Lecture 2 Game Plan

- Question the fundamental assumptions of game theoretic analysis
  1. Rational decision-making
  2. Common knowledge of rationality
  3. Nash equilibrium

- Begin the rebuilding process
  - *Dominant strategies* when 1,2,3 may fail

Rationality?

"Only the Paranoid Survive"
- Andy Grove, Intel Co-founder

Rationality?

- Most economic analysis assumes "rationality" of decision-makers, i.e. that you make decisions by

  1. forming a belief about the world
  2. choosing an action that maximizes your welfare given that belief

- In principle, requires enormous powers of imagination and computation.

And Common Knowledge of Rationality??

■ Most game-theoretic analysis makes the further assumption that players' rationality is common knowledge

- Each player is rational

- Each player *knows* that each player is rational

- Each player *knows that each player knows* that each player is rational

- Each player *knows that each player knows that each player knows* that each player is rational

- Each player *knows that each player knows that each player knows that each player knows* that each player is rational

- Etc. etc. etc.

And Correct Beliefs?!?

- Nash equilibrium assumes that each player has *correct beliefs about what strategies others will follow*

- Implicitly this is saying that, in novel strategic situations, each player knows what the other believes

- Requires all players to thoroughly understand each other

Online Game #1

The Beauty Contest

In-Class Game

The Urn Game

Urn Game: Rules

- **Two indistinguishable urns**
  - "Urn W" has two white balls, one yellow
  - "Urn Y" has two yellow balls, one white
- **TA will flip coin to choose an urn**
- **You must guess which urn it is after seeing one ball from the urn *and after hearing all guesses of those before you***
- **Your goal is to "CHOOSE WISELY", i.e. to make the correct guess**

Urn Game: How We'll Play

- Eight students will be called per round (new urn-draw each round)
  - Please line up in the front of the room

- At your turn, draw out a ball without looking at any others <u>and without showing the ball to anyone else</u>

- Return the ball to the urn, write your guess on provided sheet, then give the sheet to me

"Groupthink"

- The Urn Game illustrates how conformity can be rational for individuals, even when they don't care what others do per se.

- The decisions made by others convey some information → Rational individuals may ignore their own information
  - *"informational cascade"* when this happens

Conformity

- Observation: People in a group often do (and believe) the same thing as people around them.

- There are several natural reasons for this other than info cascades, including:
  - People may simply prefer doing the same thing (or prefer avoiding being different)
  - People may simply know the best thing for them to do, so everyone does that

- In these cases, we would expect group behavior to be relatively stable over time.

"Paradigm Shift"

- But in an informational cascade, *rational* individuals' decisions convey relatively little info
  - If the first two people say "Urn W", everyone else will say "Urn W" regardless of their own ball's color

    → 100 people saying "Urn W" gives same info as 2 people saying "Urn W"

- Better info or a few "irrational" individuals can swing behavior of the entire group

"Path Dependence"

- The behavior of early-movers has a disproportionate effect on the group

- We should therefore expect different groups to make different (possibly wrong) decisions in the same setting

Summary of Info Cascades

- Even when individuals are rational, groups may not be

- *Rationality* of group decision-makers can be an especially strong assumption

Dominant Strategies

"I'll make him an offer he can't refuse."

- The Godfather

Recall: Cigarette Ad Game

		Philip Morris	
		No Ad	Ad
Reynolds	No Ad	**50** , 50	**20** , 60
	Ad	**60** , 20	**30** , 30

Reynolds' best strategy is Ad regardless of what Philip Morris does → Ad is *"dominant strategy"*

Dominant Strategies and Rationality

- If *you* are rational, you should play your dominant strategy. Period.

- No need to think about whether others are rational, etc.

- Rationality + dominant strategies implies Nash equilibrium
  - no need for common knowledge or correct beliefs
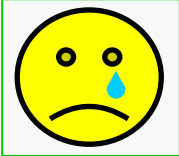
Warren Buffett's "Billionaire's Buyout Plan"

■ A campaign finance reform bill banning soft money is about to come to a vote:

"Suppose some eccentric billionaire (not me, not me!) makes the following offer. If the bill is *defeated*, this E.B. will donate $1Billion in soft money to the party that delivers the most votes to getting the reform passed"

-- Buffett, Warren. "The Billionaire's Buyout Plan," *The New York Times*, 10 September 2000.

Billionaire's Buyout Plan as Prisoners' Dilemma

For simplicity, suppose that there is one Democrat and one Republican and both need to vote Yes for the reform to pass.

Summary

- Nash equilibrium is not the right concept for some strategic situations
    - Real players make mistakes or, for other reasons, may fail to be "rational"

- Yet dominant strategies give a clear prescription of what to do, regardless.

- *Next time*: Continue rebuilding and applying the notion of Nash equilibrium.

Online Game #4 (Monitoring Game)

- Play Online Game #4 prior to midnight before next lecture.

- Note: We are *not* playing the games in their numerical order!!

In-Class Game Next Time

- Prepare for "Bluffing Game" to be played in class next lecture.
  - See handout