Game Theory and Politics

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La place d'autruy est le vray point de perspective en politique aussi bien qu'en morale.

The position of the other is the true viewpoint in politics as well as in morality.

1679, Gottfried Wilhelm Leibniz (1646 – 1716)

$$\frac{d}{dx}\int_a^x f(s)ds = f(x)$$

Main message

- Game theory models interaction among **multiple** “players”
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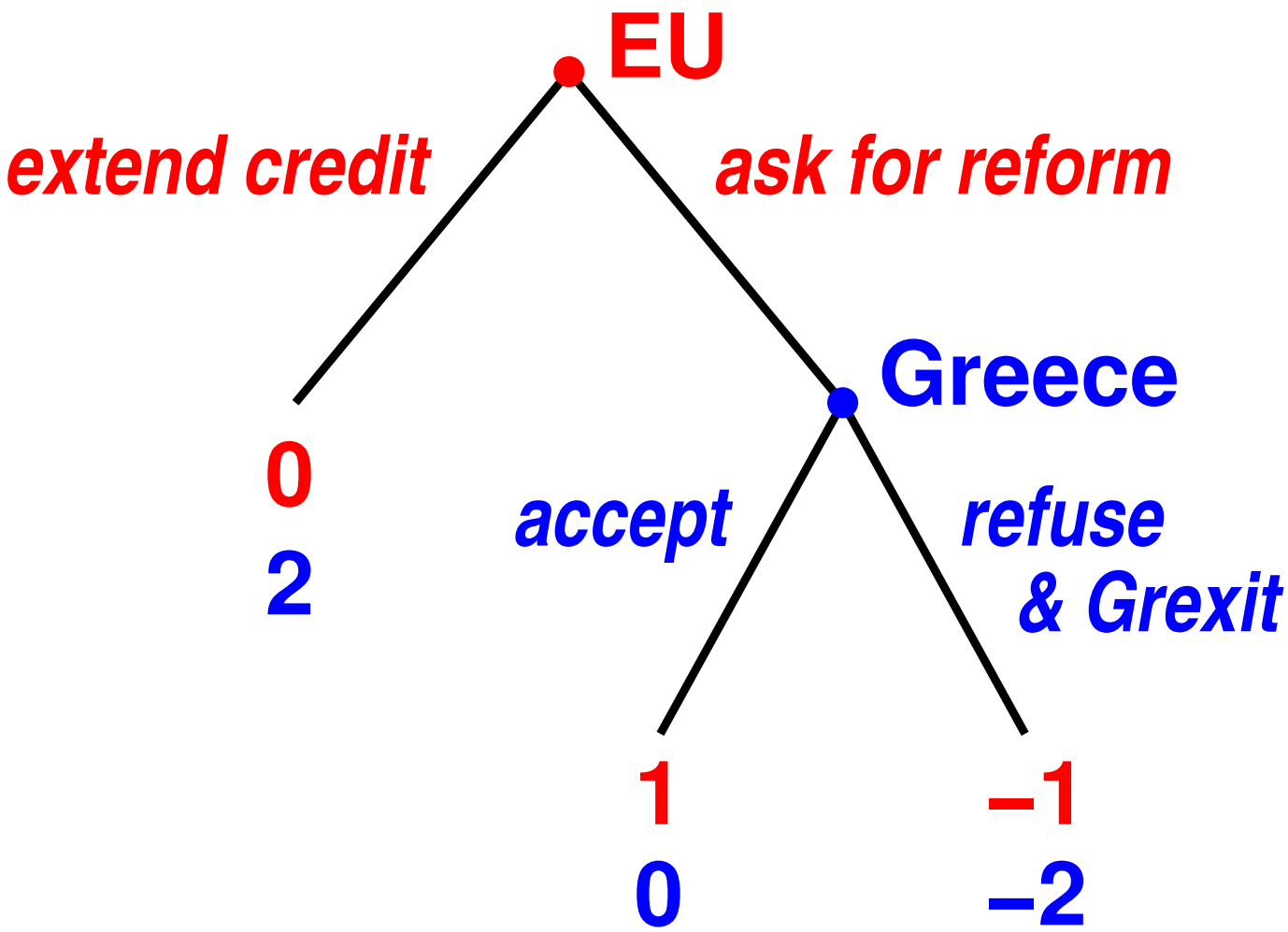
- Game theory models interaction among **multiple** “players”
- A “solution”, such as **equilibrium**, gives a recommendation to **every** player
- The **rules of the game matter**
- . . . including “unwritten” rules, conventions, habits
  (lots to do for game theory here)

1. Threats

The threat game of the Greek crisis 2015



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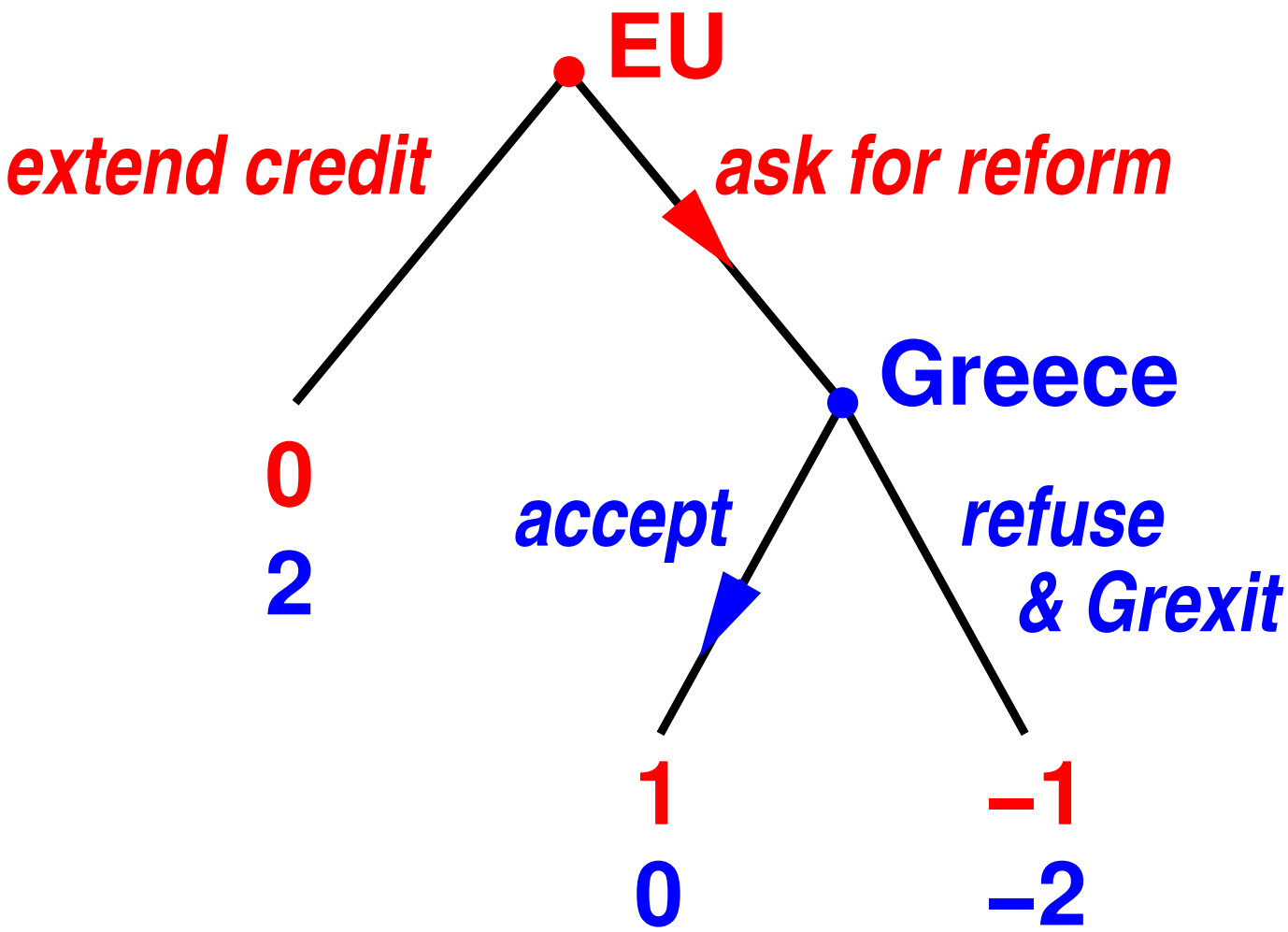

