Agenda Two

1. EFG (topology)
2. Examples EFG
3. Rules for
   3.1 Not in Harrington
4. More Examples
5. Form Groups

Agenda Thurs Mapping
1. SFG $\leftrightarrow$ EFG
2. Rationality
   2.1 Dominant Strategies
   2.2 Weakly Dom Strategy
3. Zermelo's Theorem
   3.1 BI and Sol'n of some
   3.2 EFG

Solu EFG

Ques 1, 2, 3 $\rightarrow$ RPS $\rightarrow$ EFG

Ques. 7, Apply to Ques 2 on IRAN
write strategy sets

Ques 9, 10
word problem from Dan
Chapter 2

Models of a strategic situation

Simplify to a metaphor

Real World Complexity

Kidnapping Game

Guy

Initial Node

Kidnap

Do Not Kidnap

Vivica

Pay

Vivica

Don't Pay

Actions

decision True

Decision Node

Kill

Release Kill

Release

Terminal Node

Payoffs

G

V

Guy

Vivica

Guy

Violent Guy

Vivica

G

3

V

2

1

3

5

2

4

Kidnapping in Sea Others

Kidnapper

If Ransom Paid, Husband Killed

"" "" Release

If Ransom Not Paid, Husband Killed

"" "" Released

+ Leaves job
Information Set
All of the decision nodes a player can't distinguish among

Every decision node belongs to one & only one information set
if information set has >1 node uncertain where he is

Guy
Kidnap
Do Not Kidnap

Pay Ransom

Guy
Kill Release

Guy
Kidnap
Do Not Kidnap

Pay Ransom
Release

Guy
Kill Release

Guy
Kidnap
Do Not Kidnap

Pay Ransom

Guy
Kill Release

Guy
Kidnap
Do Not Kidnap

Pay Ransom

Guy
Kill Release

Guy
Kidnap
Do Not Kidnap

Pay Ransom

Guy
Kill Release
Rules for Growing Trees ("Valid EPGs")

1. There is exactly one initial node ("root") that has no predecessor.
2. Every other node has 1 predecessor and is direct or indirect successor of initial node.
3. Terminal node has no successor, each is labelled by a payoff vector of length # of players.
4. Each non-terminal node belongs to a unique player in the set of players P or to a Nature Move.
5. Each non-terminal node has at least 2 successor nodes.
6. Information set is a set of nodes s.t. branching
   a) They all belong to the same player.
   b) Each node must have same number of outward branches.

Definition:
A pure strategy for a player i is a complete contingency plan a vector specifying the action at each information set (which can be single node) that he/she controls.

In survivor
1) Whether or not to win E
2) W vs L
3) Who to kick off

Rich 

\[ S_i = \{WR, WK, LR, LR \} \] seems silly, trust game theorists and think
An early reality TV show Survivor 2000 2
16 contestants voted off 1 by 1
last part of 1st episode

3 players {Rich, Kelly, Rudy} left

jury

payoffs 1 million to winner 0 others (0.1 + 2nd)

simplified rule an Endurance Contest
Winner eliminates one of the others

Then majority vote of jury panel chooses winner

Rudy would win Jury vote 72 year old Navy SEAL loved

Rudy’s actions not germane

So Rich should
Throw The EC
Kelly Exicts Rudy
Kelly More despised
Than Rich 60% Rich Expected 60%
of 1 Million
Iran WMD $\rightarrow$ Nuclear Enrichment Plant

6 Rankings for US in the IRAQ Example
Are the rankings for Iran vs Israel the same?
**Strategic Form Games** "One shot" 2-8

EFG describes sequence of players action.

1. Describe sequence of players action
2. What actions they have & what they know
3. How they can evaluate the outcomes

**SFG (NFG)**

1. Who is making decisions (set of players)
2. Over what are they making decisions (strategy sets)
3. How do they evaluate decisions (payoff functions)

\[ \text{pair} \rightarrow \text{tuple} \rightarrow n\text{-tuple} \text{ of players} \]

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Tosca Opera by Puccini
Scarpia attacks Cavaradossi: Firing Squad

\[
\begin{array}{c|cc}
\text{Stab} & 1,2 & 4,1 \\
\text{Concert} & 1,1 & 3,3 \\
\end{array}
\]

**From p. 57 chapter 3**

\[ \text{Tosca} \]

**Defs, 1. A strategy S' strictly dominates a strategy S" if S' > S" regardless of strategy chosen by other strategies.**

**3.2. