players avoid outcomes they don't like (common aversions)
  - E.g. drivers drive in the right lane on the road to avoid collisions
- Cooperation is based on common interests

Anti-coordination games

- Coordinating more players can even reduce their payoff!
  - A driver may choose a longer but more scenic route (such as the old Corinth-Patras National Highway)
  - The more drivers choose it, the more traffic congestion there will be, so their payoffs will decrease

Applications in technology, education, and war

The adoption of common standards is a game of pure coordination

- E.g. the width of railway tracks (whose standard value is 1.44 meters)
  - Allows to move a train from one state to another
  - Different widths may prevent logistical support by train in the case of war
- If behind the standards hide state or business interests, then the game of pure coordination turns into a game of battle of the sexes
  - **Operation Barbarossa**

        - Soviet railways operated on a broader gauge of 1.520 mm (commonly referred to as Russian gauge)
        - Most European railways, including Germany's, used the standard gauge of 1.435 mm
        - So, German trains could not run on Soviet tracks without modification
            - Either re-gauge the tracks to the standard gauge as the Germans advanced (very time consuming)
            - Or unload and transfer cargo at the border between different rail networks (also a logistical obstacle)
- Regulatory regimes are a game of pure coordination, e.g.
    - The International Civil Aviation Organization regulates air transport
        - To solve the issue of lack of communication due to language, the use of English has become a focal point
            - Every control tower must have English-speaking personnel on duty at all times
    - This seminar course is taught in English
- Germany and Austria in the First World War (WWI) were preparing a two-front war with one front in the West (France) and the other in the East (Russia)
    - The allies would have to coordinate on which opponent to attack first
    - They would have to avoid engaging one with France and the other with Russia so as not to split their forces
        - Assuming they were indifferent to the choice of front (see below)
    - A focal point would have to be identified to facilitate coordination
        - Such a focal point was provided by the German plan of General Schlieffen
            - Rail transport technology was consider to favor an attack first to the west, on the relatively weaker France
            - After a quick victory on the western front, forces would be rapidly transferred to the eastern front
            - The Schlieffen Plan predicted that Russia would be slow to mobilize due
                - Vast geographical size
                - Lack of administrative competence
                - Are you not reminded of Operation Barbarossa?
    - So, the Allies would not be forced to split their forces and could operate in concert, attacking France first and then Russia

        - The time window of opportunity along with technological infrastructure created a focal point
        - This allowed the coordination and synchronization of the two allies (war by timetable)
    - As mentioned above, coordination was not easy because there were different interests
        - Austria wanted the exact opposite of Germany: first the eastern front and then the western
        - This alludes to a game reminiscent of the battle of the sexes

https://en.wikipedia.org/wiki/Alfred_von_Schlieffen

3.1.2. Coordination (with assurance)

		Driver B: *Right strip*	Driver B: *Left strip*
Driver A	*Right strip*	2, 2 *(avoid collision)*	0, 0 *(crash)*
	Left strip	0, 0 *(crash)*	1, 1 *(avoid collision)*

Applications in society, technology, and global politics

Instances of failed coordination

- A relatively small occupying military force manages to keep a very large population under control for a long time without revolting
    - If many people of the occupied population managed to coordinate and revolt at the same time, the revolt would be crowned with success
    - Experience shows that this is difficult
        - Tyrants, knowing the power of the masses, often take practical measures and severe penalties to make communication difficult and characterized by great risk (risk dominant outcome)
        - People often prefer a suboptimal equilibrium characterized by lower risk and more guaranteed reward (payoff dominant outcome)
            - Disregarding the greater rewards of a superior equilibrium
    - Nevertheless, as the number of actors who manage to coordinate increases, sometimes
        - A tipping point is reached
        - The coordination failure is overcome in a stormy way
            - 1989 Tiananmen Square democracy protests in Beijing
            - 2010-2011 Arab Spring
            - 1953 East German uprising
- Another historical anecdote: 20th Congress of the Communist Party of the Soviet Union (CPSU), 1956
    - Nikita Khrushchev, General Secretary of the CPSU, in his dramatic “secret speech” repudiated Stalin's persecutions and purges

        - Khrushchev was reportedly interrupted by an anonymous delegate who asked what he had been doing during Stalin's purges
        - Khrushchev is said to have paused and demanded the person to stand up and identify themselves
        - When no one did, Khrushchev remarked something to the effect of "That's what I did, too" (in Stalin's times)
            - The implication was that fear kept everyone silent, including himself, during Stalin's rule
            - This moment is often cited as Khrushchev's acknowledgment of his own complicity in the system
                - , though it also illustrated the pervasive fear and repression that existed under Stalin, which silenced even high-ranking officials.
    - The fact that none of Khrushchev's audience spoke is also a case of failure to coordinate
        - Avoidance of an equilibrium that the audience probably saw as fraught with significant risk (political persecution of dissidents)

https://www.spectator.co.uk/article/first-signs-of-thaw/

https://www.andrewwhitehead.net/blog/the-observers-scoop-khrushchevs-secret-speech

A WORD TO READERS

This issue of THE OBSERVER is perhaps the oddest you have seen. Many regular features have been held out to accommodate a single news story of 26,000 words that runs through eight of our fourteen pages.

The story has been briefly summarised already in the daily Press, but we believe that Mr. Khrushchev's exposure of Stalin's rule, delivered to the Twentieth Party Congress in February and only now available in full, should be read as a whole to grasp what has been happening, and is now happening, in the U.S.S.R.

A momentous and fascinating document, it shows where single-party rule can bring men and nations. It is a reminder that present-day Russia is still a relatively primitive society, groping towards social order.

It also puts to final shame the Communist Parties of the West for their blind—or uncritical—allegiance to an alien tyranny.

We offer our apologies to advertisers whose announcements have been omitted without warning, and to the devotees of regular features held over until next week.

https://www.andrewwhitehead.net/blog/the-observers-scoop-khrushchevs-secret-speech

Another hypothetical scenario from technology

- Two telecommunication companies develop software for the same customer

- They have to choose between two technically equivalent communication protocols
    - One is preferred by their customer
- It would be important for both companies to choose the same protocol, preferably the one their customer wants
    - The other protocol would constitute a second choice, so that the software systems they develop can communicate with each other

---

3.1.3. Battle of the sexes (coordination without assurance)

		Woman	
		Football	*Ballet*
Man	*Football*	2, 1 *(man's preference)*	0, 0 *(failure coordination)*
	Ballet	0, 0 *(failure coordination)*	1, 2 *(woman's preference)*

Applications in global politics, technology, and society

Bargaining in the European Union resembles a battle of the sexes

- Member countries want to avoid the paralysis caused by a lack of coordination
- At the same time, they seek to impose their preferences (preferred equilibria)
    - The strongest members in such alliances usually impose their own preferences (coordination for the powerful) on the other partners (leader game)
        - Germany's insistence, for example, on imposing its own standards on the European Union on a wide range of issues (e.g. food, medicine, energy, environment, security, data protection)
        - This favors its own businesses
        - This was one of the reasons that led Britain to Brexit

In 1975, the US and the Soviet Union (USSR) were negotiating the docking of their Apollo (US) and Soyuz space vehicles

- The following technical (but also diplomatic) problem arose: who will board whom?
    - The classic male-to-female process was thought to signal weakness for the (female) vehicle to be crewed by the other (male)

- Eventually the USA and the USSR agreed and, with the help of the technicians, found an intermediate solution (male-on-male docking)
    - This acted as a focal point and on which they coordinated
- The connection of Apollo with Soyuz took place and was the first International Space Station
- The historic handshake of American astronaut Tom Stafford with Soviet cosmonaut Alexei Leonov was followed by communications between Soviet leader **Leonid I. Brezhnev** and American President **Gerald R. Ford**
    - An important moment of the Cold War détente

https://www.ebay.ca/itm/165297693662

Application of different technical standards or units of measurement

- Efforts to coordinate the different countries of the world, but with different preferences as to the best balance
    - Driving on the right or left of the road
    - Imperial system in the US and the UK, metric system in Europe
        - Measuring distances in kilometers (in Europe) or miles (in North America)

    - Video cassettes were widely used in the 1980s and 1990s
        - Different standards prevailed in many European countries and the US
        - A videotape written for one market could not be viewed in another
- Two telecommunications companies
    - One company prefers a certain protocol, while the other prefers a different protocol
    - Both would like the same communication protocol to be implemented (which would become the focal point)
        - Each would prefer that protocol to be their own
- Prevalence of a common world language
    - English-speaking countries, such as the USA and Britain, have more or less imposed English as the world language
    - Countries like France would prefer that language to be French
    - Historically, individual focal points have been found
        - English is the language of commerce, services, science and research
        - French as the language of diplomacy

3.1.4. Leader game

		State B	
		Cooperation	*Defection*
State A	*Cooperation*	2, 2 *(failure despite compromise)*	3, 4 *(State B's preference)*
	Defection	4, 3 *(State A's preference)*	1, 1 *(complete coordination failure, worse outcome for both players)*

Applications in global politics

Austria-Hungary and Germany tried to coordinate in a similar way in the First World War (WWI)

- After the assassination of Archduke Franz Ferdinand in Sarajevo in 1914, Austria-Hungary was obsessed with punishing Serbia and wanted to attack there first
- So, Austria-Hungary asked Germany to put its troops on the border with Russia
    - To prevent any help from Russia to Serbia (Serbia first strategy)
- Germany, however, had other priorities (Schlieffen Plan)
    - It preferred Austria-Hungary to put its troops on the border with Russia
    - So that Germany could defeat France and then turn to the front with Russia (France first strategy)
- If each ally did their part, the coordination would have resulted in defeat and disaster
- If they compromised by doing a little of one and a little of the other, they would achieve nothing (no gain)
    - They would be weak on all fronts
        - Austria-Hungary's efforts against Serbia were less effective due to delays and underestimation of Serbian resistance
        - German plans were strained when Austria-Hungary did not adequately defend the eastern front against Russia

Another example is the historical example of the coordinated actions of the US and British allies in the Pacific battle in the Second World War II (WWII)

- It is perhaps reasonable to assume that the US and Britain would find it easy to cooperate and coordinate their efforts to deal with Japan
    - Problems of organization and supply could be considered decisions without a strategic dimension, to be solved by military leaders with the help of technical personnel
- In reality, their relationship was more complicated
- Both countries had as their main goal to force Japan to surrender unconditionally (on the battlefield of the Pacific Ocean)
    - Yet, each country also had sub-objectives, which may not have been entirely compatible with each other
        - Churchill's Britain simultaneously wanted to revive its empire, and therefore favored goals such as
            - Occupation of (present-day) Malaya and Singapore
            - Expulsion of the Japanese from Burma (Myanmar)
            - Maintaining the control of India
        - President Roosevelt's USA preferred to focus its resources and efforts on the Pacific campaign

- Both allied powers probably realized that, with the British necessarily committed to dealing with the German threat to their country, the brunt of the war with Japan would fall on the Americans
    - But as the involvement of the USA in the Second World War exceeded that of Britain, Churchill was obviously also worried about the post-war era, in which he wanted Britain to remain a great power
    - The US on the other hand relied on supply and support for the Pacific campaign from Britain and commonwealth powers such as Australia and New Zealand.
- So, even the relations of the allies of the Second World War often had strategic dimensions
    - Even when their relations corresponded to a game with multiple equilibria, the one preferred by the stronger one (the USA) prevailed
    - Such strategic interactions between allies with different preferences (**alliance game**), which essentially allows for the existence of a mild degree of conflict, are also represented by the **battle of the sexes** game
    - In the event that the allies cannot coordinate on the equilibrium preferred by the strongest, the strategic interaction is reduced to the **deadlock game**

3.1.5. Prisoners' dilemma

		Prisoner B	
		Cooperation (keeps mouth shut)	*Defection (betrays other player)*
Detained A	*Cooperation (keeps mouth shut)*	3, 3 *(small sentence for both [mutual cooperation])*	1, <u>4</u> *(Prisoner B freed [defector's reward], severe sentence for Prisoner A [sucker's payoff])*
	Defection (betrays other player)	<u>4</u>, 1 *(prisoner A free ["defector's reward"], prisoner B*	<u>2</u>, <u>2</u> *(moderate penalty for both [mutual defection])*

severe sentence ["sucker's payoff"])	

Cooperative solution to the classic prisoner's dilemma scenario

		Prisoner B	
		Cooperation (keeps mouth shut)	*Defection (betrays other player)*
Prisoner A	*Cooperation (keeps mouth shut)*	3+3=6 *(cooperative solution)*	1+4=5 *(Prisoner B free riding)*
	Defection (betrays other player)	4+1=5 *(Prisoner A free riding)*	2+2=4 *(equilibrium)*

Global climate change as a prisoner's dilemma

		State B	
		Mitigate pollution (abate)	*Keep polluting (pollute)*
State A	*Mitigate pollution (abate)*	3+3=6 *(cooperative solution)*	1+4=5 *(State B free riding)*
	Keep polluting (pollute)	4+1=5 *(State A free riding)*	2+2=4 *(equilibrium)*

Types of goods

	Competitive (rival)	Non-competitive (nonrival)
	Pure private goods	*Mixed goods*
Excludable goods	Cereals Chocolate Cars	Pay TV Toll roads Private roads
	Mixed goods	*Pure public goods*
Non excludable goods	Public education Public health Open resources like roads, urban parks, seas	Lighthouses State defense Natural environment National parks