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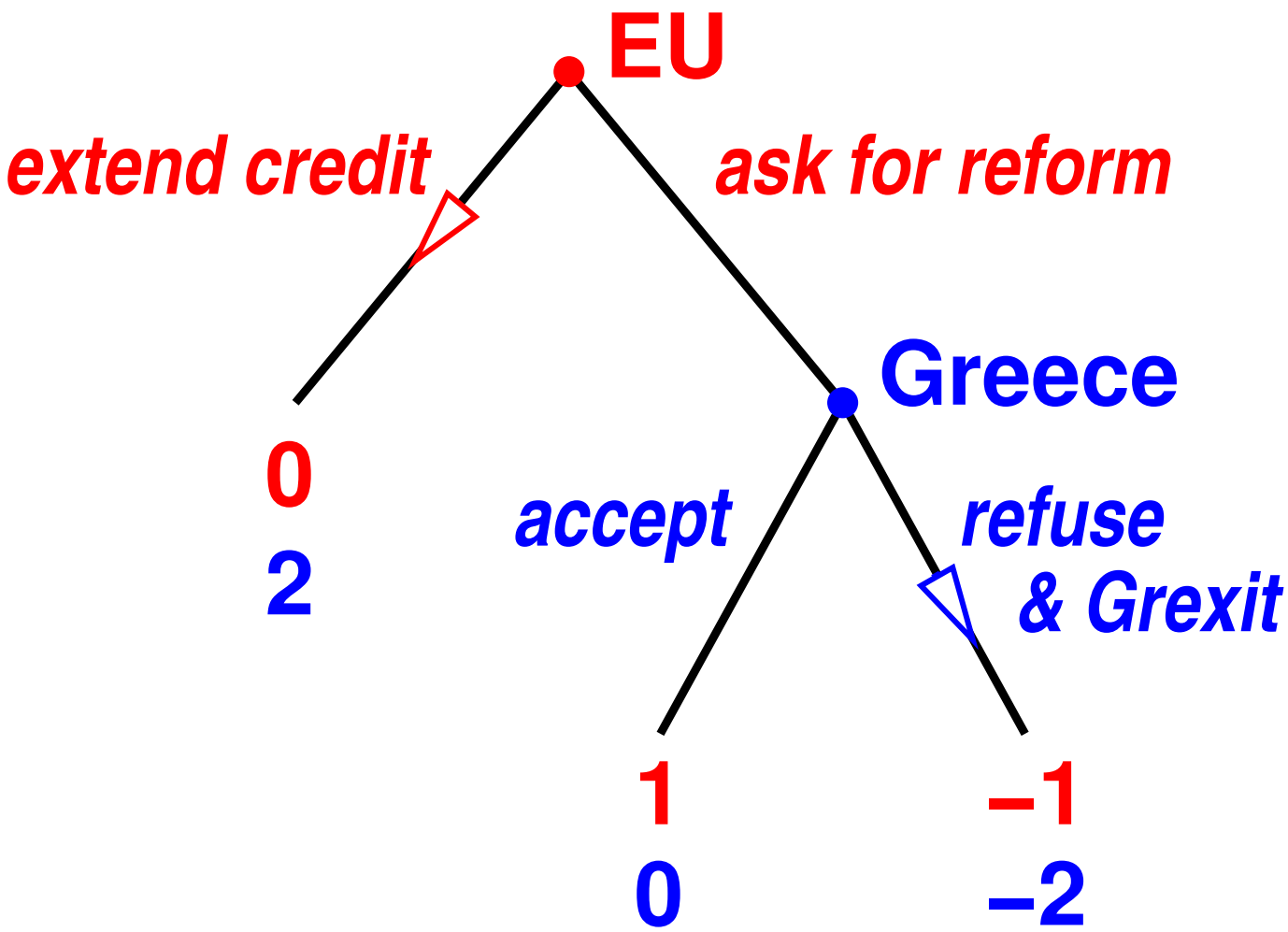

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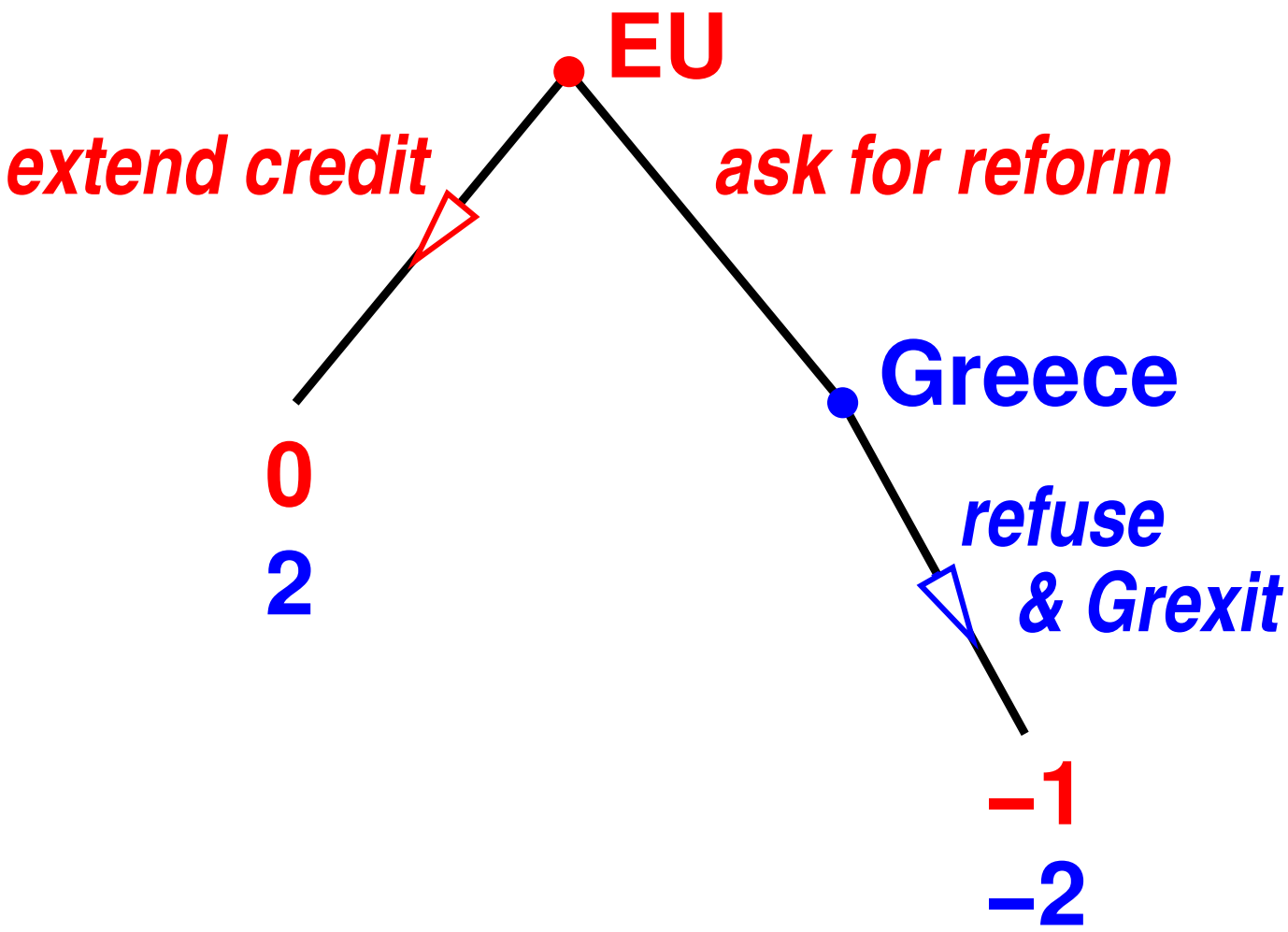

