THE THRONE OF GAMES: Game Theory as a Foundation for Dispute Resolution and Law: An Introduction for Attorneys, Judges, and Neutrals

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Let's play a game….

- We need six volunteers from the audience. Come on down!!!
- Please pair up with someone you have not met before. Do not discuss or negotiate anything.
- We will give you a handout with instructions. Please read the facts.
- Please don't start play until both of you have read the handout and we give you the go ahead.

Can we learn from games? YES!

Let's consider **FOOTBALL**.
What basic choices do coaches have for offense?

- Run the ball.
- Pass the ball.
- and for former Coach Tressel-Punt the ball.

What is the result of any play call—run or pass—taken in isolation?

- We don't know, **if** all we consider is the offensive play call.
- Why? Because the defensive play call also directly affects the result.
- It's **the interaction between the choices** that is important.

We have to consider the offensive play called against the defense called to get the result.

	Offense Runs	Offense Passes
Defend The Run	No gain	Touchdown!
Defend The Pass	Short gain	Interception

Is football this simple? Of course not. There are hundreds of plays on offense and dozens of defenses.

	Up the Middle	Sweep	Draw	Screen Pass	Corner Route	Hail Mary
4-3						
5-2						
Blitz						
Goal-line						
Zone						
Prevent						

Can we learn something as attorneys and neutrals from analyzing games like football or baseball?

- The outcome of the game depends on ***both*** players' choices.
- The players try to outguess each other to maximize their result.
- Players can use "I know that he knows that I know that he likes to run on first down…" reasoning to try to defeat their opponent.
- Games can have interactions that are repeated, or they can be one-time events.

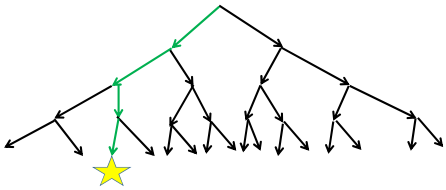
Can we generalize from "Games" to real life?

- Games involve players—two or more with choices and objectives.
- Players compete against each other for success and social benefits.
- Results are determined through the combination of players' choices.
- Players' goals sometimes are inconsistent—a win for one is a loss for another—*but not always*.
- Players' strategies can and do anticipate and factor in their opponents' thinking.
- Sometimes cooperation yields a different result from competition.

Game Theory Vocabulary

- Game—an interaction between two or more players.
- Payoff—result of the choices, can be positive or negative, can be any units of measurement (dollars, power, resources, social benefits, etc.)
- Zero Sum Game—one player wins what another loses, no net gains.
- Positive Sum Game—players' choices can increase the total of all the payoffs, net gains for everyone are possible.
- Iterated—a game with multiple rounds of play, repeat interactions.
- Non-iterated—a "one shot" game, no repeat.

Are grids the only way to describe games? No, trees work well too.



Game theory analyzes strategic thinking, where a player uses backward induction—planning a goal and reasoning backward to make the right choices so that you arrive at your desired outcome factoring in opponent's choices.

What's in a Name?

- Game Theory got its name from the analysis of games like poker and chess, and that title stuck.
- Could it have been better named? Yes.
- A better choice would have been Interaction Theory, because that is really what is being studied, and it sounds more serious.

Ladies and gentlemen, Prof. Roy Lewicki…

- Insert Video 1 here

Can this analysis of games be applied elsewhere? YES!

- Negotiation
- Mediation
- Law
- International Affairs
- Economics
- Land Use and Planning
- Evolution

What do we assume in order to look at game theory outside of sports?

- For simplicity—we assume two players, or if there are a lot of players, they act in two defined groups.
- Each player or group knows the benefits and acts rationally to maximize their benefits.
- There are two basic choices—cooperate or compete.
- The interaction can go on repeatedly or can be a one-time event.
- The players may or may not be able to communicate with each other before making their decisions.

Game Theory CSI—a basic game

- Police have arrested two suspects—Able and Baker—based on some evidence of a crime they were both involved in.
- Able and Baker are held in separate cells and can't communicate.
- The police tell each prisoner "Look, we have enough evidence now to get a conviction and a 1 year sentence against both of you. But if you confess and implicate your partner, you will serve no time and your partner gets 15 years. If you both confess, you will each get 8 years."
- The police also say "Only the first one to confess gets the deal. Better start talking."

A Basic Game—Prisoners' Dilemma

	Player Able Cooperate with B (Stay silent)	**Player Able Compete with B (Confess)**
Player Baker Cooperate with A (Stay silent)	**A gets 3 pts.** **B gets 3 pts.**	**A gets 5 pts.** **B gets 0 pts.**
Player Baker Compete with A (Confess)	**A gets 0 pts.** **B gets 5 pts.**	**A gets 1 pt.** **B gets 1 pt.**

A's REASONING: 5 better than 3, and 1 better than 0, so A's best choice is to compete (rat out B)

	Player Able Cooperate	**Player Able Compete** ★
Player Baker Cooperate	**A gets 3** **B gets 3**	**A gets 5** **B gets 0**
Player Baker Compete	**A gets 0** **B gets 5**	**A gets 1** **B gets 1**

B's REASONING: 5 better than 3, and 1 better than 0, so B's best choice is to compete (rat out A)

	Player Able Cooperate with B	Player Able Compete with B
Player Baker Cooperate with A	A gets 3 B gets 3	A gets 5 B gets 0
Player Baker Compete with A ★	**A gets 0** **B gets 5**	**A gets 1** **B gets 1**

RESULT: Both players compete, turn on each other, get 1 point each, and miss chance at mutual benefit (3 each)

	Player Able Cooperate	Player Able Compete
Player Baker Cooperate	A gets 3 B gets 3	A gets 5 B gets 0
Player Baker Compete	A gets 0 B gets 5	**A gets 1** **B gets 1** ⊘

Now, let's look at the legal system…

- Law strives to control how groups and individuals interact.
- Some legal interactions: buyer/seller, debtor/creditor, spouses, employer/employee, injured/insurance co., etc.
- Attorney and party interactions can be cooperative or competitive, and can be repeated over time.
- Attorneys' advice about negotiation and settlement influences clients' decisions.
- Attorneys, being competitive and in an adversary system, strive for advantage and try to "win".

Bargaining—What approach to take?

- What are the basic choices of a party or attorney in negotiations?

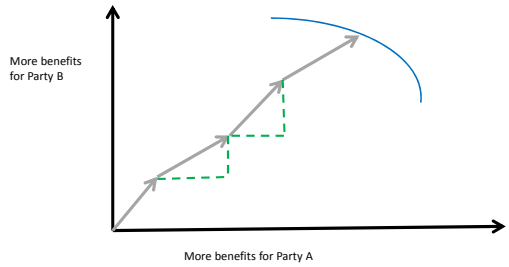
Make many concessions to get a deal—**cooperate**.

Hold out to get maximum unilateral benefits—**compete**.

Results—The Negotiator's Dilemma

	Buyer (Cooperate) Make concessions	Buyer (Compete) Hard bargaining
Seller (Cooperate) Make concessions	Make a deal Make a deal	Get nearly all benefits Get almost nothing
Seller (Compete) Hard bargaining	Get almost nothing Get nearly all benefits	No deal No deal

Solution—Craft a Positive Sum Game



International Example—An Arms Race

	Blue Nation Disarm (Cooperate)	Blue Nation Build Bomb (Compete)
Red Land Disarm (Cooperate)	Safe, Less Cost Safe, Less Cost	Dominate All Be Intimidated
Red Land Build Bomb (Compete)	Be Intimidated Dominate All	Huge Cost & Risk Huge Cost & Risk

Relationships—a cycle of interaction—"tit for tat."

	Red Nation (or divorce party A) Sign treaty, make peace (Cooperate)	Red Nation (or divorce party A) Retaliate always (Compete)
Blueland (or divorce party B) Sign treaty (Cooperate)	Live in peace Live in peace	Look tough, get even Be victimized
Blueland (or divorce party B) Retaliate always (Compete)	Be victimized Look tough, get even	Constant war Constant war

A word on "Tit for tat"….

- "Tit for tat" is not a game, it is a strategy for use in Prisoners' Dilemma.
- In a repeated game of Prisoners' Dilemma, "Tit for tat" calls for a player to cooperate on the first round, and then mirror the cooperate/compete decision of the other player in subsequent rounds.
- "Tit for tat" has been demonstrated in computer and human experiments to yield the best long run outcomes in iterated Prisoners' Dilemma games.
- "Tit for tat" has a downside if the players get into a cycle of retaliation.

Civilization—The Social Contract

	You and your tribe **Give up some rights** **(Cooperate)**	**You and your tribe** **Absolute freedom** **(Compete)**
Me and my tribe **Give up some rights** **(Cooperate)**	**Live in peace** **Live in peace**	**Pillage, loot** **No security**
Me and my tribe **Absolute freedom** **(Compete)**	**No security** **Pillage, loot**	**Live in chaos** **Live in chaos**

THE ABSENCE OF SOCIAL COOPERATION?

In the words of Thomas Hobbes: a war of all against all… “the life of man, solitary, poor, nasty, brutish, and short.”

Are there other games besides Prisoners’ Dilemma? Yes.

- Chicken (know in diplomatic circles as brinksmanship)
- Stag hunt (do the parties cooperate to find bigger prey or get just enough food for themselves?)
- Divide the cake (also known as “I cut, you choose.”)
- Volunteer’s Dilemma (who makes the first move at some personal inconvenience to solve a problem common to all?)

Land Use—The Tragedy of the Commons

	Your family Limit grazing in the commons (Cooperate)	Your family Graze to the maximum (Compete)
My family Limit grazing in the commons (Cooperate)	Food for all sheep Food for all sheep	Enlarge herd Have less wool, meat
My family Graze to the maximum (Compete)	Have less wool, meat Enlarge herd	Overgraze, sheep starve Overgraze, sheep starve

Bandwidth or Ocean Fishing or Natural Resources—The New Tragedy of the Commons?

	Your family or nation Conserve finite resources (Cooperate)	Your family or nation Consume finite resources (Compete)
My family or nation Conserve finite resources (Cooperate)	Get a certain amount, protect future Get a certain amount, protect future	Get as much as you can right now Get less, risk future
My family or nation Consume finite resources (Compete)	Get less, risk future Get as much as you can right now	Deplete resources Deplete resources

The "free rider" or honor system problem

	Half of population Pay for service (Cooperate)	Half of population Not pay for service (Compete)
Other half Pay for service (Cooperate)	Costs covered, service available Costs covered, service available	Get service for $0 Pay costs for all
Other half Not pay for service (Compete)	Pay costs for all Get service for $0	No service at all No service at all

How to avoid a Tragedy of the Commons?

- Change the structure of the game—create private property rather than a commons. Each player bears their own costs for their property.
- Empower a central authority—rule of law to prohibit certain conduct (change the payoffs with penalties, fines, fees, taxes, social shame)
- Private agreements—parties agree to avoid certain conduct, but trust and enforcement become problems.
- Social mores—Social stigma associated with uncooperative conduct ("Horder!" or "Greedy so-and-so!" or "Cheater! That's not fair!")

Land use game—NIMBY (not in my backyard) & LULU (locally undesired land use)

	Region A Cooperate (Allow adverse land use)	**Region A Compete (Avoid adverse land use)**
Region B Cooperate (Allow adverse land use)	**Project built.** **Project built.**	**No project built in Region A.**
Region B Compete (Avoid adverse land use)	**No project built in Region B.**	**No project is ever built.**

Once again, Prof. Roy Lewicki….

- Insert Video 2 here

How can a mediator use game theory? #1

- Calm the parties' emotions so they can rationally analyze the game they are in.
- Use caucuses to learn parties' real goals and perceived payoffs.
- Help the parties see joint gains and/or joint savings ("enlarge the pie before it is divided") to create a positive sum game.
- Brainstorm with parties (jointly or in caucuses) to see if a creative solution will convert a zero sum game into a positive sum game.
- Discuss relationship between the parties, try to avoid a negative tit-for-tat cycle if there are future repeat interactions between the parties.

How can a mediator use game theory? #2

- Recognize a game pattern where a third party has to make the first move toward cooperation (avoid a game of chicken). Use of suggestions. Face saving methods. Offer to hear each party's best position privately and compare.
- Use a single negotiation text to help parties see win-win tradeoffs in a multi-issue dispute (avoid a negotiator's dilemma).
- Create trust-building mechanisms (escrows, independent expert inspections, objective verification of performance, etc.) in the agreement to encourage long-term cooperation.
- Be an agent of reality if someone overestimates litigation payoffs.

Are there limits to game theory? YES.

- People are not always rational. Fear, greed, revenge, habit, bias, risk aversion, etc. affect decisions. See behavioral economics.
- Decision makers lack full information (don't know payoffs and/or other party's goals).
- Power imbalances (other party can play longer game, can absorb more losses, take greater risks, incur more transaction costs).
- Long term benefits/costs hard to calculate. Litigation risk hard to measure.
- Other party may be deceptive/bluffing.

The Ultimate Insight About Cooperation?

- The Golden Rule—
- Do unto others as you would have them do unto you. (21 religions have a variant of this concept)
- Kant's Categorical Imperative—
- "Act only according to that maxim whereby you can at the same time will that it should become a universal law."
- Mom's Rule— "What if everybody did it?"

"And in conclusion….