Israeli-Palestinian conflict

		Palestinians	
		Cooperation	*Confrontation*
Israelis	*Cooperation*	3, 3	1, 4
	Confrontation	4, 1	2, 2

India-Pakistan confrontation

		Pakistan	
		Attack	*No attack*
India	*Attack*	-10, -10	5, -20
	No attack	-20, 5	0, 0

3.1.6. Stag hunt game

		Hunter B (State B)	
		Deer (Cooperation & arms control)	*Hare (Competition & arms race)*
Hunter A (State A)	*Deer (Cooperation & arms control)*	5, 5	0, 1
	Hare (Competition & arms race)	1, 0	1, 1

The push ("heave ho") game

		Player 2	
		Pushes (cooperation)	*Does not push (defection)*
Player 1	*Pushes (cooperation)*	5, 5 *(payoff dominant)*	-10, 0
	Does not push (defection)	0, -10	1, 1 *(risk dominant)*

Stag hunt with relative rewards

		Hunter B (State B)	
		Deer (arms control)	*Hare (arms race)*
Hunter A (State A)	*Deer (arms control)*	Absolute rewards (5, 5) Relative rewards (5-5, 5-5) = (0, 0)	Absolute rewards (0, 1) Relevant rewards (0-1, 1-0) = (-1, 1)
	Hare (arms race))	Absolute rewards (1, 0) Relative rewards (1-0, 0-1) = (1, -1)	Absolute rewards (1, 1) Relative rewards (1-1, 1-1) = (0, 0) *Equilibrium of Dominant Strategies, Nash equilibrium, and maximin equilibrium*

3.1.7. Chicken game

		Driver B	
		Continue course/ Stand firm (courage)	*Yield/ Back down/ Retreat (cowardice)*
Driver A	*Continue course/ Stand firm (courage)*	1, 1 *(conflict)*	4, 2 *(Driver B retreats, crash avoided)*
	Yield/ Back down/ Retreat (cowardice)	2, 4 *(Driver A retreats, crash avoided)*	3, 3 *(crash avoided, both players retreating)*

The chicken game played by states

		State B: *Conflict (defect)*	State B: *Retreat (cooperate)*
State A	*Conflict (defect)*	1, 1 *(conflict)*	4, 2 *(State A victory [hawk], State B retreat [dove])*
State A	*Retreat (cooperate)*	2, 4 *(State B victory [hawk], State A retreat [dove])*	3, 3 *(mutual retreat of the two states [compromise])*

Applications from society and global politics

Schelling asserted that a threatened strike is a chichen game

- When we have a labor dispute and a strike is threatened
  - Management either sticks to its positions or gives in to the demands of the workers
  - So is the labor side: either it sticks to its demands or backs down
- If neither side backs down, then the strike takes place
  - This outcome is the worst for both sides, because both sides lose
- As Schelling wrote, the best strike is one that never needs to occur
  - The mere threat of it will satisfy the strikers' demands
  - So they will no longer wish to go on strike

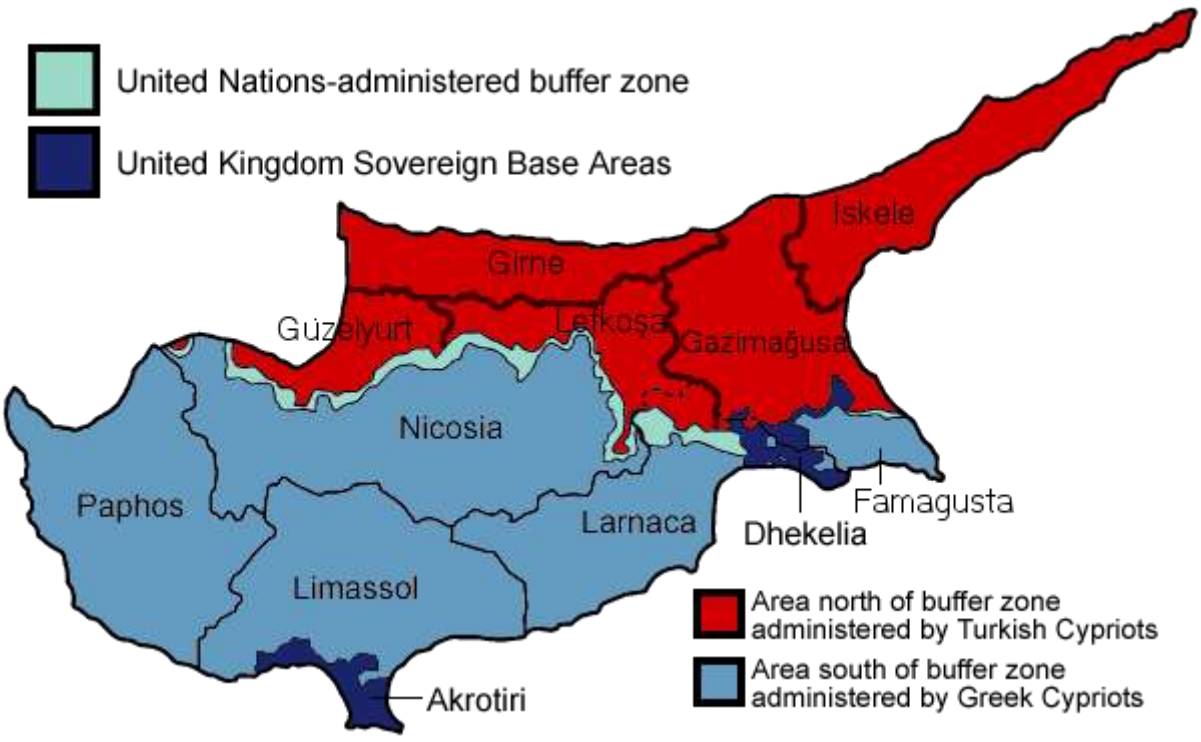
Bertrand Russell (1872-1970) likened the Cold War (1947-1991) between the USA and the USSR to a chicken game

- The unyielding persistence of the two opposing sides would have led to nuclear war
  - This would have been the worst option for both them and for all humanity
- As Kenneth Waltz wrote, after all the four and a half decades of the Cold War were decades of nuclear peace

Greece-Turkey 1987 confrontation

- Use of deterrence by Greece, the smaller (and less powerful) state
- Turkey's threats to Greece have been related to the asymmetries that characterize the relationship between the two countries

    - Greece: smaller population, problematic geography (which exposes it more), poorer natural resources of Greece
    - Great power (mainly USA) interests in the region
        - Historically more favorable to Turkey
- Turkey has adopted a revisionist foreign policy
    - Signals, statements, and policies considered harmful to the interests and national security of Greece
    - Turkey is likely to follow a *fait accompli* policy towards Greece
        - When Greece will be unable to resist Turkey's expansionism
        - When a window of vulnerability opens
            - In such a window of opportunity, other powers will be unlikely to oppose Turkey's expansionism
- The challenge for the less powerful state is to deter the adversary's unwanted actions
    - Must appear convincing that it is willing and able to impose an unacceptable diplomatic and military cost on its adversary
- To enhance its security, Greece has joined NATO since 1952, giving up a part of its independence in return
    - After the events of 1974 Turkish Military Intervention in Cyprus, Greece assessed that the cost of joining NATO was not commensurate with the benefits (purported protection that the alliance should offer to its member states



https://en.wikipedia.org/wiki/Greece%E2%80%93Turkey_relations

    - Thus Greece gradually reduced its dependence on the USA, turning towards Europe and the European Economic Community (precursor of the European Union)
        - Admitted as the 12th member in 1981
- At the same time, Greece tried to develop an autonomous security policy, utilizing its own resources to counter the Turkish threat
    - In international politics this is referred to as an internal balancing strategy
        - External balancing refers to reliance on allied aid
    - This internal balancing involved
        - Development of special forces of the army
        - Emphasis on the navy and air force (which had perhaps been neglected before 1974)
        - Utilization of the domestic defense industry
- Since the end of the Second World War, Greece has considered itself a status quo country
    - Mainly aiming to prevent Turkish aggression
- In the context of national deterrence, Greece aims for qualitative superiority over Turkey's forces
    - It has also drawn clear red lines, which are activated automatically
        - So that there is no ambiguity as to which actions by Turkey could lead to war
- Greece's international deterrence is based on the hosting of US and NATO military bases on Greek soil
    - The security of these bases would be threatened in the event of a war with Turkey
- Extended deterrence concerns the shield of protection that Greece has extended to Cyprus
    - This is based more on the threat of retaliation than denial
    - In 1987, the then Prime Minister Andreas Papandreou clearly signaled in speeches to his cabinet and the Parliament that an attack or invasion of Greek Cypriot territory would constitute a cause of war () for Greece
    - Like the presence of American troops in Berlin in the past, the presence of Greek troops in Cyprus also acts as an alarm (broken class or trip wire policy)
        - A conflict there would automatically involve Greek forces
    - Prime Minister Andreas Papandreou committed his government in a position from which it could not retreat

- At the same time, the prime minister warned that, in case of war, there would be catalytic changes in the defense system of the West and NATO in the region
- Greece signaled its intention to take the risk of unilateral escalation with general mobilization and orders to sink the Turkish Sismik ship to the navy
- At the same time, however, it provided assurances to Turkey that it would also refrain from drilling in disputed areas
    - Leaving Turkey an escape route that would allow it to maintain its dignity (face saving)

3.1.8. Deadlock game

		State B	
		Cooperation	*Defection*
State A	*Cooperation*	2, 2	1, 4
	Defection	4, 1	3, 3 *(conflict)*

Greek-Persian war

In the mid-480s BC, the young king Xerxes, who had just ascended the throne of the Persian empire, convened a war council to decide on an invasion of Greek territory to subjugate the independent Greek cities

One of the participants, Artavanus, uncle of Xerxes, disrupted the atmosphere of unanimity by raising questions about the feasibility of the planned campaign

Xerxes' answer encapsulates the concept of zero-sum games, i.e. games of pure conflict (from Herodotus' Histories)

- *"I know well that if we remain at peace, the Greeks will not. For they are men who are always restless and aggressive, and it is clear from their past actions that they will invade our land if we do not strike first. They are the ones who first invaded Asia, and I see no way for both of us to live in peace. Either we must conquer Greece, or they will conquer us. The hatred between us is too deep for anything but total victory or defeat."*

Deadlock game as viewed by the Persians

		Persians: *peace*	Persians: *war*
Greeks	*peace*	2, 2 *(peace)*	1, <u>4</u> *(Persians dominate)*
	war	<u>4</u>, 1 *(Greeks dominate)*	<u>3</u>, <u>3</u> *(war)*

The Greeks did not want to be enslaved by the Persians but preferred peace to war

- Unlike Xerxes, who preferred war if the Greeks did not submit

Deadlock game as viewed by the Greeks

		Persians: *peace*	Persians: *war*
Greeks	*peace*	3, 2 *(peace)*	1, <u>4</u> *(Persians dominate)*
	war	<u>4</u>, 1 *(Greeks dominate)*	<u>2</u>, <u>3</u> *(war)*

US vs Japan, 1941

US negotiations with Japan in the summer and fall of 1941

- Both sides preferred war to the concessions necessary to reach an agreement
    - Japan preferred war to giving up trying to dominate China and Southeast Asia
    - The US preferred war to allowing such a thing
- Japan's leaders wanted the self-sufficiency that unhindered access to Asian raw materials and markets would produce
    - So that they could be immune to Western pressures
- If the US and Japan had been able to reach a binding agreement giving Japan economic independence in Asia in exchange for renouncing the use of its power, the course of history might have changed
    - Such a thing remains difficult in international politics

---

3.1.9. Zero-sum games

Guerrilla war game

		Rebels: *open conflict*	Rebels: *skirmishes*
Police	*hunting in forest*	−4, 4	−6, 6
	protect cities	9, −9	3, −3

Electoral campaign game (first version)

Politician A \ Politician B	*1*	*2*	*3*	
1	2, −2	1, −1 *Nash equilibrium & maximin*	4, −4	*minimal payoff = 1*
2	2, −2	0, 0	1, −1	*minimal payoff = 0*
3	−1, 1	−2, 2	0, 0	*minimal payoff = −2*
	minimal payoff = −2	*minimal payoff = −1*	*minimal payoff = −4*	

Electoral campaign game (second version)

Politician A \ Politician B	1	2	3	
1	-3, 3	-2, 2	6, -6	minimal payoff = -3
2	2, -2	0, 0 Nash equilibrium & maximin	2, -2	minimal payoff = 0
3	5, -5	-2, 2	-4, 4	minimal payoff = -4
	minimal payoff = -5	minimal payoff = 0	minimal payoff = -6	

Electoral campaign game (third version)

Politician A \ Politician B	1	2	3	
1	0, 0	-2, 2	2, -2 equilibrium & maximin	minimal payoff = -2
2	5, -5	4, -4	-3, 3	minimal payoff = -3
3	2, -2	3, -3	-4, 4	minimal payoff = -4
	minimal payoff = -5	minimal payoff = -4	minimal payoff = -2	

Avranche opening battle

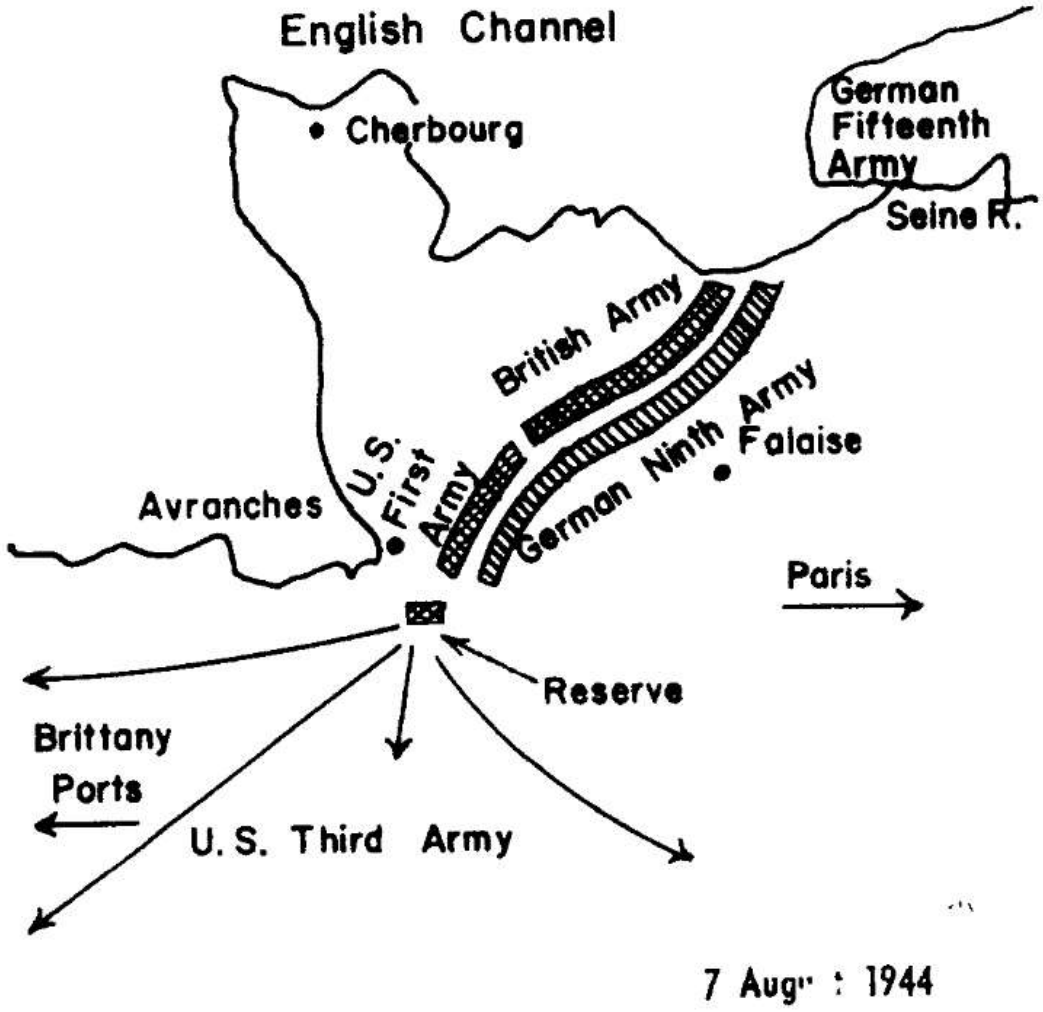
Battle of Avranches gap (Falaise pocket), 12-21 August 1944

- Took place after the Allied landings in Normandy

The American General Omar Bradley was faced with the question of the best strategy for an opening in the Allied lines (in the town of Avrance, northwestern France)

The German general Günther Von Kluge was debating whether to

- Attack the opening (hoping to advance to the sea) or
- Retreat to a better defensible location (near the Seine River



		Germany: Strategy *1* *(Attack on opening)*	Germany: Strategy *2* *(Retreat)*	
Allies	*Strategy 1 (Reinforce opening with reserve forces)*	*2, −2 (opening endures)*	*3, −3 (weak pressure of German retreat)*	*minimal payoff = 2*
	Strategy 2 (Reserve forces attack east)	*1, −1 (opening recedes)*	*5, −5 (strong pressure of German retreat)*	*minimal payoff = 1*
	Strategy 3 (Await reserve forces for one day for possible reinforcement of the opening or attack east)	*6, −6 (opening holds, possible German reinforcements)*	*4, −4 (moderate pressure of German retreat, maximin equilibrium)*	*minimal payoff = 4*
		minimal payoff = −6	*minimal payoff = −5*	

Hitler ordered General Von Kluge to attack the gap in the Allied forces

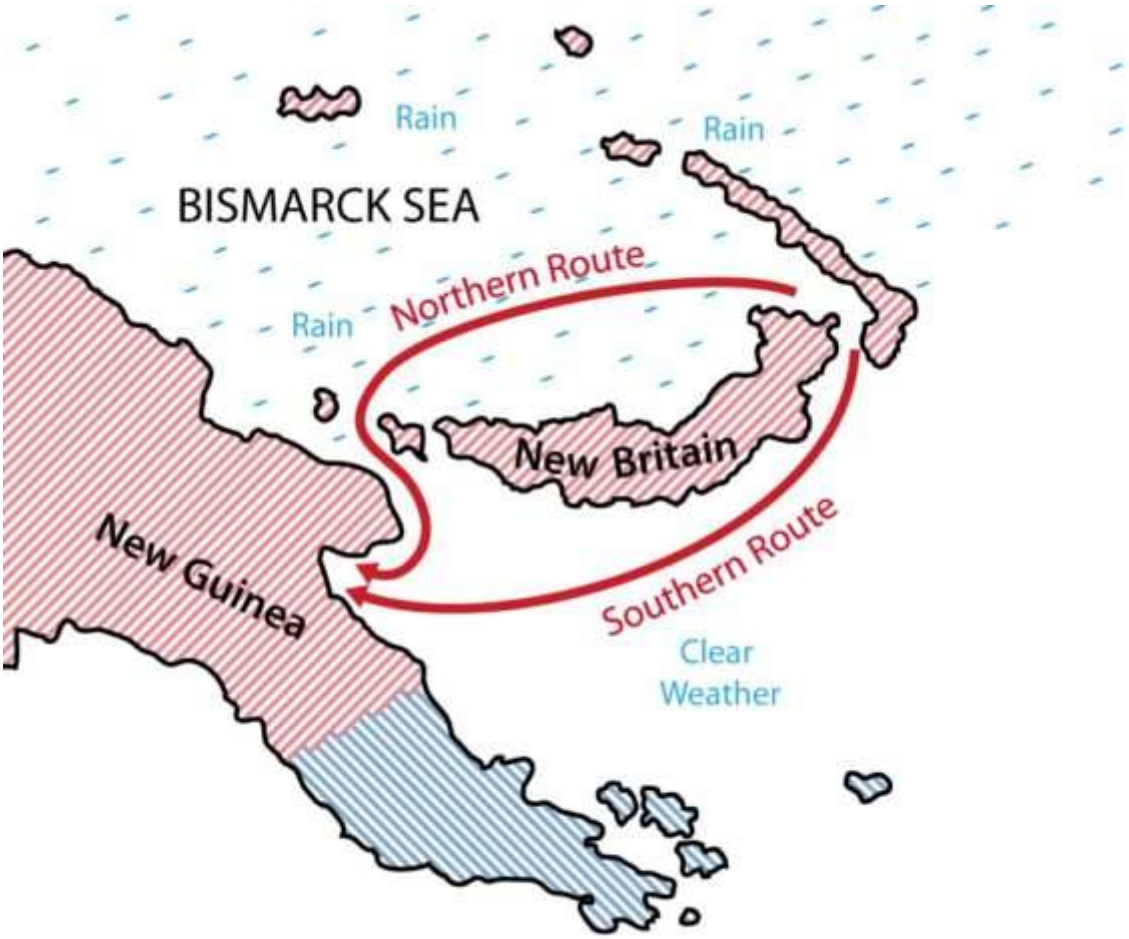
- Forcing the game to result in the bottom left cell
    - Worst outcome for the Germans
- As a result, on July 30, 1944, the Allies were able to enter France (through Avranches), encircle, and defeat the German forces
    - This defeat, along with Von Kluge's involvement in the failed assassination plot against Hitler, led to his suicide on August 17, 1944

Battle of the Bismarck sea

US and Australian air forces attacked a Japanese convoy transporting soldiers to Papua New Guinea through the Bismarck sea (2-4 March 1943)

- The Japanese had to choose between the north and the south route

- The Allies (Americans and Australians) had to choose which of the two routes they would search for the Japanese fleet for bombardment
    - The northern route was shorter and easier for the allies to search
    - The south left the Japanese exposed for longer
- Weather conditions were also a factor influencing the strategic choice.
- If the Allied planes took the wrong route and did not find the Japanese fleet, they could change course
    - But they would lose a day



https://policonomics.com/battle-of-the-bismarck-sea/

		Japanese navy	
		North	*South*
Allied air force (USA and Australia)	*North*	2, −2 *Nash & maximin equilibrium*	2, −2
	South	1, −1	3, −3

“This Japanese transport ship was highly camouflaged with trees and foliage as it traveled through the Bismarck Sea. A US Army plane carrying a combat cameraman flew low to capture this shot. The ship has been hit, and smoke is rising as it burns."

https://blog.fold3.com/march-2-4-1943-battle-of-the-bismarck-sea/

Let's also take a look at the page of the previous map:
https://policonomics.com/battle-of-the-bismarck-sea/

This famous battle has also inspired PC games

https://www.mission4today.com/index.php?name=ForumsPro&file=viewtopic&t=24007&printertopic=1&start=0&finish=-1

3.1.10. Asymmetric games

Game of bluff

The bluff game

		Player B	
		Cooperate	*Defect*
Player A	*Cooperate*	3, 3	1, 4
	Defect	4, 2	2, 1

Bully games

The bully game

		State B (bullied)	
		Cooperate	*Defect*
State A (bully)	*Cooperate*	2, 3	1, 4
	Defect	4, 2	3, 1

The big bully game

		State B (bullied): *Cooperate*	State B (bullied): *Defect*
State A (big bully)	*Cooperate*	2, 3	1, **4**
	Defect	**3**, 2	**4**, 1

Applications in global politics

The big bully game is a suitable game model for reenacting

- Austria's campaign against Serbia in 1914
- Germany's invasion of Czechoslovakia in 1938
    - The bully Adolf Hitler intimidated the British and pushed them into a strategic confrontation similar to the chicken game

Protector games

First variant of the protector game

		State B (weak ally): *Cooperate*	State B (weak ally): *Defect*
State A (strong ally - protector)	*Cooperate*	1, 2	2, **4**
	Defect	**4**, **3**	**3**, 1

Second variant of the protector game

		State B (weak ally): *Cooperate*	State B (weak ally): *Defect*
State A (strong ally - protector)	*Cooperate*	2, 2	1, **4**
	Defect	**4**, **3**	**3**, 1

3.1.11. Repeated games

Game of penalties

Penalty game

		Goalkeeper		
		left	*center*	*right*
Attacher	*left*	0,1	1, 0	1, 0
	center	1,0	0, 1	1, 0
	right	1,0	1, 0	0, 1

Rock, paper, scissors

		Player B		
		Rock	*Paper*	*Scissors*
Player A	*Rock*	0, 0	1, −1	−1, 1
	Paper	−1, 1	0, 0	1, −1
	Scissors	1, −1	−1, 1	0, 0

Application in global politics

Kenneth Waltz

- Anarchic international system
  - No higher authority to enforce rules and regulations
  - States are always in a state of competition and conflict
    - Their desire for more security and increased power leads them to constantly seek to improve their relative position vis-à-vis other states

John Mearsheimer

- Aggressive realism
  - States constantly seek to outdo each other in a perpetual competitive struggle for security and power
    - Like the players in the game of rock, paper, scissors, trying to predict their opponents' moves to win

Strategies in modern times

- Countering terrorists within local communities with the help of the police
- Mobilizing organized troops to occupy and occupy territories
- Striking the opponent's communications, economy, or leadership from afar

Among these alternative strategies, no one is clearly dominant

- Like the model of the game of rock, paper, scissors

- The strategies of the rock-paper-scissors game refer to the distinctness of different types of conflict e.g. terrorism, insurgencies, nuclear war)
    - They differ qualitatively from one another, rather than lying on a continuous spectrum of conflict intensity
    - This discretion allows the use of alternative strategies such as signaling, escalation, or negotiations

Arms races tend to be escalatory

- Rivals acquire larger, faster, and more powerful tanks, planes, ships, etc.
- Military history shows the fragility of dominant positions
    - Competition is often more subtle
    - Competing forces try to offset their opponent's advantages
        - By imitation, e.g. by buying weapons of the same type
        - By countering the opponent's strategy, e.g. by developing an air defense system to counter the enemy's air attack capabilities
            - Modeled after a game of rock, paper, scissors
- Also, arms races are not only played out in the field of weapons but also in other areas
    - Economy
    - Technology
    - Ideology, etc.