The problem with threats

- the (ir)rationality of threats
- is the threat credible ?

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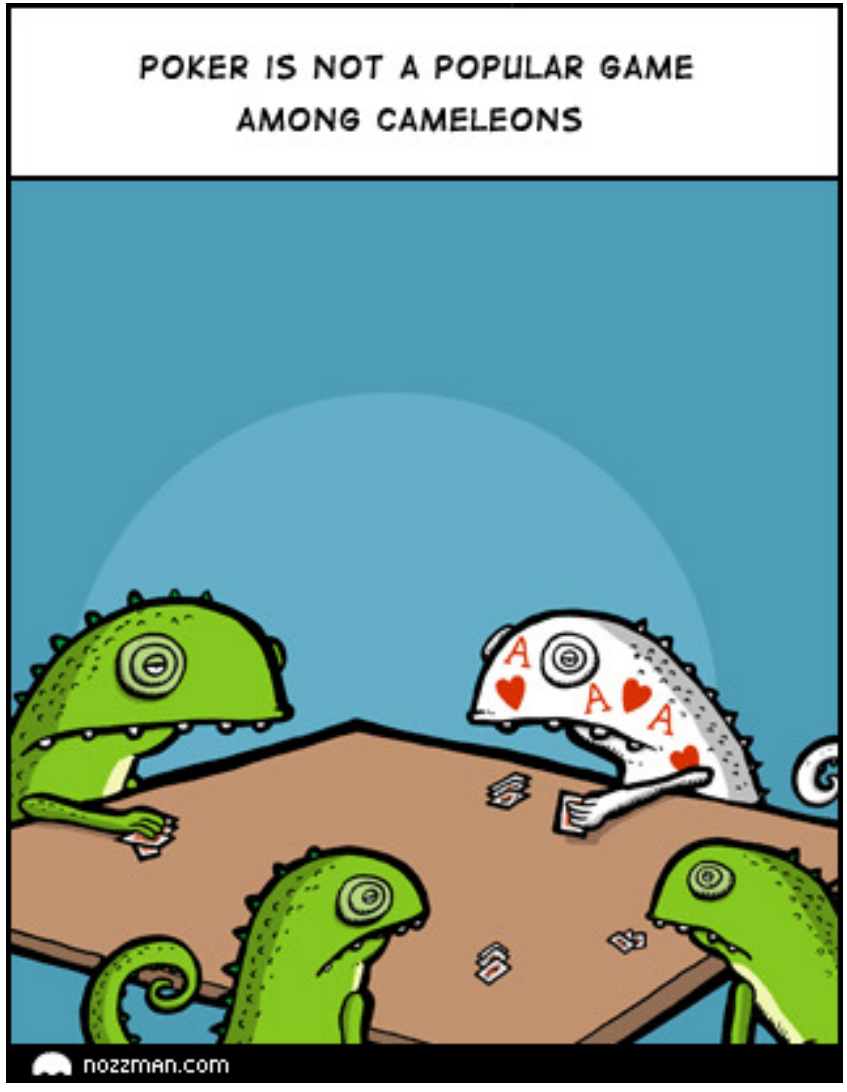
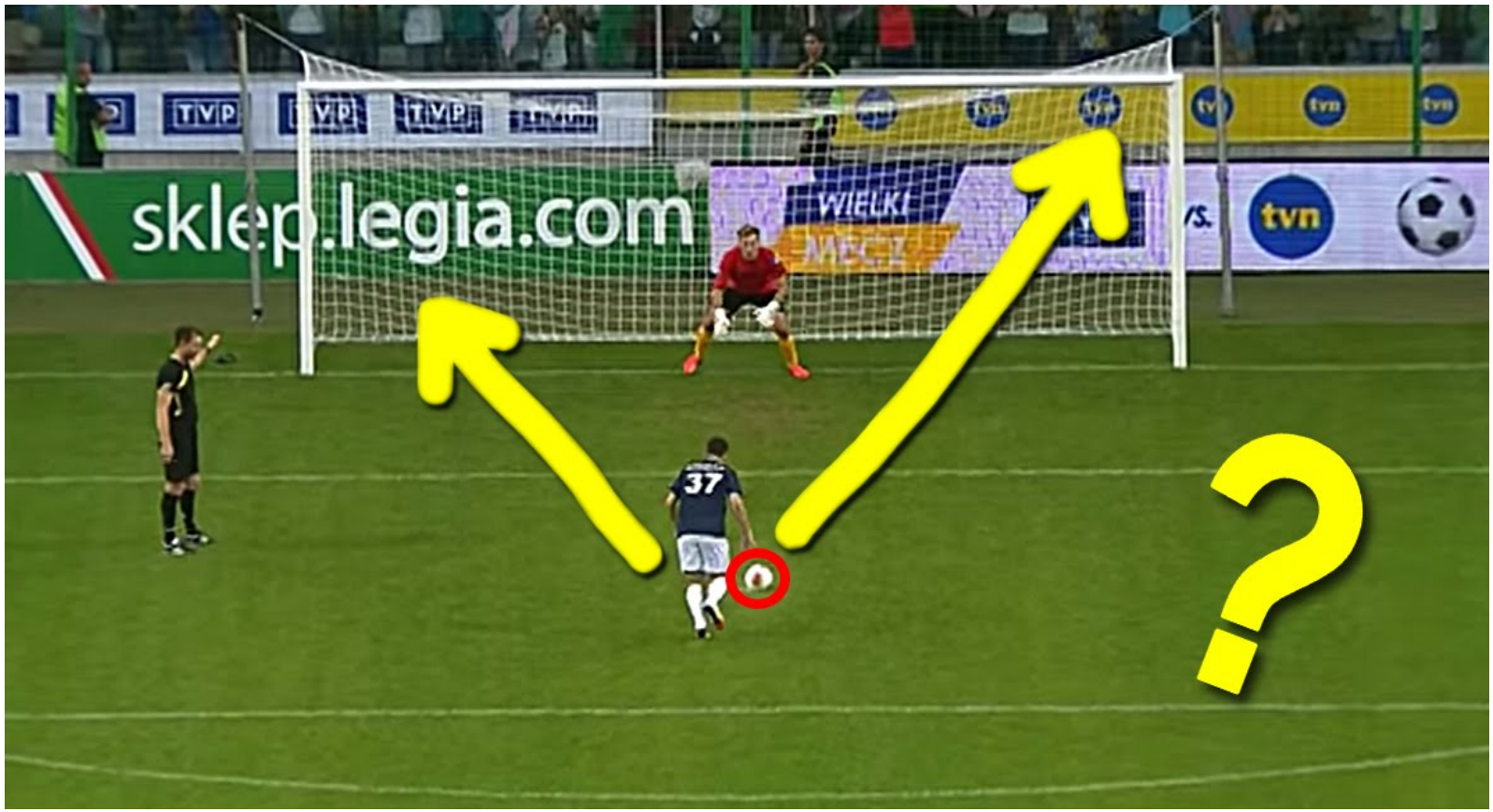
- the (ir)rationality of threats
- is the threat credible ?
- “call your bluff” refers to something different

