Scientific Explanation and Game Theory

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GOV 40, February 14 2019

The menu

- Introductions, housekeeping
- Review of scientific explanation ("The Process")
- Review of game theory

Who's Pablo?

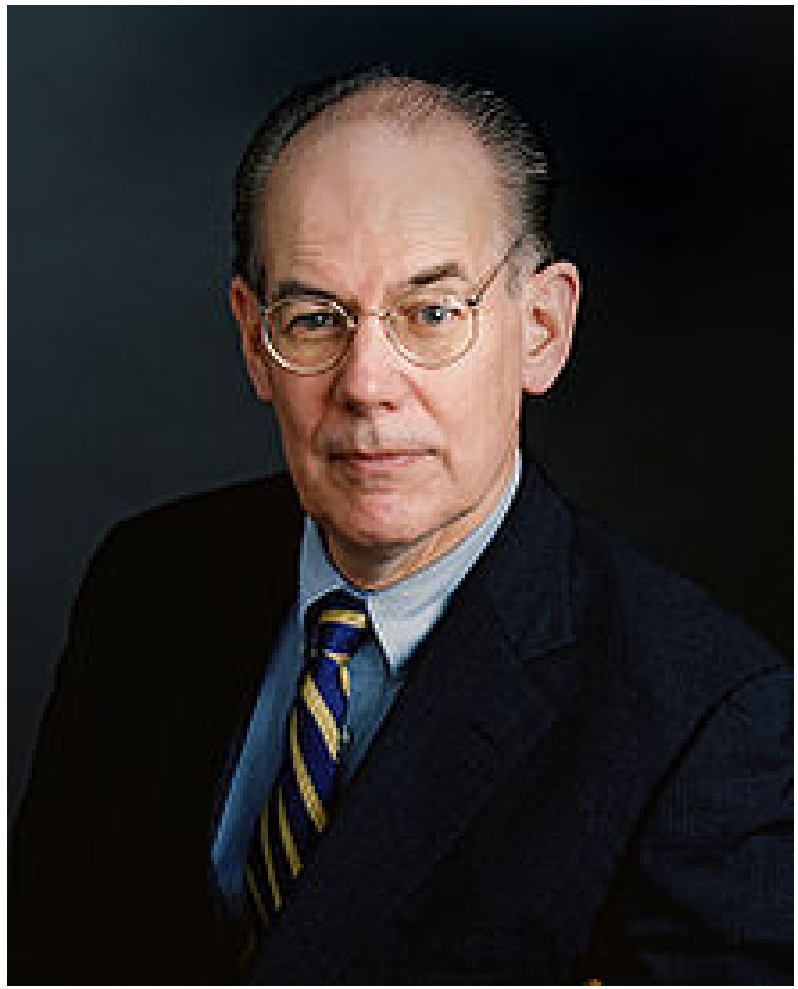
- Fourth year graduate student in Government
- From Argentina ☹
- Runs field experiments in the Democratic Republic of Congo ☺

IR


INTERNATIONAL RELATIONS MAJORS
What my Family Thinks I Do
What my Friends Think I Do
What Society Thinks I Do
What Hard Sciences Majors Think I Do
What I Think I Do
What I Actually Do

What has lecture been about?

"So, no social science theory can account for every case, although good theories can account for most of the cases. Many students of international politics don't like simple theories. They prefer complex explanations instead. But if you're a **complexifier** and not a **simplifier**, you're not going to be an important international relations theorist. You have to be interested in making simple arguments with a persuasive logic." **John Mearsheimer**

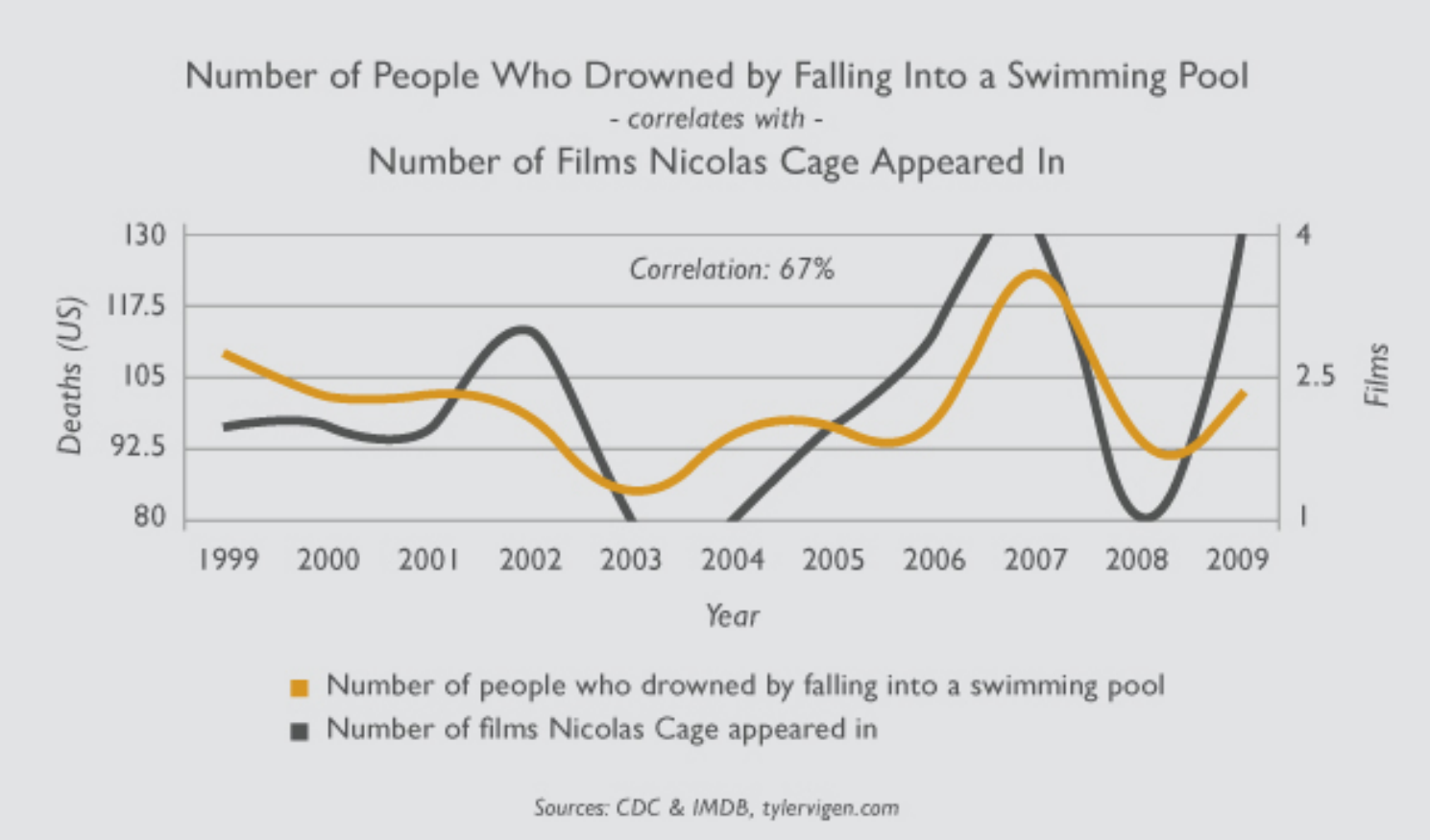


“THE PROCESS”

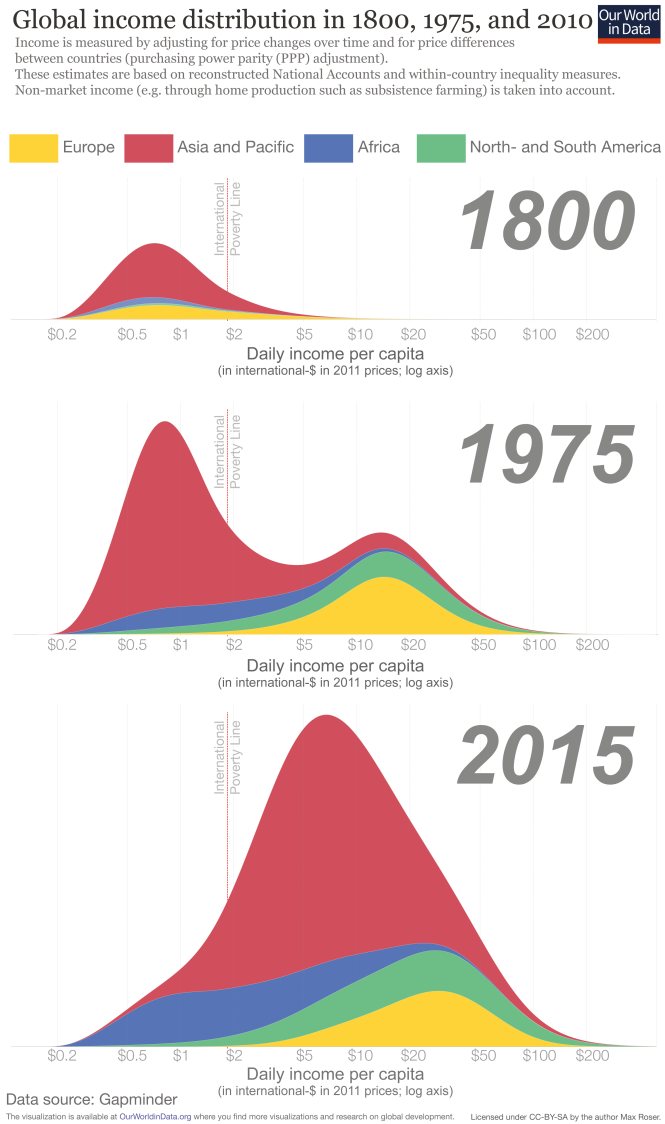
The ingredients

1. Observations: unit of observation. Countries, regions, parliaments, people, coups, rebel groups
2. Dependent variable: What we want to explain
3. Independent variable(s): (aka explanatory variable(s)). What does the explaining
4. Prediction: "If X, then Y" "If X increases, Y increases"
5. Variation:
   - DV = We want to explain variation in outcomes
   - IV = A constant can't explain variation

Correlation is not causation



ICA Redux


Global income distribution in 1800, 1975, and 2010
Our World in Data
Income is measured by adjusting for price changes over time and for price differences between countries (purchasing power parity (PPP) adjustment).
These estimates are based on reconstructed National Accounts and within-country inequality measures.
Non-market income (e.g. through home production such as subsistence farming) is taken into account.
Europe
Asia and Pacific
Africa
North- and South America
1800
International Poverty Line
$0.2 $0.5 $1 $2 $5 $10 $20 $50 $100 $200
Daily income per capita
(in international-$ in 2011 prices; log axis)
1975
International Poverty Line
$0.2 $0.5 $1 $2 $5 $10 $20 $50 $100 $200
Daily income per capita
(in international-$ in 2011 prices; log axis)
2015
International Poverty Line
$0.2 $0.5 $1 $2 $5 $10 $20 $50 $100 $200
Daily income per capita
(in international-$ in 2011 prices; log axis)
Data source: Gapminder
The visualization is available at OurWorldinData.org where you find more visualizations and research on global development.
Licensed under CC-BY-SA by the author Max Roser.

ICA Redux

1. Observations: Regions over time
2. Variation: # of people living in extreme poverty, across regions, over time
3. Dependent variable: # of people living in extreme poverty, across regions, over time
4. Independent variable(s): Economic growth/industrialization
5. Prediction: "As economic growth increases, the number of people living in extreme poverty decreases"

MORE EXAMPLES

Nalepa and Powell (2016)

This article considers how international criminal justice administered by the International Criminal Court (ICC) affects the possibility of negotiated, peaceful transitions of power in autocracies. We argue that a strong international criminal tribunal can deter dictators' decisions to peacefully relinquish their power. It does so when the dictator in question has faced a relatively violent opposition, one that was ready to strike a deal with the dictator promising him amnesty in exchange for stepping down. Facing an opposition that "has skeletons in its closet" the dictator will peacefully exit his office only under a weak ICC regime. We use a cross-national time-series data set spanning 1998 to 2007 to test our theory and find that under a weak ICC regime, the more skeletons the opposition has in its own closet, the more likely is the dictator to peacefully step down from office. Interestingly, this relationship holds, to a large extent, across various levels of dictator's culpability. If the ICC is strong, the number of skeletons the opposition has in its closet has, for the most part, no effect on the dictator's likelihood of stepping down.

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Choi and Piazza (2016)

This study asserts that countries with large internally displaced populations (IDPs) are more likely to experience a higher rate of suicide terrorism. After demonstrating this, the study tests four intervening factors hypothesized to drive the relationship between IDPs and suicide attacks: IDPs are expected (1) to increase the pool of potential suicide recruits, thereby lowering the labor costs for suicide terrorist groups; (2) to increase local ethnic conflicts that foster a favorable environment for suicide terrorism; (3) to worsen the human rights conditions in countries, prompting aggrieved people to support suicide terrorist tactics; and (4) to raise the counterterrorism and policing costs of the state, enabling terrorists to plan and execute suicide attacks. Results from negative binomial regression and Tobit models show evidence for the IDPs-suicide terrorism connection. When recursive models are employed to evaluate the effects of four intervening variables, the results most consistently support human rights violations as a significant and substantive mediator between IDPs and suicide attacks.

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Kim and Woods (2016)

What causes petro-aggression? [Petrostates are countries that produce a lot of oil]. Conventional wisdom maintains that the regime type of petrostates has significant effects on the likelihood that petrostates will launch revisionist militarized interstate disputes (MIDs). While domestic politics is an important factor that might explain the motivation and behavioral patterns of a petrostate, it says little about the international environment in which a petrostate decides to initiate conflicts. One significant factor that presents opportunities and constraints for petro-aggression is a great power alliance. In essence, the great power has strong incentives not to upset the relationship with its client petrostate ally for both strategic and economic reasons and, hence, tends not to oppose military adventurism by its ally. Consequently, the petrostate's anticipation of great power inaction or even protection for its revisionist policy creates a moral hazard problem. Overall, by offering favorable circumstances, a great power alliance has a positive effect on petro-aggression. Although not without caveats, our large-n model and case study bear out this conclusion.

Boutton and Carter (2014)

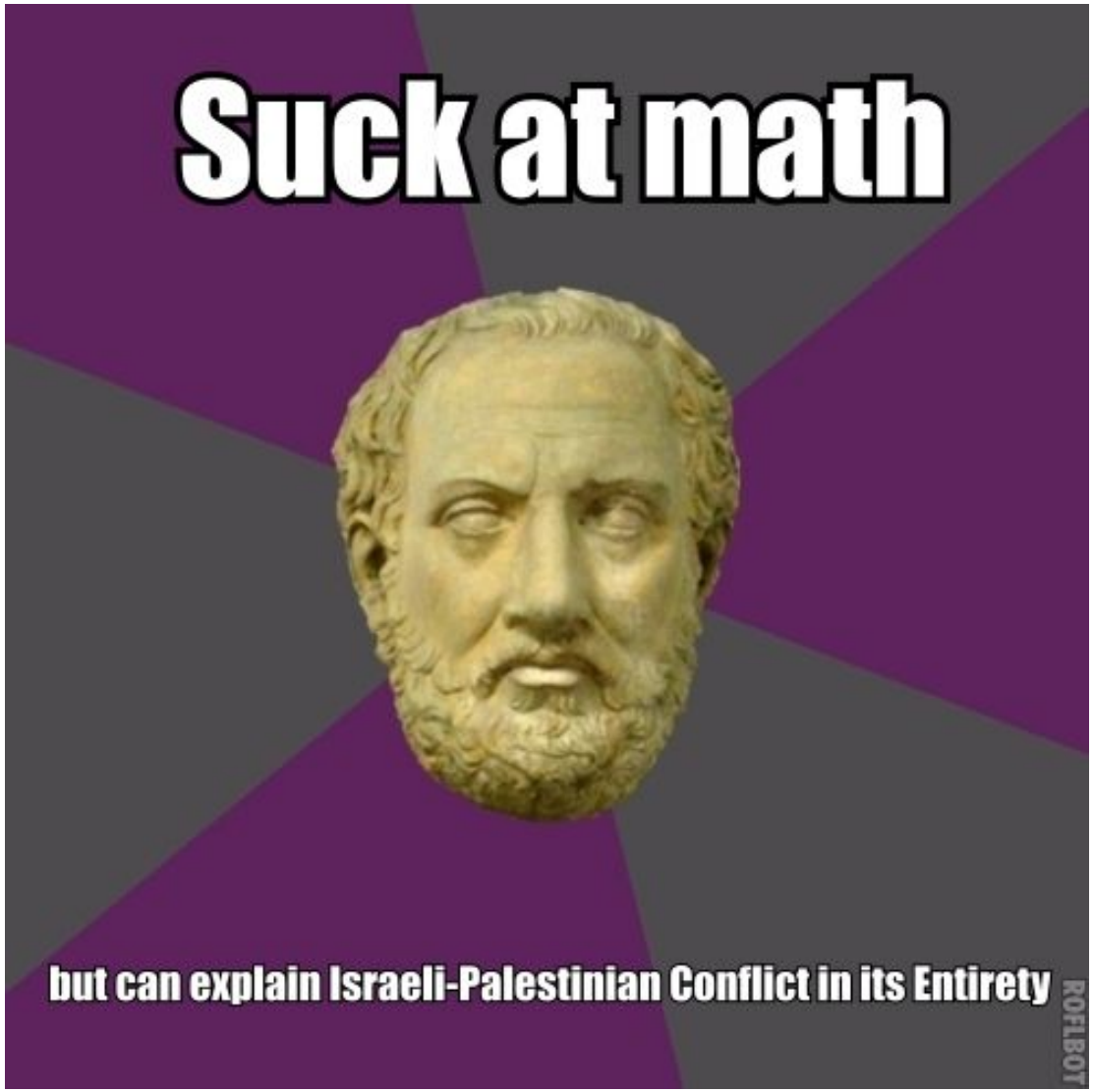
While it is commonly assumed that the United States uses foreign aid as an instrument to combat global terrorism, it is unclear whether it views terrorist threats to other countries, particularly its allies, with urgency. We show that the relationship between transnational terrorism and foreign aid flows is strongly conditional on whether terrorist activity based in a potential recipient directly threatens the United States. Using data on terrorist attacks and casualties in potential recipient countries, we demonstrate that terrorist activity based within a state's borders, which targets US interests is a strong determinant of both whether that state receives any aid and also how much aid it receives. In contrast, the presence of terrorism targeted at non-US interests, even if it targets formal allies of the United States, is generally unrelated to US aid allocation. These findings suggest that the United States' use of foreign aid to fight terrorism and political violence is narrowly tailored to assist countries that directly threaten its own security, rather than those of other countries, even its allies.

Frustrated, huh?

¯_(ツ)_/¯

GAME THEORY

Math


Suck at math
but can explain Israeli-Palestinian Conflict in its Entirety
ROFLBOT

Why game theory?

- Game theory is the study of strategically interdependent behavior
- Strategic interdependent = what you do affects my outcomes, and vice versa
- The outcome of a situation (social outcomes) doesn not depend on my choices or your choices only
- Study situations that contain a mix of conflict and cooperation
- What do different strategic situations have in common?
  - Applications: Nuclear deterrence, war, bargaining in Congress, animal conflict

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What is a game?

- Players (actors)
- Strategies (actions)
- Payoffs (preferences)

- **Note:** In the games we are studying, players choose their strategies simultaneously. This does not necessarily mean that they act at the same time but that they choose their action without knowing what the other players choose.

Key concepts

Best Response

Strategy S_1 is a best response to (the other player's) strategy S_2 if: Player 1 cannot do any better by switching to another strategy, given what player 2 is doing.

Nash Equilibrium

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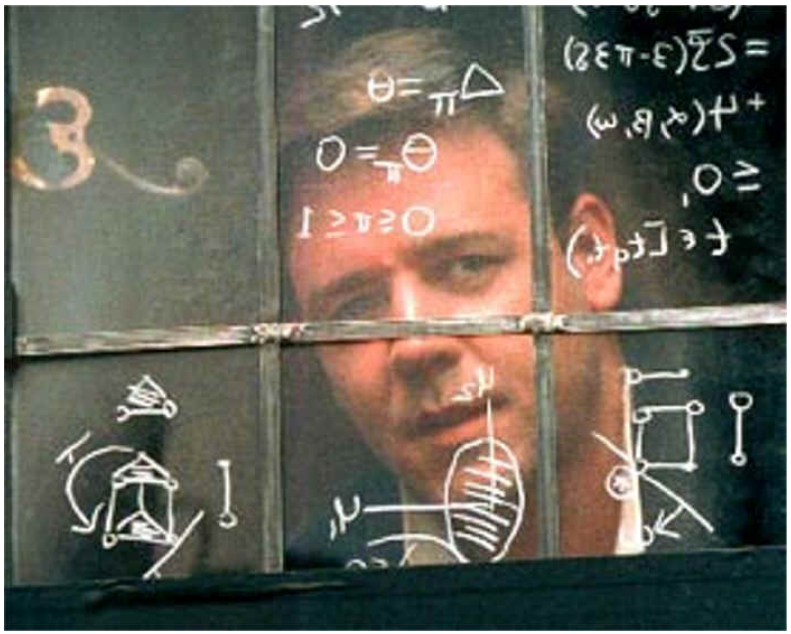
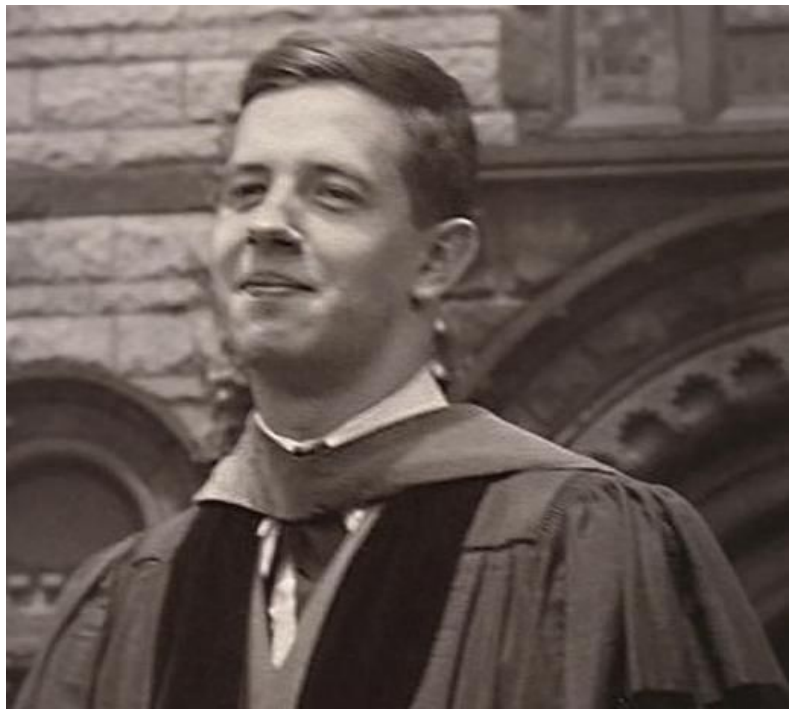
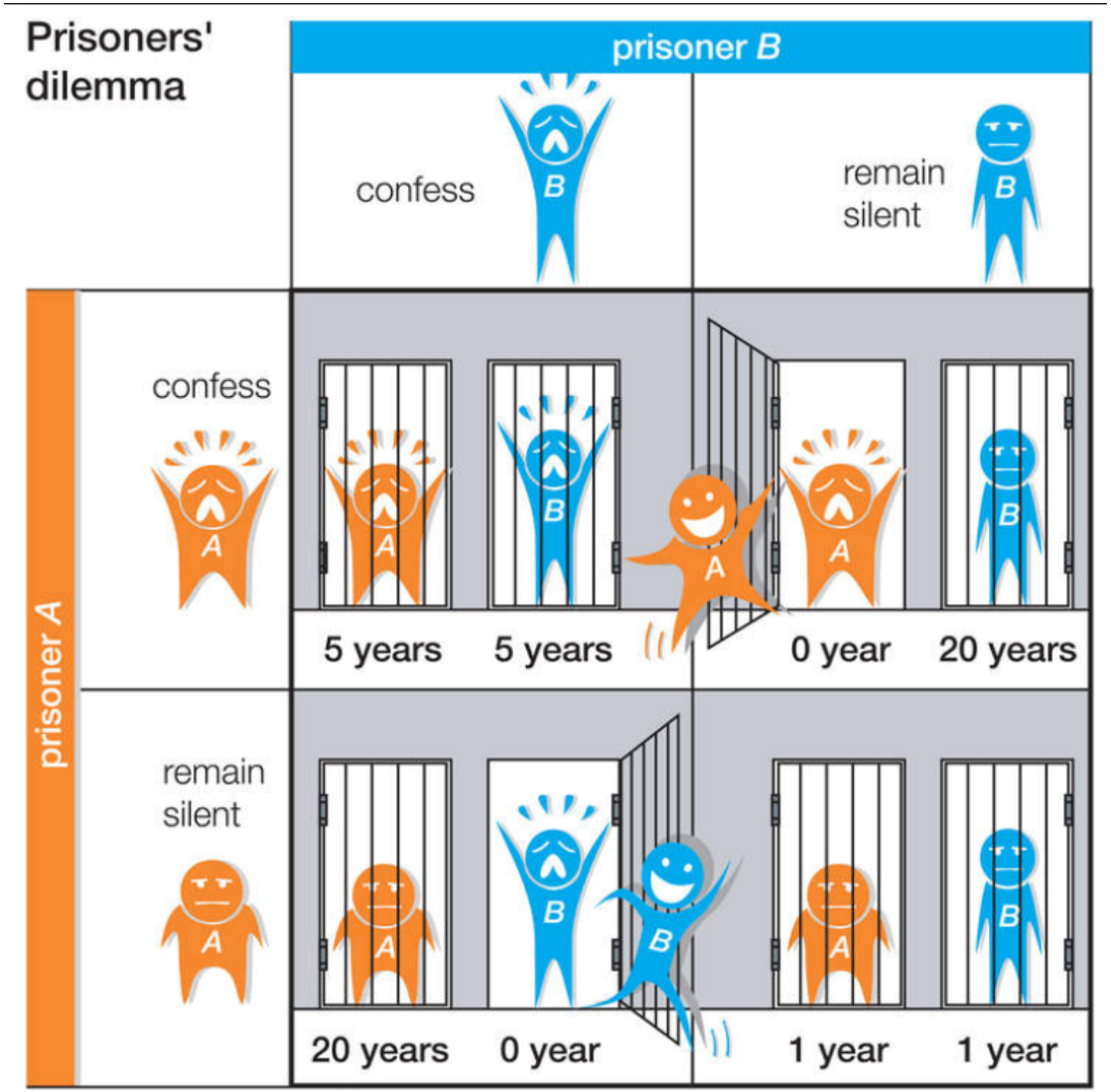
Nash Equilibrium





Prisoners' Dilemma (PD)

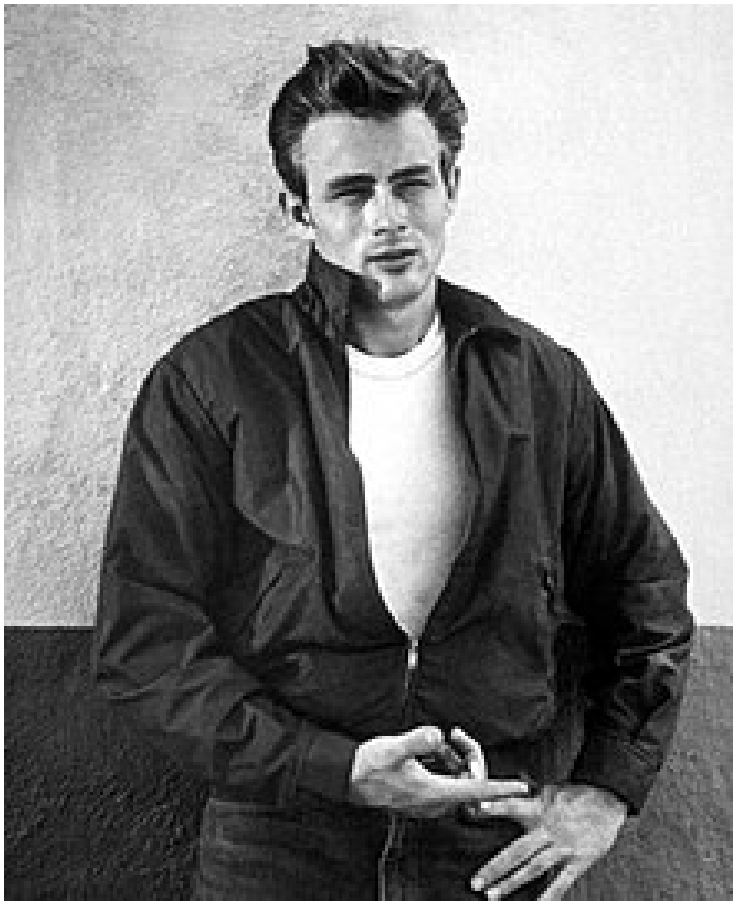


Prisoners' Dilemma (PD)

		P2: $C = stay\ quiet$	P2: $D = rat\ out$
P1	$C = stay\ quiet$	$3, 3$	$1, 4$
	$D = rat\ out$	$4, 1$	$2, 2$

- Each players' payoff function: $DC > CC > DD > CD$
- Nash Equilibrium: $\{D, D\}$
- Takeaway: Individual vs. collective optimum
- Application: public goods provision

Chicken



Chicken

		P2: $C = turn$	P2: $D = stay\ tough$
P1	$C = turn$	$0, 0$	$-2, 2$
P1	$D = stay\ tough$	$2, -2$	$-100, -100$

- Each players' payoff function: $CC > DC > DD > CD$
- Nash Equilibrium: $\{D, D\}$ and $\{C, C\}$
- Takeaway: Do the opposite of what you think the other player is gonna do. Show resolve.
- Application: Bargaining

Stag Hunt

Stag Hunt

		P2: $C = stag$	P2: $D = hare$
P1	$C = stag$	$4, 4$	$1, 3$
	$D = hare$	$3, 1$	$2, 2$

- Each players' payoff function: $CC > DC > DD > CD$
- Nash Equilibrium: $\{D, D\}$ and $\{C, C\}$
- Takeaway: (1) Coordination (2) Trust
- Application: International institutions

PRACTICE PROBLEMS

Solve for the equilibrium

		P2	
		Left	*Right*
P1	*Up*	$4, 6$	$11, 2$
	Down	$2, 9$	$1, 1$

3 X 3 matrix

		P2		
		Left	*Middle*	*Right*
P1	*Up*	$4, 6$	$4, 7$	$11, 2$
	Center	$5, 2$	$0, 0$	$-2, 4$
	Down	$1, -1$	$2, 9$	$1, 1$

Fill out the payoffs

- So that $\{D, L\}$ is a Nash equilibirum

		P2: *Left*	P2: *Right*
P1	*Up*	,	,
	Down	,	,

Fill out the payoffs

- So that $\{D, L\}$ is a Nash equilibirum

		P2	
		Left	*Right*
P1	*Up*	$4, 1$	$0, 2$
	Down	$5, 5$	$1, 4$

What have we learned?

- The fundamental building blocks of a scientific explanation
- Game theory and applications