3.2. Sequential games

3.2.1. Ultimatum game

Warm up

Ultimatum game

- Simple negotiation game
- Highlights some interesting strategic concepts when it comes to making decisions under deadlines
- Offers the possibility to take a first look at the issue of absolute and relative payoffs
    - Central concept role in the analysis of international cooperation/conflict

Scenario

- An unknown benefactor decides to donate 100 euros to two players, Alice and Bob
    - As long as they agree how to share it between them

https://www.pokerstrategy.com/news/world-of-poker/GTO-Poker-Theories:-The-Ultimatum-Game_104182/

Three scenarios are considered

(A) First scenario

Rules set by the benefactor in this first scenario

- Alice first makes a distribution proposal
    - If Bob accepts the proposal, the amount is donated and distributed according to this proposal
    - If Bob rejects the proposal, the benefactor does not proceed with the donation
        - The amount is lost and neither player receives anything

Dynamic game

- The strategic choices of the players are not made simultaneously, but one after the other
    - Alice moves first, by proposing a way to split the money to Bob
    - Bob moves next, accepting or rejecting Alice's proposal

This is a game of sequential moves also referred to as a sequential (move) game

To explore its outcomes, we must analyze it from the end to the beginning

- This backward analysis is called backwards induction
    - Typical of sequential games

Analysis

If Bob acts rationally, he would accept any proposal from Alice that predicts a share greater than zero for him

- He would maximize his absolute gains and would not care if Alice received more
    - Even if Alice gave him one hundredth of the total amount, the solution would be considered beneficial for both (win-win)
    - Bob should accept it, because any amount is better than nothing (zero euros)
- So, Alice, who moves first, keeps almost all of the donation money
    - Bob is forced by the structure of the game to accept whatever amount Alice is pleased to give him

The game is characterized by a first-mover advantage

- Alice reaps this, ensuring an unequal distribution

Social experiments on many volunteers have shown that this scenario is not empirically verified

- Participants in these experiments seem to be interested in
    - How much they earn (absolute gains)
    - How the sharing is done (relative gains)

Participants tend to suggest a 50/50 split

- Each player keeps half of the donation money
- Such outcomes
    - Seem reasonable or fair to most participants
        - Are focal-point or Schelling equilibria
    - Have occupied political philosophy for centuries

Proposals for an unequal split, for example 70/30, are rejected by the second player in the majority of cases

A small twist

Let's put in the place of the unknown benefactor, a father

- The father wants to divide his property between his two children, Alice and Bob
- The rules of the game remain the same
    - If Bob accepts the division proposal that Alice will make, the property is donated
    - If Bob does not accept it, the donation does not take place and the property remains with the father

The dynamic between the two players has changed

- The game is now a **zero sum game**
    - Whatever Alice gains from her father's property, Bob loses

    - Any win-win proposal from Alice is not enough to reach an agreement
        - The proposal must be balanced or it will not be accepted
    - Bob is not going to be interested only in the absolute but also in the relative profits
        - He will be interested in preventing Alice from benefiting more than he does from the father's property

Applications in global politics

Distinction between absolute and relative gains

- Central to international politics
    - Relative power between strategic players is of particular importance in the anarchic international system
        - No overarching authority, no world government to police rogue states
- The main currency of international politics is power
    - Only power can ensure the survival prospects of states
    - Power is always relative
        - In a competitive international system, what one strategic player wins is lost by his strategic competitors (this is why these games are called zero-sum games)

The position of a strategic player in the international system is determined by its power relative to the power of other players

- The empowerment of a strategic player automatically gives the player an advantage over its strategic competitors
    - For example, even small changes in growth rate among major powers can, over time, produce large changes in the global balance of power
- This dynamic has been particularly evident in the case of the Soviet Union and China
    - These two strategic players have moved on diametrically opposed economic trajectories
        - The once mighty Soviet superpower collapsed over 30 years ago (1991) due to chronic economic weakness
        - The gross national product (GDP) of Russia, which succeeded the USSR, is smaller than that of South Korea
            - Declining in relative terms—representing just under 1.8% of world GDP
        - On the contrary, China, which was poor until a few decades ago, today has a GDP ten times that of Russia

        - China owns approximately 20% of the world's wealth, with upward trends
    - This has changed dramatically the relationship between them
        - A few decades ago, China was a satellite of the Soviet superpower
        - Today Russia is a satellite of China
    - China's relative economic growth is so rapid that it threatens the primacy of the US in the international system
        - This causes structural changes in the global distribution of power

Preserving relative power and relative position in the international system is a matter of vital importance for strategic players

- Oftentimes, states resort to war to
    - Reverse unfavorable trends in the correlation of forces
    - Prevent changes that damage their relative position in the international system

---

(B) Second scenario

In this second scenario, the benefactor, having in mind the possibility of dividing the donation amount unequally between Alice and Bob, sets the following rules

- First, as before, Alice makes a distribution proposal to Bob
    - If Bob accepts the proposal, the amount is distributed as agreed and the game ends
    - if Bob does not accept the proposal, the amount is reduced by 10% and Bob proposes a way to distribute the remaining 90% to Alice
        - If Alice accepts Bob's proposal, the amount is divided accordingly
        - If Alice rejects Bob's proposal, the amount is lost and neither player receives anything

Analysis

With the benefactor's rule change, the game has now become a two stage bargaining game

- In the first round, Alice now understands that if the proposal she makes is not accepted by Bob, the game will go to the second round
    - Then, it will be Bob who proposes to Alice

Using backward induction

- Alice realizes that if the negotiation reaches the second phase, Bob will be able to propose that he keep the larger part of the amount, giving the smaller part to Alice
    - Assuming that the players choose based on absolute benefits, even if Bob gave Alice 1% of the initial amount, Alice would have to accept
        - Bob would keep 89% of the original amount for himself (since the amount would have been reduced to 90% in the second round)
- Therefore, Alice understands that it is not in her interest to allow the negotiation to reach the second round
    - To achieve this, she must concede 89% of the original amount to Bob from the start
        - So Bob has no incentive to bring the negotiation to the second round
- Thus, Alice decides to propose from the first round that she keep 11% for herself, and Bob keep 89% of the initial amount
    - Bob will accept this
        - As long as we assume that the players choose strategies based on absolute payoffs

---

(C) Third scenario

In the third and final scenario, the benefactor changes the rules dramatically, turning the negotiation to a game of simultaneous moves

- Both Alice and Bob, without being able to communicate with each other, each write (at the same time) the percentage they want on a piece of paper
- Once they are done, the benefactor reveals the two cards and the following applies
    - If the two percentages add up to 100%, e.g. 50/50, then the amount is distributed according to these percentages, e.g. 50% for Alice and 50% for Bob
    - If the sum of the two percentages is greater than 100%, e.g. 60/50, then the benefactor withdraws the donation and the total amount is forfeited
    - If the sum of the two percentages is less than 100%, e.g. 40/40, then each player gets the percentage they wrote and the remaining amount of the donation is split in half (i.e. each player gets 50% of the balance)

Analysis

Let's look at some examples to reinforce the rules of the third scenario

- If both players write 50, they each get 50% of the amount

- If both players write the same number from zero to 50, e.g. 35, they each get 35% of the total amount
    - The remaining 30% is split down the middle (15/15), so again the total amount is split 50/50
- Finally, if one player writes 60 and the other 65, the donation is canceled and the amount is lost
    - Because 60 and 65 add up to 125, which is greater than 100
    - He who wants everything loses everything

Now the game has transformed into a game of simultaneous moves

- Alice and Bob must somehow coordinate without being able to communicate
    - If they both write the same amount from zero to 50, the donation will be split in half

If someone decides to write a number over 50, the entire amount can be losttimid niece game (so that they can then apply this in Cuban missile crisis)