Calling your bluff is something different



Play randomly to be unpredictable



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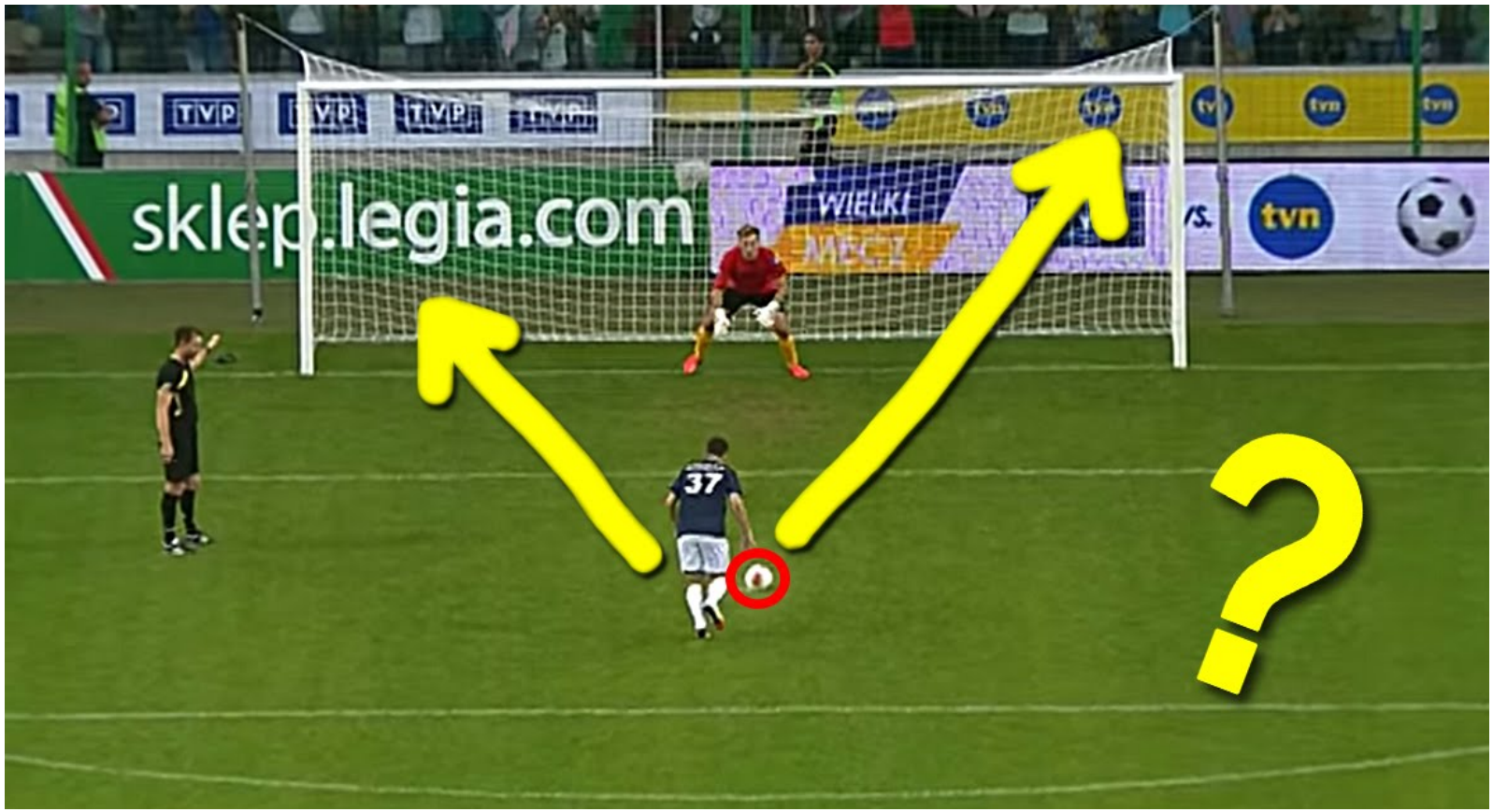

Unpredictability is important in **zero-sum games** with **lack of information**

2. (Possibly Bad) Equilibrium

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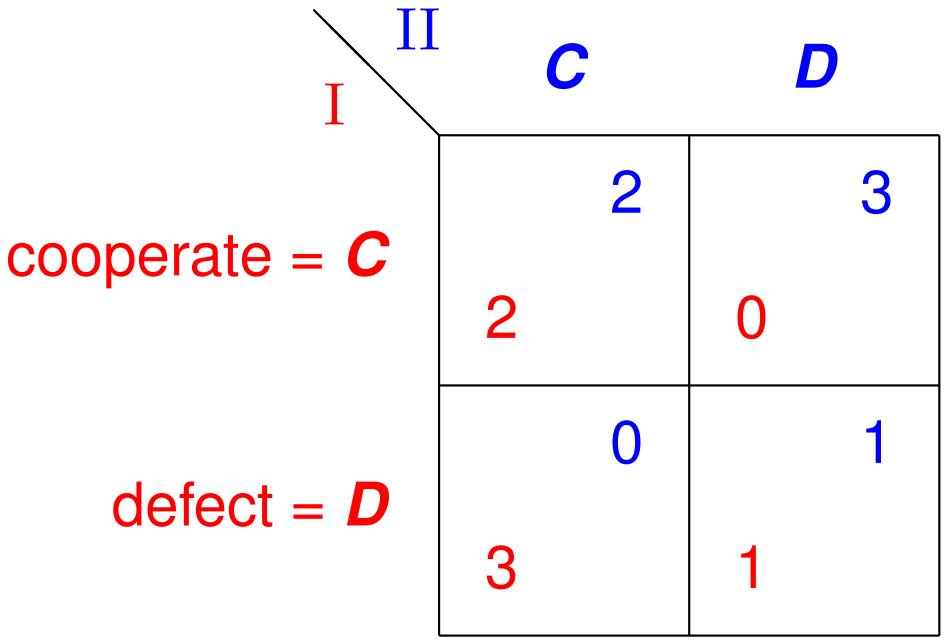
- equilibrium = mutually optimal behaviour