- Game theory gives us a helpful intellectual tool for looking at patterns/models of how humans interact, especially in disputes.
- Game theory can give attorneys and neutrals new insights about how to prevent or resolve disputes.
- Game theory can be learned with outside reading.
- Game theory can "scientifically" confirm that which we intuitively knew already—cooperation often is a better path.
- Long term, reciprocal, mutually beneficial cooperation is often a good approach to law, dispute resolution, and everyday life.

Suggested Introductory Reading

- Prisoner's Dilemma by William Poundstone
- Rock, Paper, Scissors: Game Theory in Everyday Life by Len Fisher
- The Evolution of Cooperation by Robert Axelrod
- Game Theory and the Law by Douglas G. Baird, Robert H. Gertner, and Randal C. Picker

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Additional Materials….

- We could not cover everything in one hour.
- Game theory is highly versatile.
- Here are some extra materials for further consideration…..

Baseball has similar games within the game.

	Throw a curve	Throw a fastball	Throw a changeup
Look for a curve	Double	Strike	Foul ball
Look for a fastball	Strike	Homerun	Look silly
Look for a changeup	Hit grounder	Swing and miss	Hit triple

Q-bomb Hypothetical—scoring

- The players' overarching goal was to maximize their country's stature on the world stage, measured in IPUs (international prestige units).
- If country #1 deploys the Q-bomb and country #2 does not, #1 gets IPU 10,000 and #2 will receive 0 IPUs.
- If country #1 does not deploy the Q-bomb and country #2 does, #1 gets 0 IPUs and #2 will get 10,000 IPUs.
- If both countries do not deploy the Q-bomb, both will get 3,000 IPU.
- If both countries deploy the Q-bomb, each nation gets 1,000 IPU.

Q-bomb drone hypothetical—scoring

- If both countries deploy subs with drones, each nation gets negative 100,000 IPU as both countries will have an incentive to strike first, making war a near certainty.
- If country #1 deploys subs and country #2 seeks U.N. mediation, #1 gets 10,000 IPU and country #2 will lose 10,000 IPUs for appearing weak.
- If country #1 seeks U.N. mediation and country #2 deploy subs, #1 loses 10,000 IPUs for appearing weak. Country #2 will get 10,000 IPUs.
- If both countries withdraw their subs, both countries' IPU totals will rise by 1,000 as a destructive world conflict will be less likely.

History quiz—Who are these men?

Representative Willis C. Hawley and Senator Reed Smoot

What about tariffs and trade?

	Steel Nation Lower Tariffs (Cooperate)	Steel Nation Raise Tariffs (Compete)
Iron Land Lower Tariffs (Cooperate)	More Trade More Trade	Protect Industry Markets Flooded
Iron Land Raise Tariffs (Compete)	Markets Flooded Protect Industry	Exports Drop Exports Drop

Senator Smoot and Representative Hawley go down in history for the Smoot-Hawley Tariff in 1930.

- The Act raised import tariffs on over 20,000 items to the second highest levels in 100 years.
- Other nations enacted tariffs in retaliation.
- International trade fell, and U.S. exports and imports dropped by 50%.
- The tariff exacerbated the Great Depression.

The American Free Trade Zone

U.S. Constitution, Article 1, Section 9 states:

- 5: No Tax or Duty shall be laid on Articles exported from any State.
- 6: No Preference shall be given by any Regulation of Commerce or Revenue to the Ports of one State over those of another: nor shall Vessels bound to, or from, one State, be obliged to enter, clear, or pay Duties in another.

Ever wonder about Gas Wars?

	Good-Gas Co. **Hold Prices** **(Cooperate, hold price)**	**Good-Gas Co.** **Lower Prices** **(Compete on price)**
Cool-Fuel Inc. **Hold Prices** **(Cooperate, hold price)**	**$10,000 profit** **$10,000 profit**	**$25,000 profit** **$2,000 profit**
Cool-Fuel Inc. **Lower Prices** **(Compete on price)**	**$2,000 profit** **$25,000 profit**	**$3,000 profit** **$3,000 profit**

Antitrust question…

- Are two or more corporations colluding in violation of antitrust law by fixing prices?
- Or are the corporations avoiding an iterated Prisoners' Dilemma where competition and repeatedly undercutting prices will drive profits down to unsustainable levels?
- Will market competitors find other terms to compete on to avoid a price war?

Are there Nobel Prize winners who have used Game Theory in their work? Yes.

- **John Nash** (1994), Robert Lucas (1995), John Harsanyi (1994)
- Richard Selten (1994), Kenneth Arrow (1972), Paul Samuelson (1970)
- Jean Tirole (2014), Roger Myerson (2007), Leonid Hurwicz (2007)
- Eric Maskin (2007), William Vickery (1996), Robert Auman (2005)
- **Thomas Schelling** (2005)

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