3.2.1. Three country game

As a prelude to the Cuban missile crisis

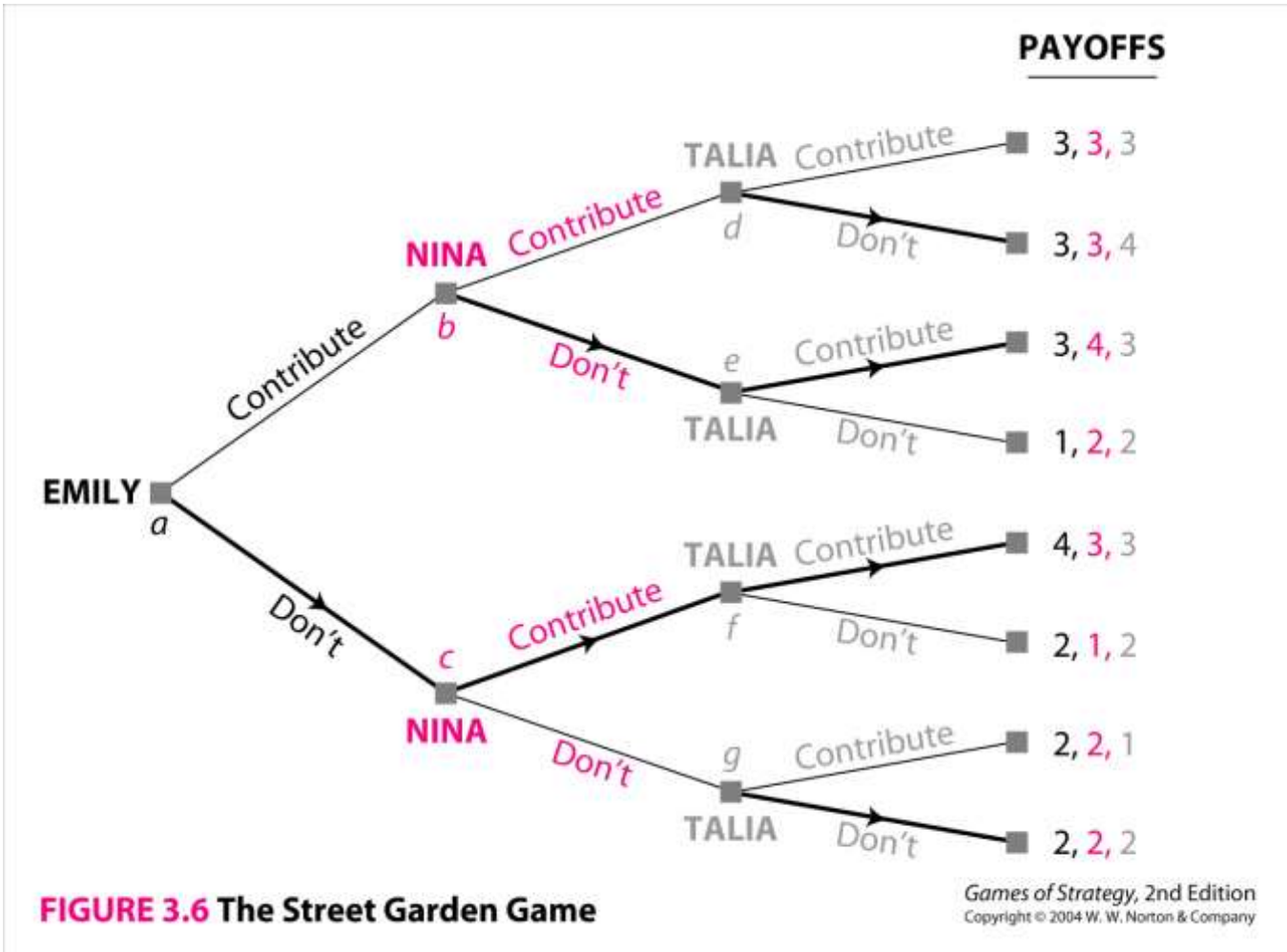


FIGURE 3.6 The Street Garden Game

Games of Strategy, 2nd Edition

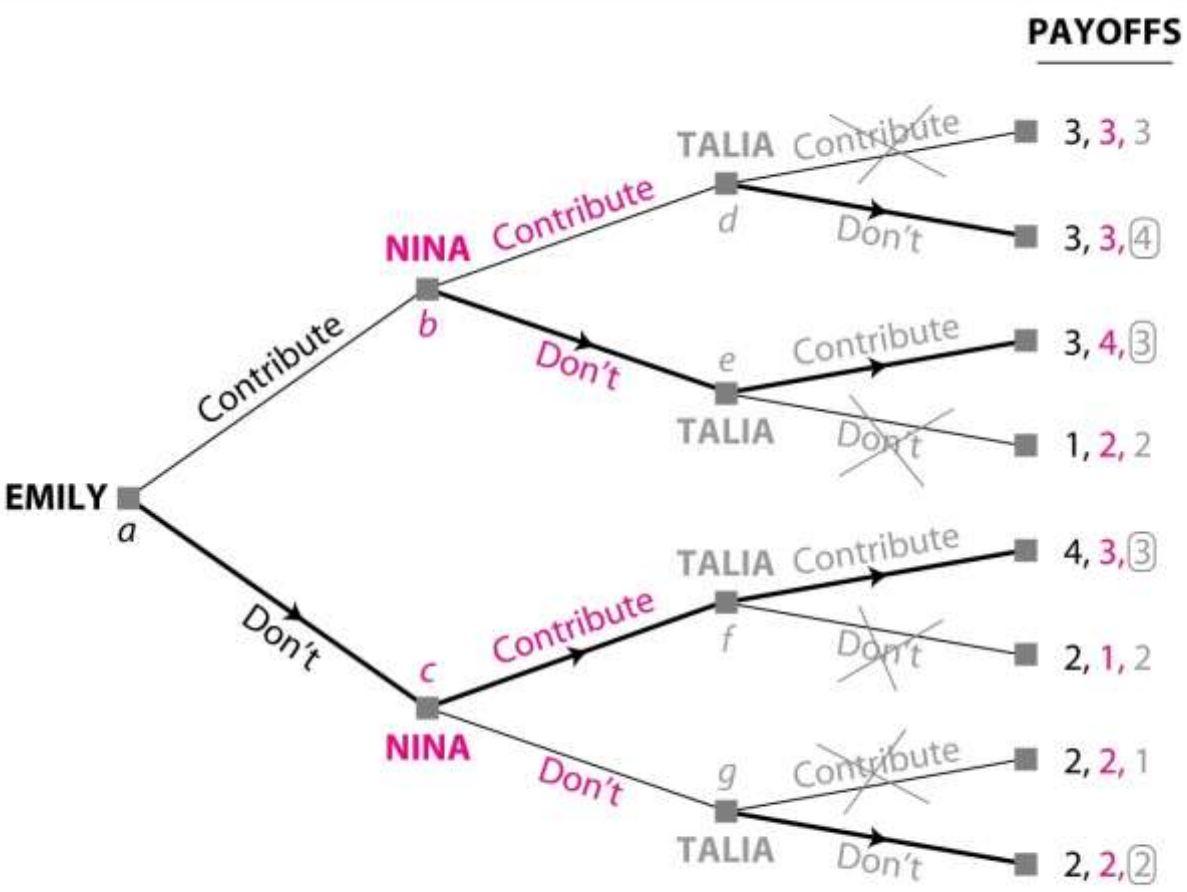


FIGURE 3.6 The Street Garden Game

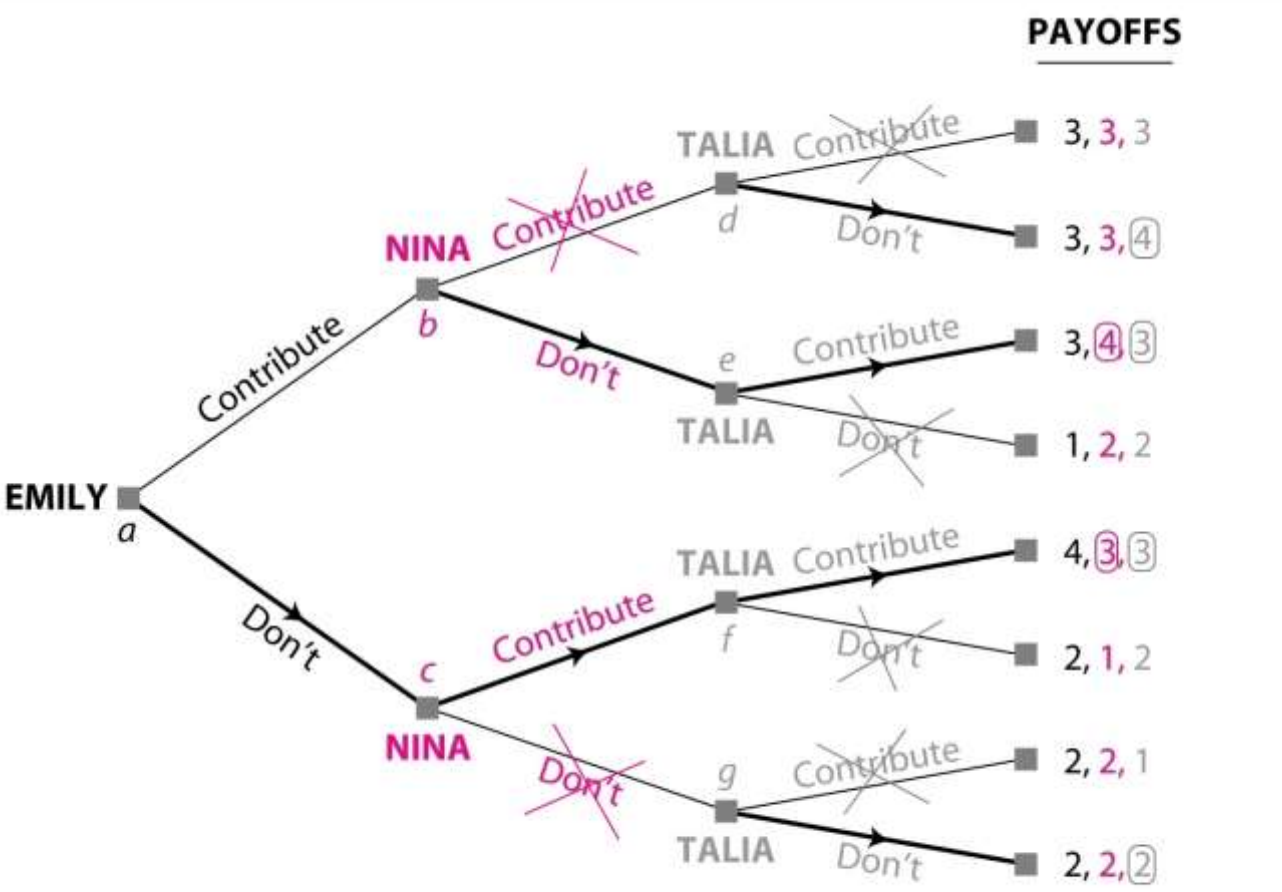


FIGURE 3.6 The Street Garden Game

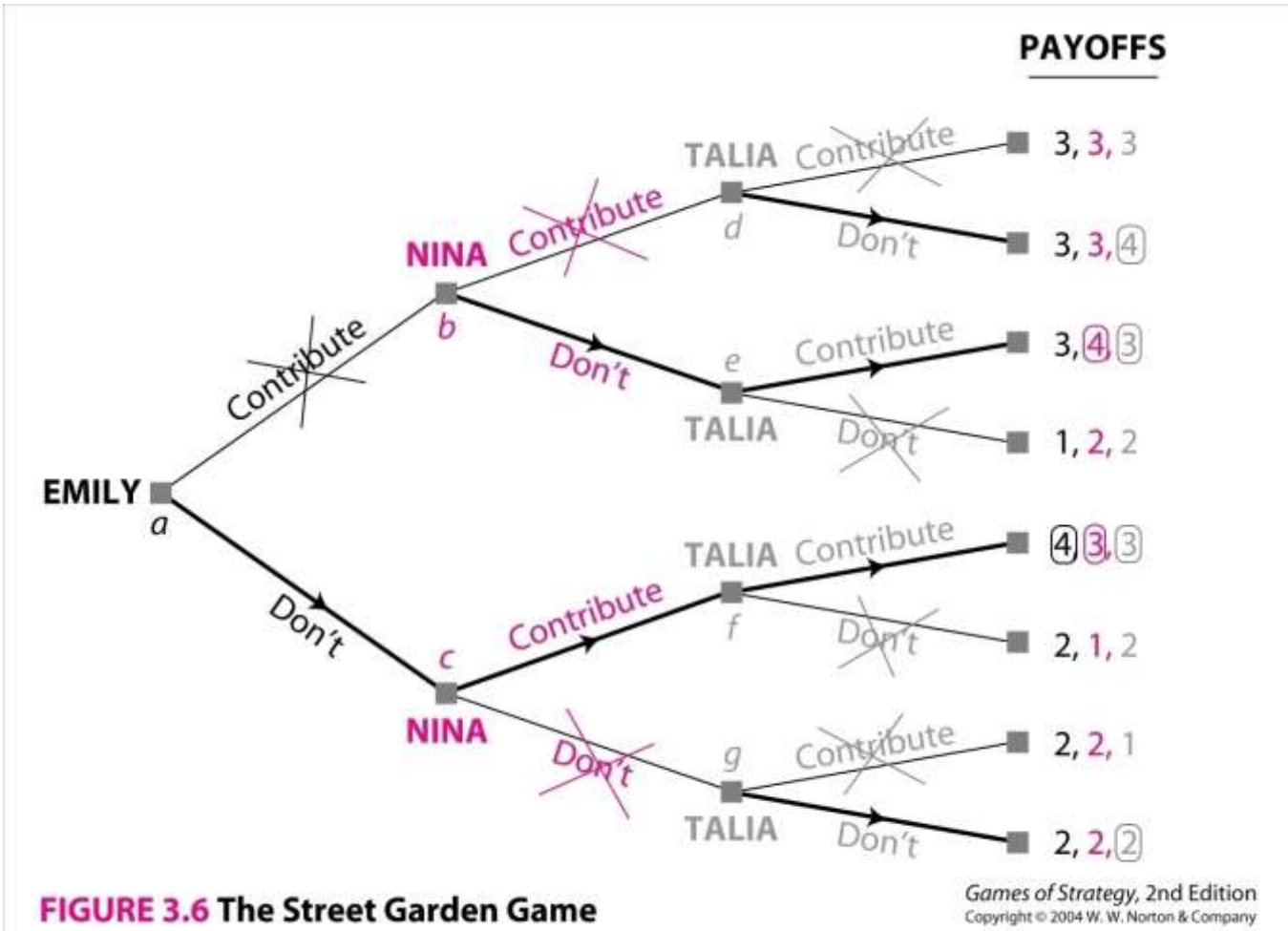


FIGURE 3.6 The Street Garden Game

Games of Strategy, 2nd Edition

3.2.3. Cuban missile crisis

Cuban Missile Crisis, a tense 13-day standoff between the United States and the Soviet Union in October 1962, which brought the world to the brink of nuclear war

1. October 14, 1962
    - A US U-2 spy plane flying over Cuba photographs Soviet missile sites under construction
    - The US confirms that the Soviet Union is installing medium-range ballistic missiles capable of striking major US cities
2. October 16, 1962
    - President John F. Kennedy is informed of the missile installations
        - Start of the crisis
    - Over the next few days, Kennedy and his advisers secretly discuss options, ranging from
        - Airstrikes to
        - Naval blockade
3. October 22, 1962
    - Kennedy addresses the nation on television, revealing the presence of Soviet missiles in Cuba

        - He announces a naval quarantine of Cuba to prevent further Soviet shipments of military equipment
            - "Quarantine" was used instead of "blockade" to avoid triggering a formal state of war under international law
        - He demands the removal of the missiles
4. October 23–24, 1962
    - The Soviet oil tanker Bucharest crossed the quarantine line on October 25, 1962
        - However, it was allowed to proceed because US intelligence had determined that it was carrying oil and not military equipment
    - Other Soviet ships carrying potential military cargoes halted or turned back in response to the quarantine
        - Avoiding direct confrontation with the U.S. naval forces
            - This measured response by both sides eventually contributed to the eventual de-escalation of the crisis
    - Tensions escalate as both sides prepare for potential military action
5. October 26, 1962
    - Soviet Premier Nikita Khrushchev sends a message to Kennedy proposing a deal
        - The Soviet Union would remove the missiles from Cuba
        - As long as the US promised not to invade Cuba
6. October 27, 1962 ("Black Saturday")
    - A US U-2 plane is shot down over Cuba
        - The crisis reaches its peak
        - Tensions are at their highest
    - A second letter from Khrushchev demands the removal of US missiles in Turkey in exchange for removing the missiles in Cuba
        - The US agrees secretly to this condition but publicly focuses on the first offer
7. October 28, 1962
    - Khrushchev agrees to remove the Soviet missiles from Cuba in exchange for a US public promise not to invade Cuba
    - Secretly, the US also agrees to remove its Jupiter missiles from Turkey
        - This part of the agreement was made public much later
8. November 20, 1962

- The US ends the naval quarantine, confirming that all Soviet missiles and bombers have been removed from Cuba

Significance of the Cuban Missile Crisis

- A turning point in the Cold War
  - More cautious approach to superpower relations
  - Establishment of a direct hotline between Washington and Moscow to avoid future crises

CUBAN MISSILE CRISIS

■ **1962** Soviet leader Nikita Khrushchev, worried by U.S. nuclear missiles in Turkey, sends more than 40 medium-range nuclear-capable missiles to Cuba

■ **October 14** U.S. spy planes take the first clear pictures of the missiles. Moscow denies deployment.

■ **October 22** President Kennedy imposes a sea blockade of Cuba and puts armed forces on heightened alert, ready to order a strike on Cuba

■ **October 26** Moscow announces it will remove missiles in return for guarantees U.S. will never attack Cuba. Secret deal removes U.S. missiles from Turkey

THE OLDEST DAILY NEWSPAPER IN THE UNITED STATES—FOUNDED 1771

The Philadelphia Inquirer

PUBLIC LEDGER

AN INDEPENDENT NEWSPAPER FOR ALL THE PEOPLE

FINAL CITY EDITION

Kennedy Orders Cuba Blockade, Calls Island Soviet Missile Base; Navy to Sink Defiant Red Vessels

Bristol Girl Is Strangled In Choir Loft

Program of Action

40 Warships, 20,000 Men Start Siege

President Cites Kremlin Deceit In Atom Buildup

FINAL

DAILY NEWS

NEW YORK'S PICTURE NEWSPAPER

5¢

Vol. 44, No. 193 New York 17, N.Y., Tuesday, October 23, 1962 WEATHER: Partly cloudy and cool.

WE BLOCKADE CUBA ARMS

JFK: Blast Reds If Castro Attacks

—Story on Page 4

Color-flecked Kennedy boards airplane

Faces in a Crisis. Presidential Press Secretary Pierre Salinger tells members of Washington press corps that President Kennedy would address nation via radio and TV last night. The President announced Soviet military buildup in Cuba had halted offensive and U.S. would turn back any ship carrying offensive weapons to Castro. Earlier, Soviet Foreign Minister Gromyko left International Airport after talk with JFK. See ◀— —Story on P. 2, other pics, controversy

RED ENVOY EVADES ANSWER ON CUBA MISSILE SITES

Adlai Blows Top, Tongue-Lashes Zorin in the UN

VALERIAN ZORIN

ADLAI STEVENSON

Dupts After Tirade

From the Beginning

NEW YORK Herald Tribune

European Edition

Khrushchev Offers to Scrap Cuba Bases

Kennedy Calls 'Statesmanlike Decision' Aid to Peace

President Moves To Assure UN Role

U Thant To Havana Tomorrow

Sees Stevenson On Red Decision

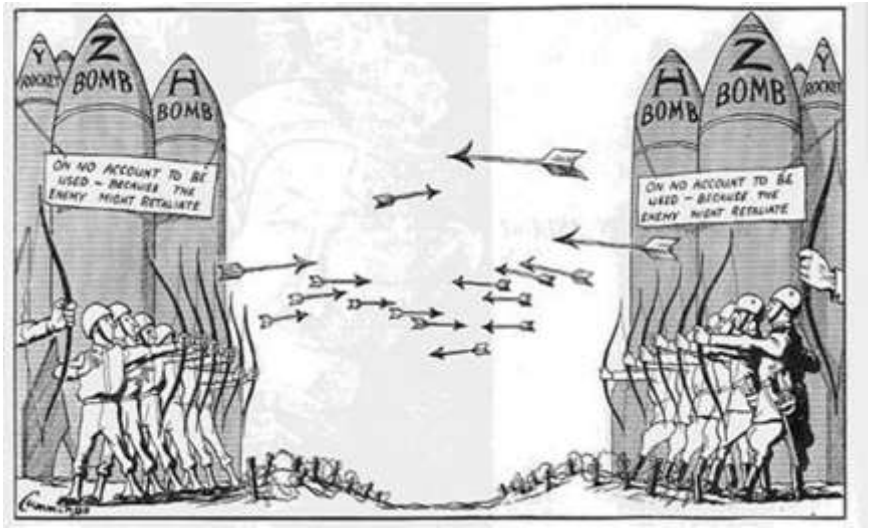
U.S. Would Renounce Cuba Attack, Blockade

India Seen Set to Ask U.S. for More Weapons

Pentagon: No Orders To Relax

Castro Demands U.S. Leave Guantanamo

Premier Accepts UN Supervision



Construct a game theoretic model for the Cuban missile crisis

- Showing the strategic interaction of the US with USSR

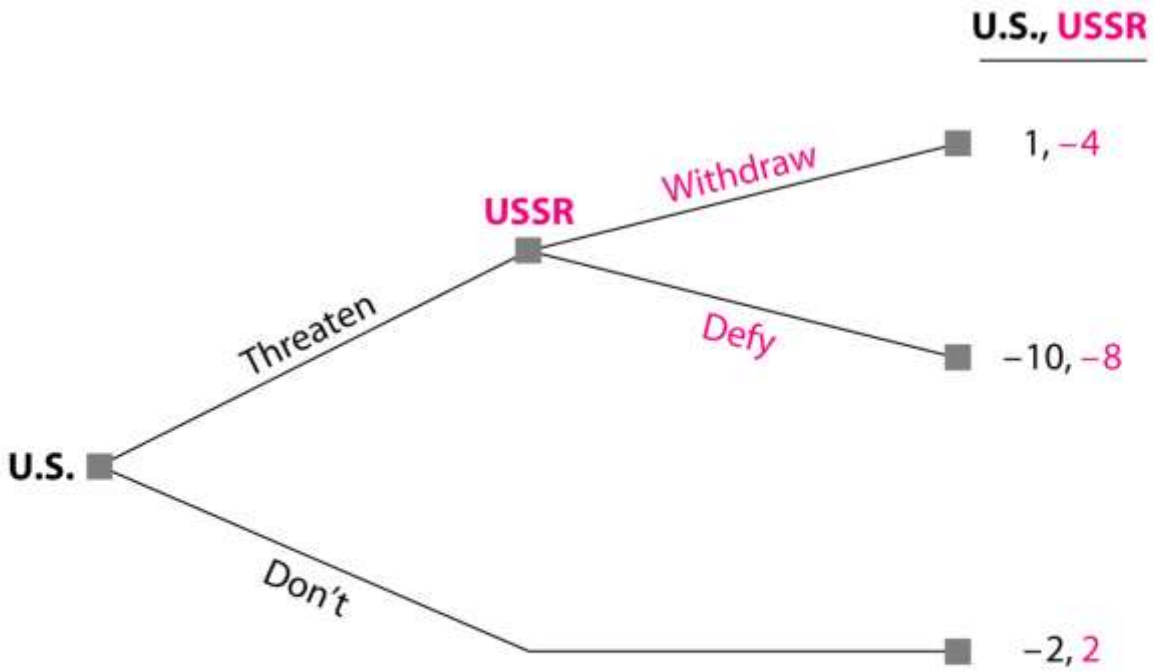


FIGURE 14.1 The Simple-Threat Model of the Crisis

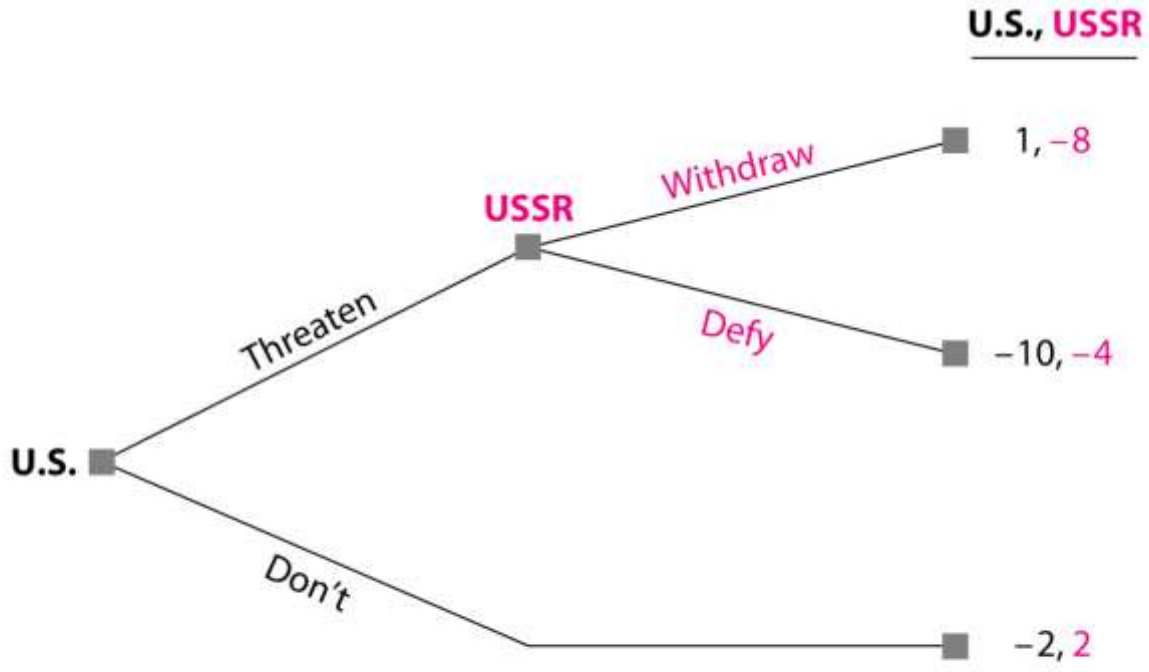


FIGURE 14.2 The Game with Hard-Line Soviets

All these factors made the outcome of any decision by the top-level commander on each side somewhat *unpredictable*. This gave rise to a substantial risk of the "threat going wrong." In fact, Kennedy thought that the chances of the blockade leading to war were "between one out of three and even" (*Essence*, 1).

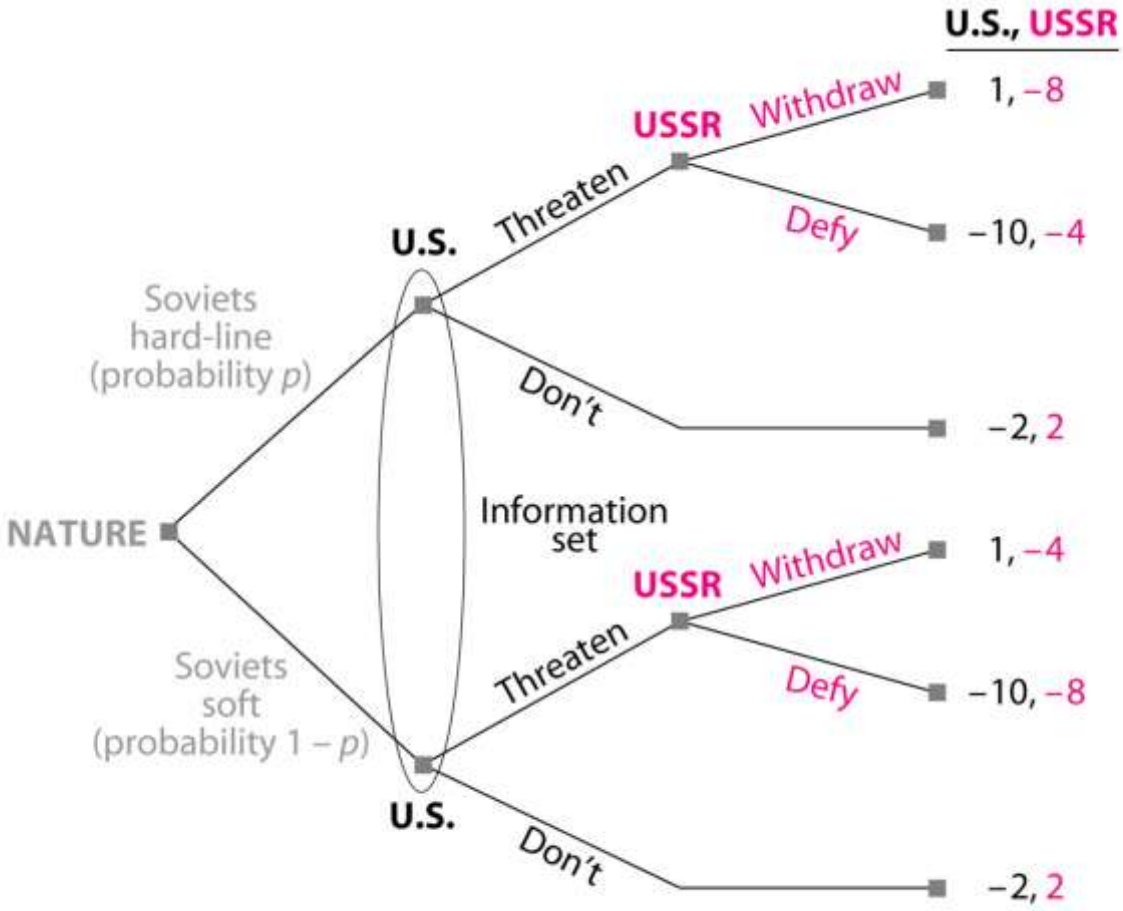
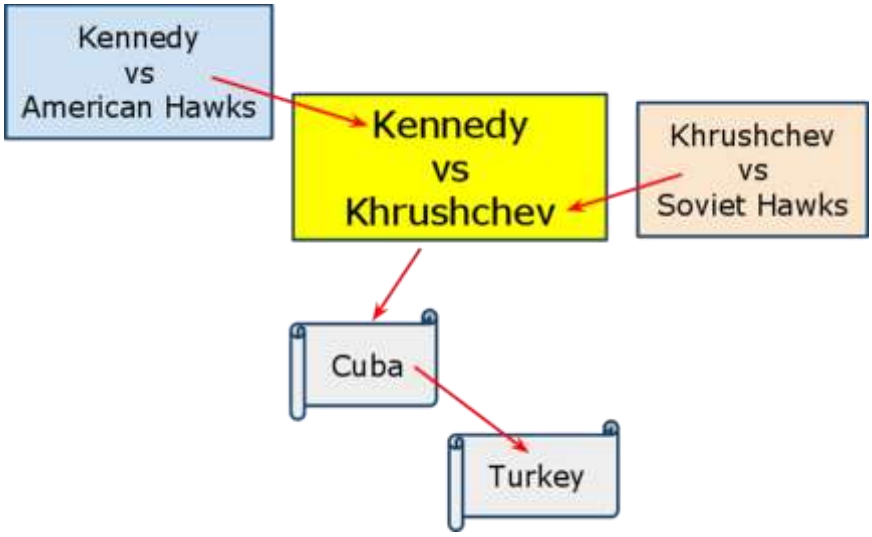
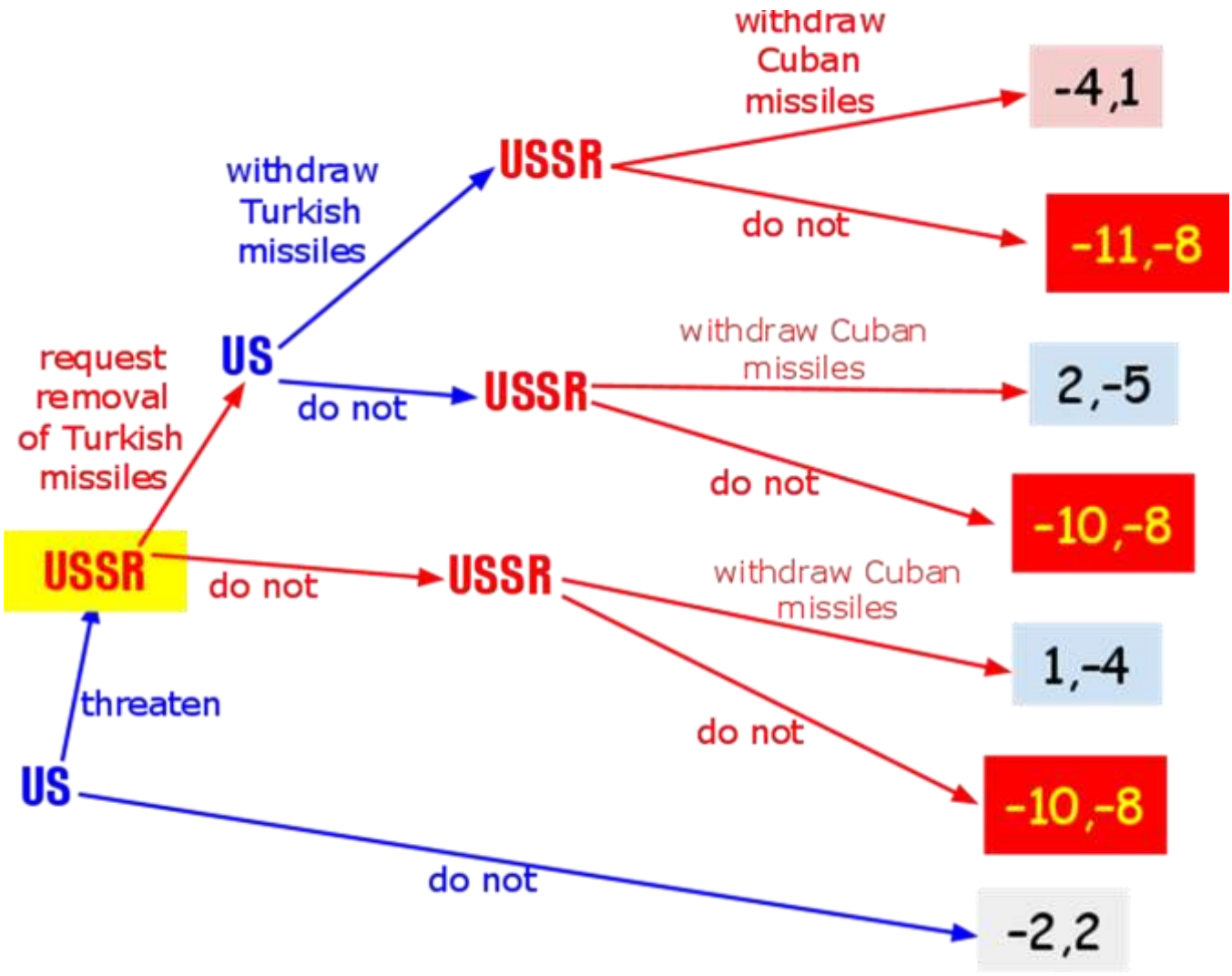