The Prisoner's Dilemma



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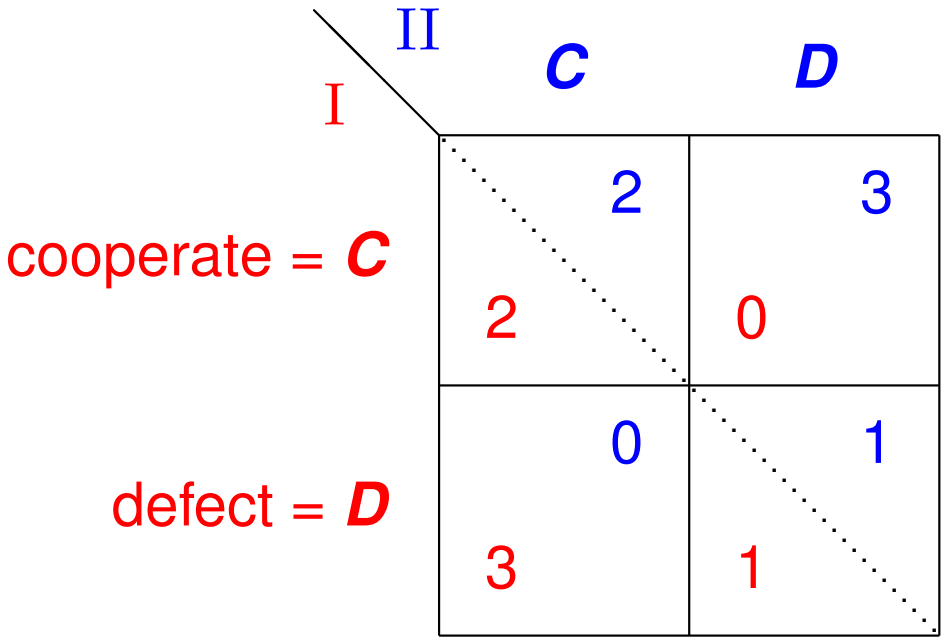

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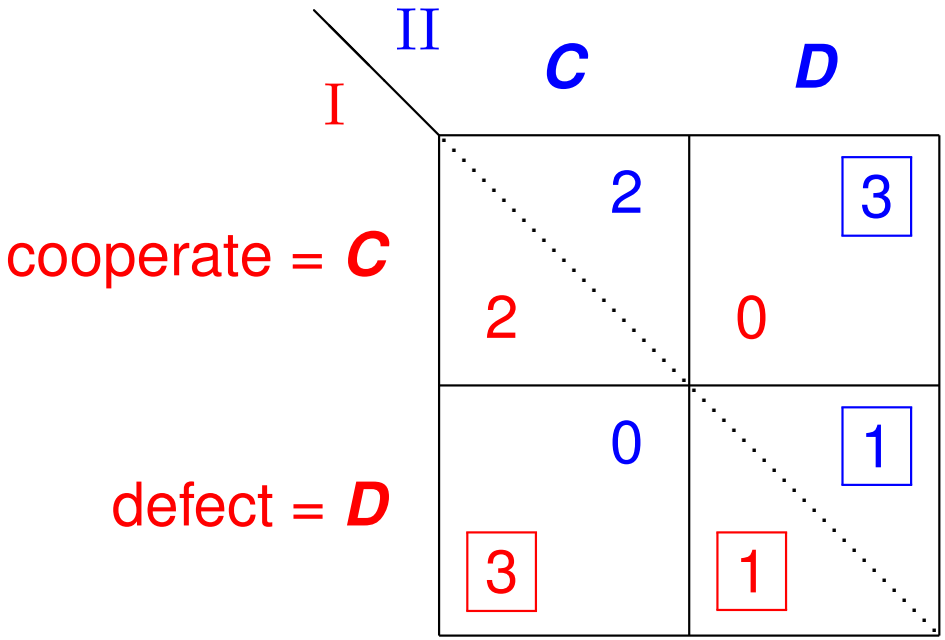

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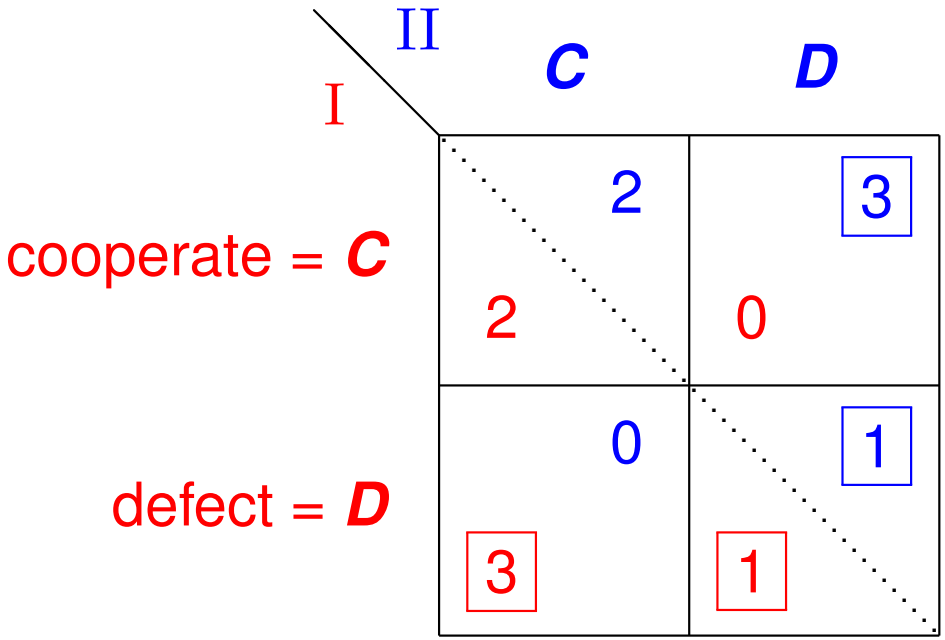

a metaphor for the "**tragedy of the commons**"

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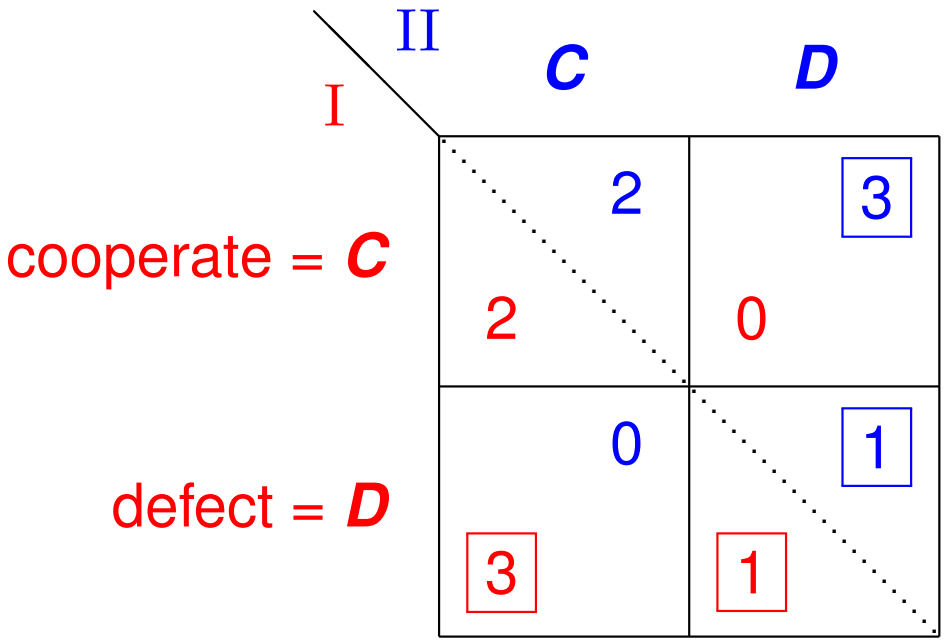
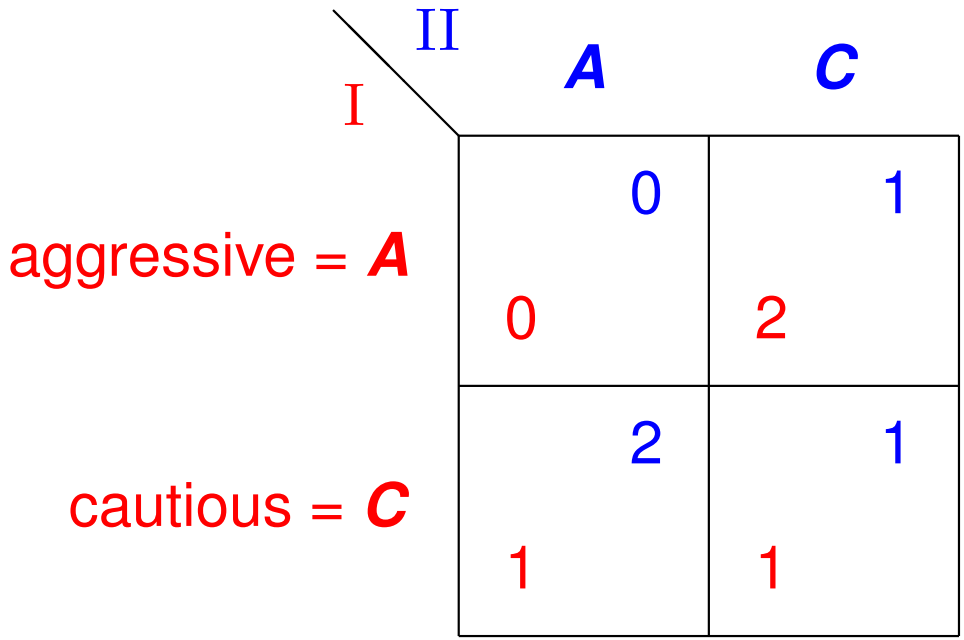


a metaphor for the **"tragedy of the commons"**

. . . but traditional "commons" often have (unwritten) enforcement rules to prevent this tragedy

Brinkmanship – the game of Chicken



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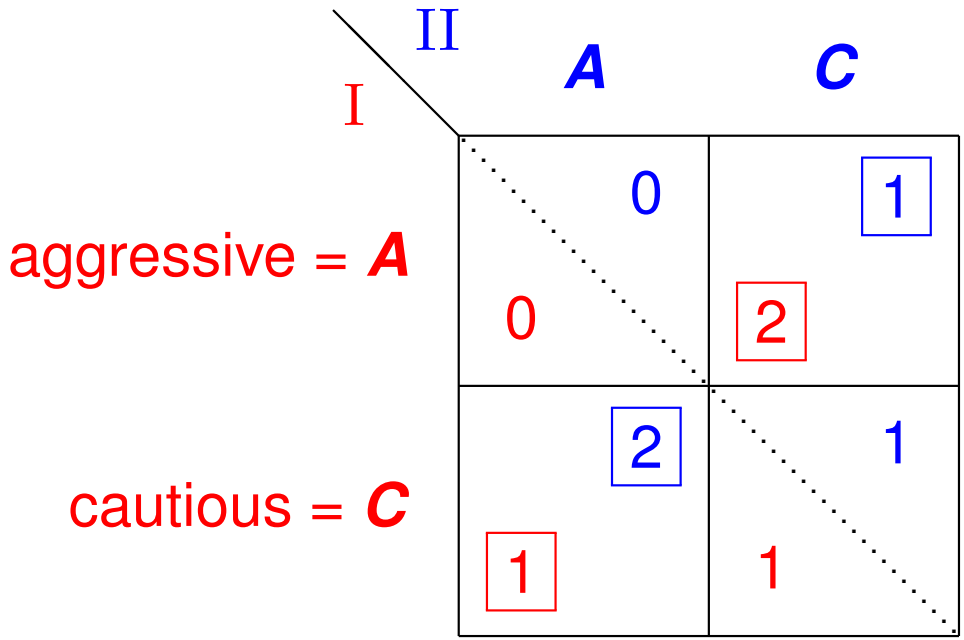
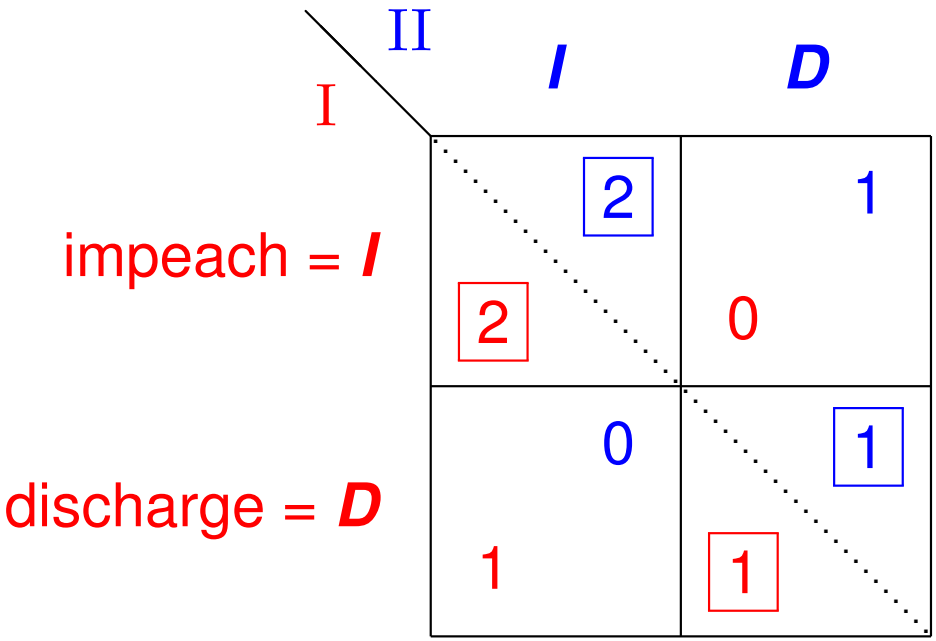


The game is symmetric (see dotted line), but its two equilibria **(*A*, *C*)** and **(*C*, *A*)** are **not** symmetric (the two players do not use the same strategy).

The Stag Hunt game



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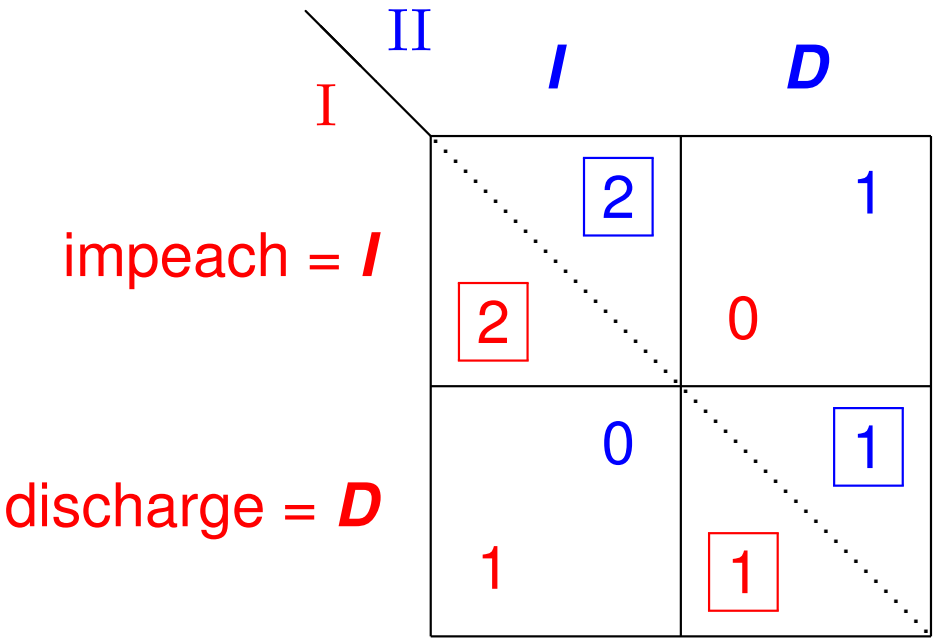
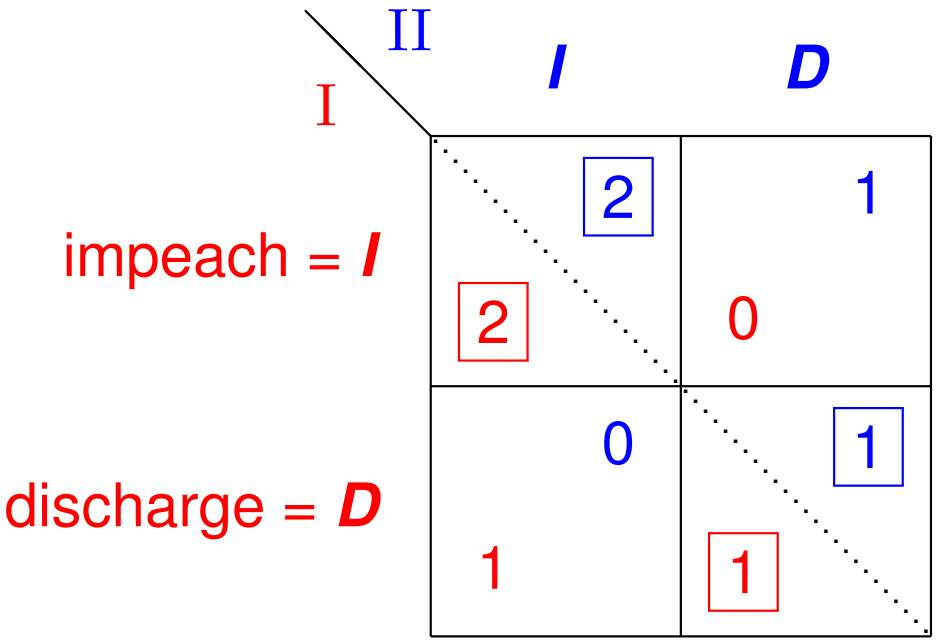


Symmetric game with two symmetric equilibria (***I***, ***I***) and (***D***, ***D***) .

What could be advantageous about (***D***, ***D***) ?

The Stag Hunt game or Trust Dilemma



Symmetric game with two symmetric equilibria (***I***, ***I***) and (***D***, ***D***) .

What could be advantageous about (***D***, ***D***) ? It's risk-free!

3. Payoffs and Preferences

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- where do the payoff numbers come from?

- they are meant to represent a **consistent**, often just **ordinal** preference

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- where do the payoff numbers come from?
- they are meant to represent a **consistent**, often just **ordinal** preference
- are consistent preferences consistently **aggregated**?

Maths Interlude:
Brexit Numeracy

Which number is largest (UK contribution to EU budget)?

- £350 million per week
- £18.4 billion per year
- £5.30 per person per week

Brexit criteria

	hard Brexit	soft Brexit	stay in the EU
Respect referendum result	**1**	**1**	**−1**
Northern Ireland peace	**−1**	**0**	**0**
Economic impact	**−1**	**0**	**1**
Sovereignty	**1**	**0**	**−1**
British world influence	**0**	**−1**	**1**

Brexit criteria – (weighted) sum

	hard Brexit	soft Brexit	stay in the EU
Respect referendum result	**1**	**1**	**−1**
Northern Ireland peace	**−1**	**0**	**0**
Economic impact	**−1**	**0**	**1**
Sovereignty	**1**	**0**	**−1**
British world influence	**0**	**−1**	**1**
total score	**0**	**0**	**0**

Brexit criteria – compare pairwise

	hard Brexit	soft Brexit	stay in the EU
Respect referendum result	**1**	**1**	**−1**
Northern Ireland peace	**−1**	**[0]**	**0**
Economic impact	**−1**	**[0]**	**1**
Sovereignty	**[1]**	**0**	**−1**
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hard Brexit : soft Brexit			

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hard Brexit : soft Brexit	**2**	**2**	

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hard Brexit : soft Brexit	**2**	**:**	**2**
soft Brexit : stay in EU			

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hard Brexit	: soft Brexit	**2**	: **2**	
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hard Brexit : soft Brexit	**2**	:	**2**	
soft Brexit : stay in EU			**2**	: **2**
hard Brexit : stay in EU	**2**		:	**3**

Brexit criteria – aggregate

	hard Brexit	soft Brexit	stay in the EU
Respect referendum result	**1**	**1**	**−1**
+ Northern Ireland peace	**−1**	**0**	**0**
= Acceptability	**0**	**1**	**−1**
Status of Britain =	**1**	**−1**	**0**
Sovereignty +	**1**	**0**	**−1**
British world influence	**0**	**−1**	**1**

Brexit criteria – aggregate

	hard Brexit	soft Brexit	stay in the EU
Acceptability	**0**	**1**	**−1**
Status of Britain	**1**	**−1**	**0**

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Brexit criteria – aggregate sum

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cycles in pairwise comparisons: **"Condorcet Paradox"**

hard Brexit : soft Brexit	**1**	**:**	**2**
soft Brexit : stay in EU		**1**	**: 2**
hard Brexit : stay in EU	**2**	**:**	**1**

4. Strategies

What is a strategy?

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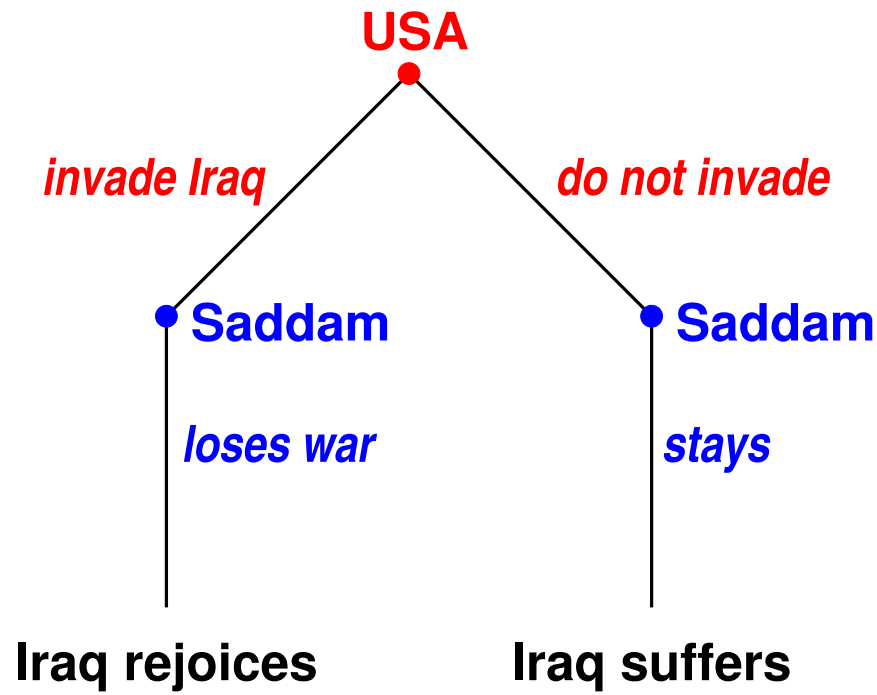