FIGURE 14.3 The Threat with Unknown Soviet Payoffs

Games of Strategy, 2nd Edition




withdraw Cuban missiles
-4,1
withdraw Turkish missiles
USSR
do not
-11,-8
request removal of Turkish missiles
US
withdraw Cuban missiles
2,-5
do not
USSR
do not
-10,-8
USSR
do not
USSR
withdraw Cuban missiles
1,-4
do not
-10,-8
threaten
US
do not
-2,2

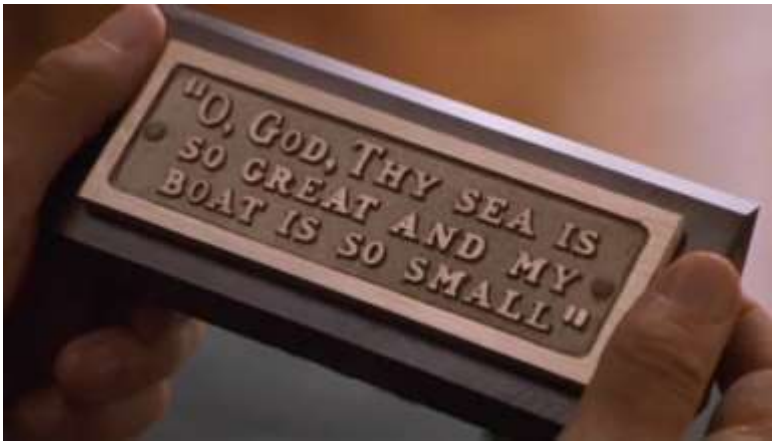

AUSTRALIA
INDONESIA
MALAYSIA
CAMBODIA
VIETNAM
PHILIPPINES
INDIA
CHINA
MONGOLIA
JAPAN
NORTH KOREA
SOUTH KOREA
PAKISTAN
AFGHANISTAN
IRAN
SAUDI ARABIA
SOMALIA
ETHIOPIA
KENYA
TANZANIA
MOZAMBIQUE
SUDAN
CHAD
ZAIRE
ANGOLA
NAMIBIA
LIBYA
ALGERIA
NIGERIA
GHANA
IVORY COAST
MALI
MAURITANIA
MOROCCO
CANADA
UNITED STATES
MEXICO
CUBA
VENEZUELA
COLOMBIA
BRAZIL
PERU
BOLIVIA
ARGENTINA
CHILE
JAMAICA
HAITI
Indian Ocean
Pacific Ocean
Atlantic Ocean
U.S.S.R.

Conflicts in which the USA, USSR and allies involved 1947–91:

1 Greek Civil War 1947: USA gave aid to help defeat communists
2 Berlin Blockade 1948–49: USSR attempted to force France, USA and Britain out of West Berlin by imposing a blockade around the city
3 Malayan Emergency 1948–60: UK troops defeated communist insurgents while moving Malaya towards independence
4 First Indochinese War 1946–54: French troops tried to prevent independence movement from establishing communism in Vietnam
5 Korean War 1950–53 (*map 2*)
6 Off-shore Island Crises 1954–55, 1958: US diplomatic effort and military support to Taiwan averted full-scale invasion by China in wake of artillery attack
7 Guatemala 1954: USA backed right-wing coup
8 Hungary 1956: Uprising of liberal communists crushed by Soviet troops
9 Vietnam War 1959–75: US troops directly involved in war 1964–73
10 Second Berlin Crisis 1961: East German government erected Berlin Wall and closed all but one of access routes to the city; USA sent tanks to Berlin
11 Laotian Crisis 1960–62: Civil war between US-backed and communist-backed forces culminated in establishment of provisional government of unity
12 Cuban Missile Crisis 1962 (*map 3*)
13 Dominican Republic 1965: USA, fearing communist takeover, sent troops to back government of military junta
14 Czechoslovakia 1968: liberal communist government overthrown by troops of USSR and Warsaw Pact allies
15 Chile 1973: US-backed right-wing forces overthrew Allende's socialist government
16 Angola 1974–90: Civil war between MPLA (backed by Soviet-funded Cuban troops) and the FNLA and Unita (backed by South Africa)
17 Namibia 1975–91: Communist-backed forces fought for independence of Namibia, illegally incorporated into South Africa
18 Nicaragua 1979: US backing failed to prevent left-wing Sandinistas deposing right-wing regime
19 Afghanistan 1979–89: Soviet troops occupied the country to prevent overthrow of pro-Soviet regime

As discussed in risk assessment?

- *"The strategic student is adrift in a strategic sea of uncertainty"*

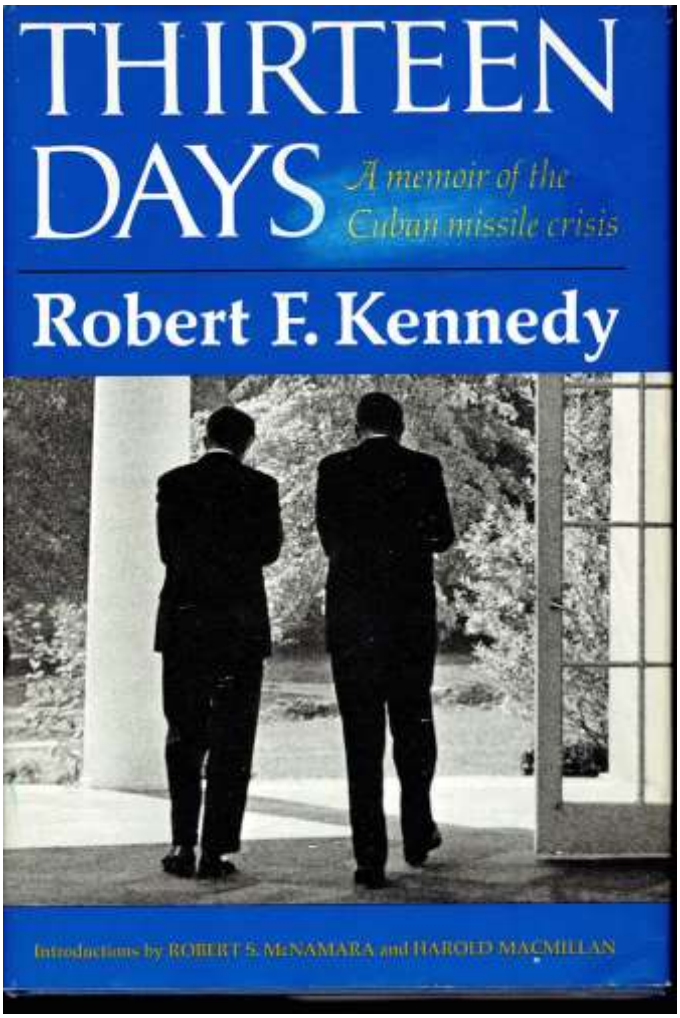


Risk was present in

- Cuba
    - Which response option?
- Kosovo
    - Was air power alone viable?
- Afghanistan (2009)
    - Target Al Qaeda in its sanctuaries OR invest in a full-up counterinsurgency campaign?

Additional sources

Book to read

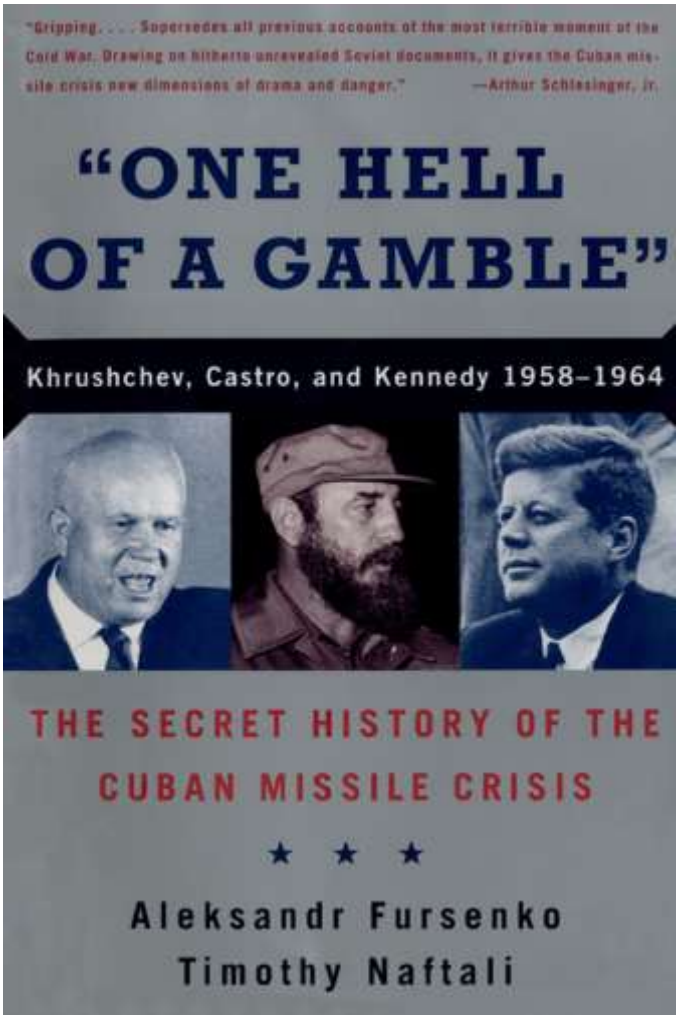


Soviet archives

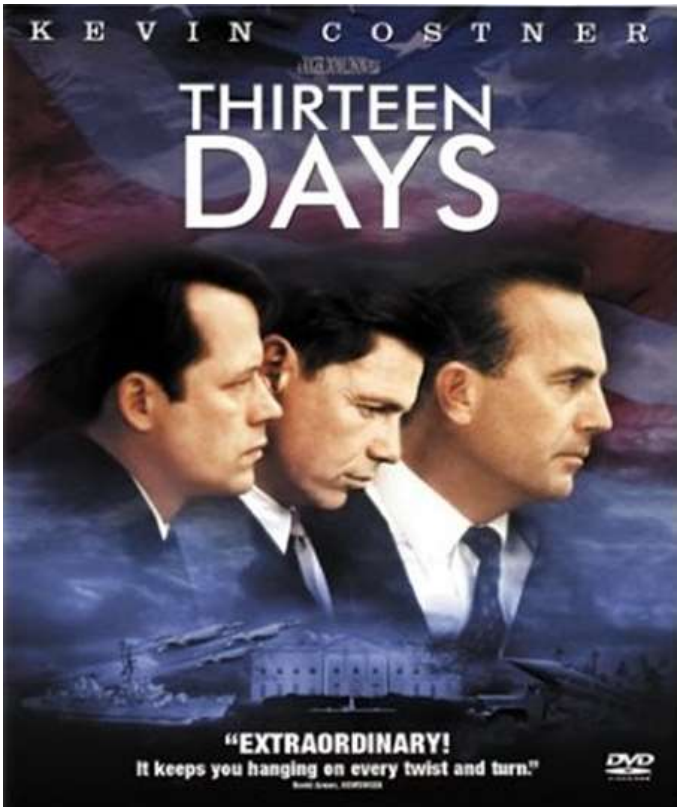
IN CONFIDENCE

MOSCOW'S AMBASSADOR TO
AMERICA'S SIX COLD WAR PRESIDENTS

ANATOLY DOBRYNIN



Movie to watch



3.2.4. Greece-Turkey Aegean dispute

Case Study: Greece-Turkey Aegean Dispute and Its Impact on Regional Stability

A potential political risk assessment case study regarding the Greece-Turkey antagonism in the Aegean could focus on territorial disputes over maritime boundaries, airspace, and resource exploitation in the Eastern Mediterranean.