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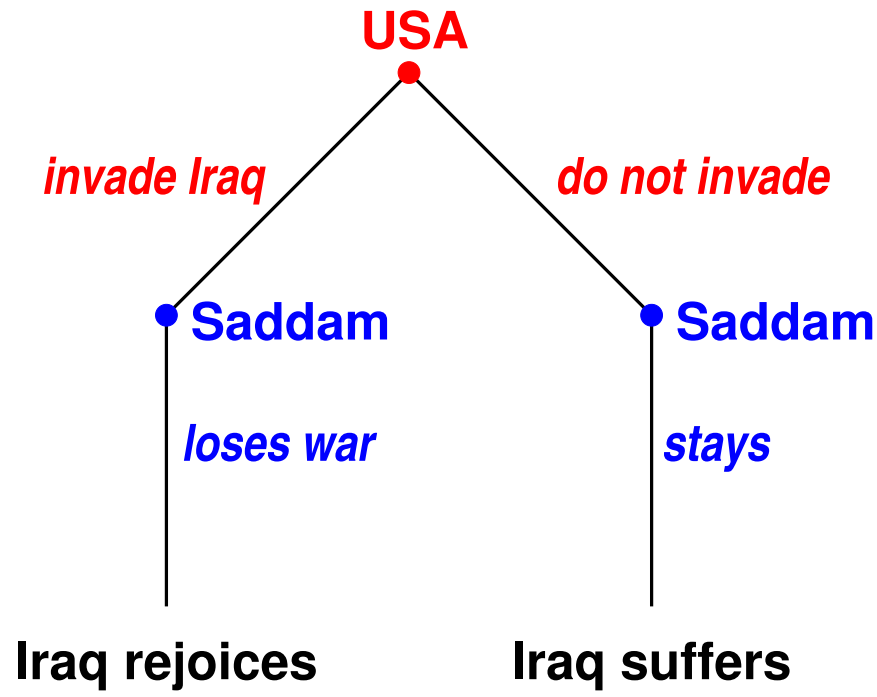

Game theory: Strategy = plan of action for every situation

5. The Rules of the Game Matter

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- does a “winner takes all” rule make your vote irrelevant?

Quorum rule

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- A majority of votes is in favour
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Suppose 28 % are **for** a strike, 20 % **against**

If you are against, should you vote?

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Suppose 28 % are **for** a strike, 20 % **against**

If you are against, should you vote?
No, to avoid meeting the quorum.

Better to induce democratic participation (replace quorum rule):

- A majority of votes is in favour
- At least 25 % (or 30 %,. . .) members vote in favour

First Past the Post – UK **2019** seat changes

Results analysis in maps and charts.

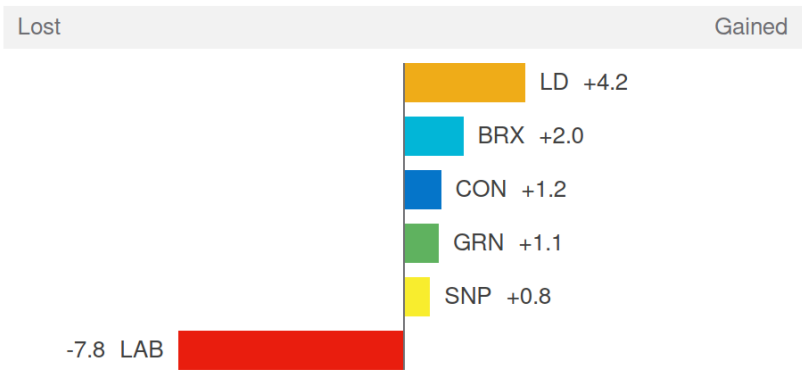
UK vote share

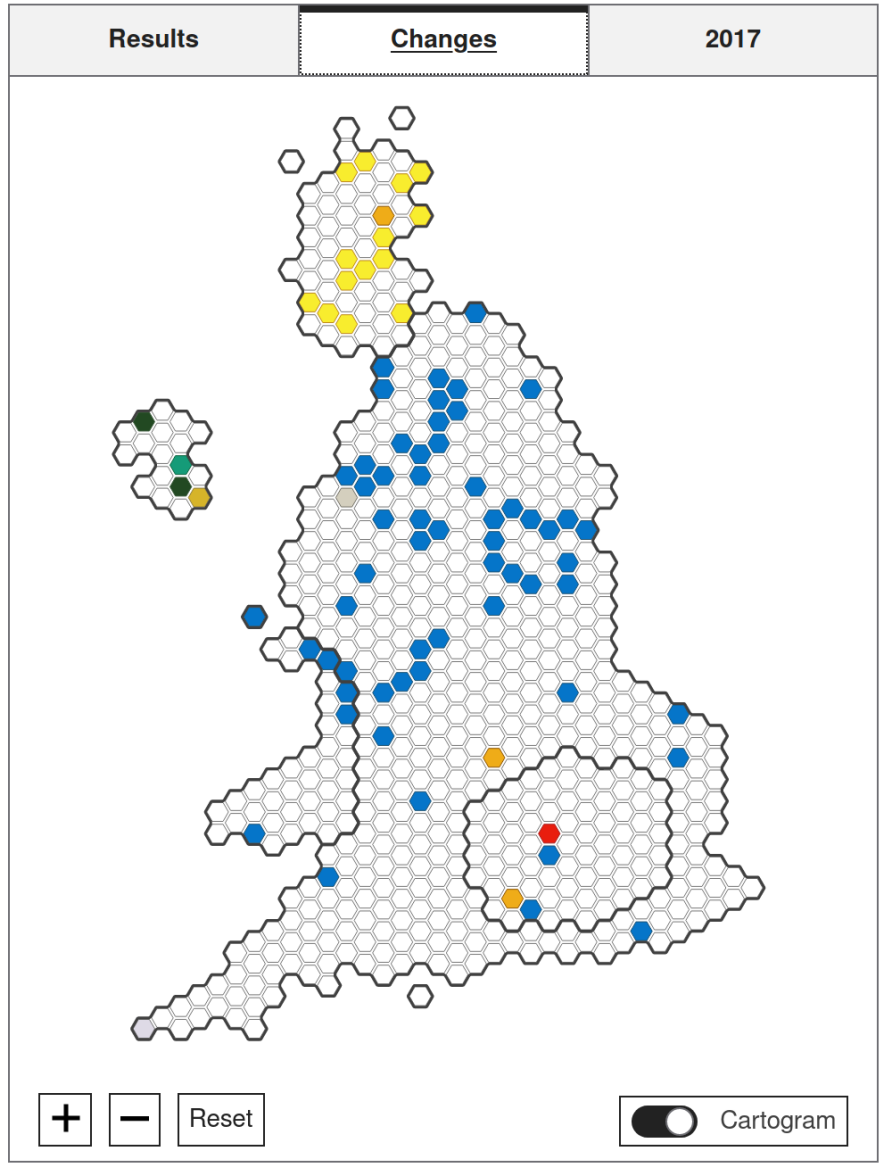
After 649 of 650 seats

Party	% share
CON	43.6%
LAB	32.2%
LD	11.5%
SNP	3.9%
GRN	2.7%
BRX	2.0%

UK vote share change since 2017

After 649 of 650 seats





https://www.bbc.com/news/election/2019/results

Is proportional representation better?

- how do party **coalitions** reflect the voters' intention?
- people are **used to** a voting system
- coalitions and referendums need practice
- learn from New Zealand

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Your individual vote **never** matters.

$\Rightarrow$ There is no such thing as a “lost vote”.

$\Rightarrow$ voters do not vote strategically (and mostly not tactically).

For discussion – challenges for game theory

- wishful thinking versus strategic thinking
  (why do so many people think only about their own tribe?)
- capture public spirit, civic duty, responsibility for the commons
- the rules of the game matter – but many unspoken rules too!

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Thank you!