Background

Greece and Turkey have long standing disputes over sovereign rights in the Aegean Sea

The issues primarily concern:

- Maritime boundaries and the extent of territorial waters
- Airspace disputes (flight information regions, air traffic control)
- Ownership of islets and uninhabited islands (e.g. Imia/Kardak crisis in 1996)
- Access to hydrocarbon resources in the Eastern Mediterranean

These disputes have escalated multiple times, leading to military tensions, aggressive posturing, and diplomatic interventions from NATO and the EU

The region's strategic importance, as it borders critical shipping routes and contains potential energy resources, adds to the complexity.

Risk factors

Risk factors include

1. Military Escalation: Both Greece and Turkey maintain significant military forces in the region, and miscalculations could lead to a conflict. Turkish naval and air operations near disputed waters often result in tensions, which could lead to inadvertent clashes.
2. Political Instability: Internal political shifts in either country (e.g., elections, nationalism) could exacerbate the dispute. Rising nationalism in Turkey, particularly under President Erdoğan, has led to more assertive claims. Greece, responding to its sovereignty concerns, could react with military readiness or increased defense spending.
3. Economic Disruptions: The dispute affects not only bilateral trade but also investment in the energy sector. Multinational companies exploring for gas in the Eastern Mediterranean face uncertainty. The risk of sanctions, EU involvement, or a broader regional conflict could deter investors from the energy sector.
4. EU and NATO Relations: Greece is an EU member, while Turkey is a NATO member. The Aegean dispute strains NATO cohesion, as both countries are critical to regional security (e.g., refugee flows, Middle East stability). Diverging national interests could undermine NATO operations and EU foreign policy.
5. International Legal Implications: Greece prefers resolving disputes through international law, including the United Nations Convention on the Law of the Sea (UNCLOS), which Turkey has not signed. Legal challenges could be

brought forward, leading to international arbitration, but Turkey's rejection of UNCLOS could prolong diplomatic resolution.

Scenario analysis

Alternative scenarios

- Worst-case scenario: Military conflict could break out over a disputed area, leading to a destabilization of the Eastern Mediterranean, sanctions on Turkey by the EU, and a refugee crisis exacerbating humanitarian concerns.
- Best-case scenario: Diplomatic resolution through international arbitration (possibly mediated by the EU or the United States), leading to shared resource exploration rights and agreements on maritime boundaries.
- Most likely scenario: Continued military posturing and diplomatic efforts without resolution. Tensions flare intermittently, but both sides avoid direct conflict due to pressure from international actors (NATO, EU).

Mitigation measures

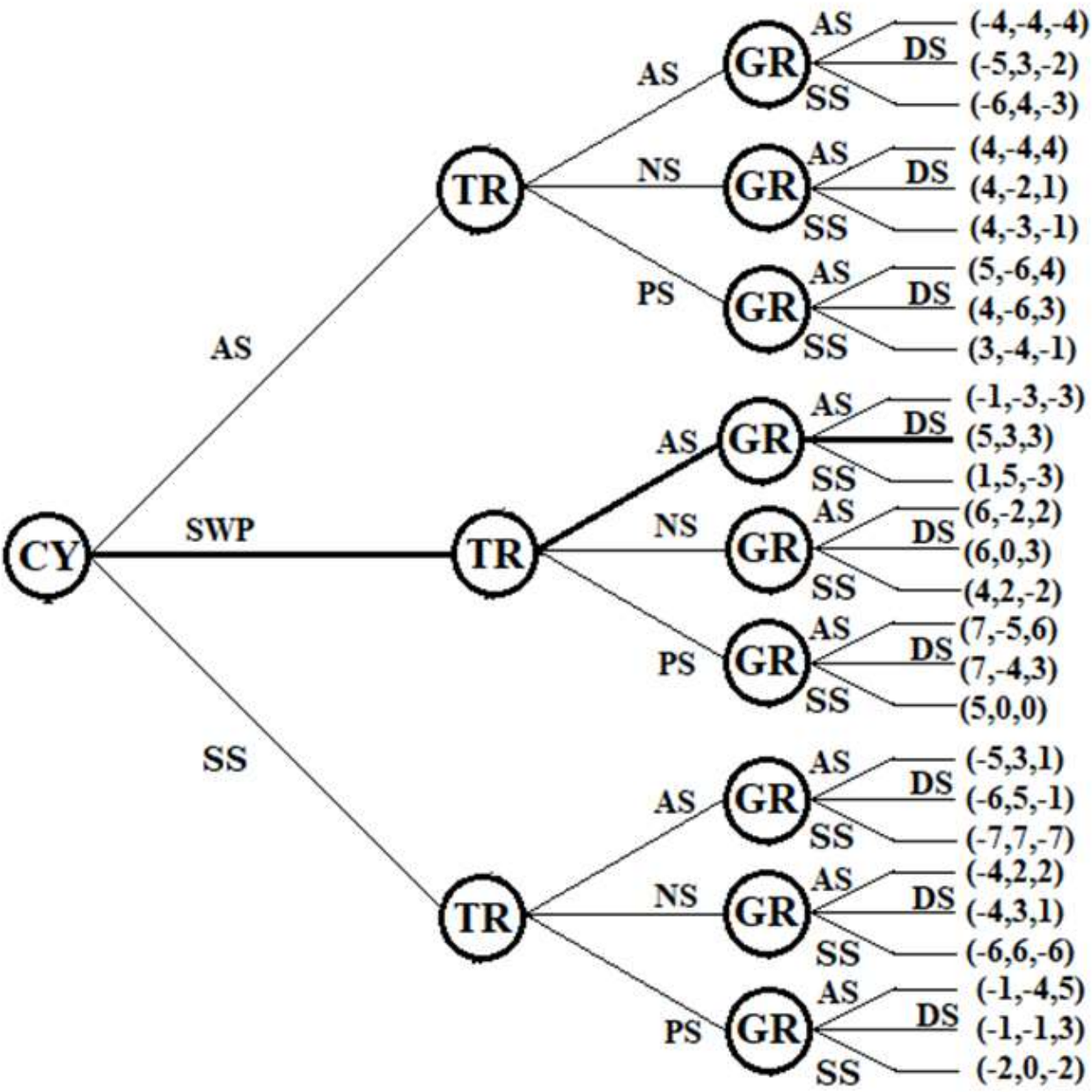
Mitigation measures

- Diplomatic Engagement: Regular dialogue through NATO and EU forums to de-escalate tensions.
- Energy Cooperation: Joint exploration and revenue-sharing agreements could reduce resource-based conflicts.
- International Mediation: Involvement of third-party mediators like the UN or the US to offer neutral arbitration platforms for dispute resolution.

This case study would highlight the geopolitical, economic, and legal risks associated with unresolved maritime and territorial disputes and their broader implications for regional security and economic stability.

Game theoretic analysis

A game theoretic analysis of energy security in the Eastern Mediterranean (Papakostas, Bekou & Paravantis, 2019)



Bibliography

Alterman, E. (2004). When presidents lie: A history of official deception and its consequences, Viking.

Ariely, D. (2008). Predictably irrational: The hidden forces that shape our decisions. HarperCollins e-books.

Baron, J. (1998). Judgment misguided: intuition and error in public decision making, Oxford University Press.

Cialdini, R. B. (2009). Influence: science and practice. 5th edition, Pearson.

Cohen, M. D., March, J. G., & Olsen, J. P. (1972). A garbage can model of organizational choice. Administrative Science Quarterly 17(1), 1-25.

Damasio, A. R. (1994). Descartes' error: emotion, reason and the human brain, Avon Books.

Dixit, A.K. and B.J. Nalebuff (2008): The Art of Strategy – A Game Theorist's Guide to Success in Business and Life, Norton.

Dixit, A. and S. Skeath (2004): Games of Strategy, 2nd edition, W.W. Norton and Company.

Fullerton, E. (2018). Risk assessment 101 – Risk management for non-risk manager (and for risk managers too!) "Fitting the Pieces" Conference, San Diego, April 23-25.

Gladwell, M. (2005). Blink: the power of thinking without thinking, Back Bay Books, Little, Brown and Company.

Goldstein, N. J., Martin, S. J., & Cialdini, R. B. (2008). Yes! 50 scientifically proven ways to be persuasive. Free Press.

Goodwin, P., & Wright, G. (2004). Decision analysis for management judgment. 3rd edition, John Wiley and Sons.

Holcomb, J. F. (2012, June). Chapter 5: Managing strategic risk. In J. B. Bartholomees, Jr. (Ed.), U.S. Army War College guide to national security issues, Volume I: Theory of war and strategy (5th ed., pp. 67-78).

Jablonsky, D. (2012, June). Chapter 1: Why is strategy difficult? In J. B. Bartholomees, Jr. (Ed.), U.S. Army War College guide to national security issues, Volume I: Theory of war and strategy (5th ed., pp. 3-12).

Jervis, R. (1978). Cooperation under the security dilemma. World Politics, 30(2), 167-214. https://doi.org/10.2307/2009958

Jervis, R. (1988). Realism, game theory, and cooperation. World Politics, 40(3), 317-349. https://doi.org/10.2307/2010216

Jowett, G. S., & O'Donnell, V. (2012). Propaganda & persuasion (6th ed.). SAGE Publications.

Kingdon, J. W. (1995). Bridging research and policy: Agendas, alternatives, and public policies. Second edition, New York: Longman.

Korosek, B. M. (1993). The Analytic Hierarchy Process: Enhancing operational level decision making. Naval War College, Newport, RI, USA.

Lehrer, J. (2009). How we decide, Houghton Mifflin Harcourt.

Lindblom, C. (1959). The science of muddling through. Public Administration Review, 19, 79-88.

Lindblom, C. (1970). Still muddling, not yet through. Public Administration Review, 39, 517-526.

Mashudi, A., Moeljadi, Herman, S., Wanto, A. H. (2023). SWOT analysis and analytical hierarchy process (AHP) to determine a sustainable development strategy in Indonesia's national defense industry. PAMATOR, 16(1), 205–221.

Mearsheimer, J. J. (2011). Why leaders lie: The truth about lying in international politics. Oxford University Press.

Navarro, J., & Karlins, M. (2008). What every body is saying: an ex-FBI agent's guide to speed reading people, HarperCollings e-books.

Papakostas, V. D., Bekou, E. E., & Paravantis, J. A. (2019, September 27-29). A Game theoretic analysis of energy security in the Eastern Mediterranean. POLITEIA An International Conference of Political Scientists, Athens, Greece.

Patterson, K., Grenny, J., McMillan, R., & Switzler, A. (2002). Crucial conversations: tools for talking when stakes are high, McGraw-Hill.

Peterson, M. (2017). An introduction to decision theory. 2nd edition, Cambridge University Press.

Simon, H. (1957). A behavioral model of rational choice, Models of Man, Social and Rational: Mathematical Essays on Rational Human Behavior in a Social Setting, New York: Wiley.

Simon, H. (1990). A mechanism for social selection and successful altruism. Science 250 (4988), 1665–8.

Simon, H. (1991). Bounded rationality and organizational learning. Organization Science, 2(1), 125–134.

Stevens, S. P. (2008). Games people play: Game theory in life, business and beyond. Parts I and II, The Teaching Company.

Tannen, D. (1990). You just don't understand, Balantine Books.

Troxell, J. F. (2012, June). Chapter 17: Military power and the use of force. In J. B. Bartholomees, Jr. (Ed.), U.S. Army War College guide to national security issues, Volume I: Theory of war and strategy (5th ed., pp. 217-241).

Yarger, H. R. (2012, June). Chapter 3: Toward a theory of strategy: Art Lykke and the U.S. Army War College strategy model. In J. B. Bartholomees, Jr. (Ed.), U.S. Army War College guide to national security issues, Volume I: Theory of war and strategy (5th ed., pp. 45-52).

Yarger, H. R. (2012, June). Chapter 4: The strategic appraisal: The key to effective strategy. In J. B. Bartholomees, Jr. (Ed.), U.S. Army War College guide to national security issues, Volume I: Theory of war and strategy (5th ed., pp. 53-66).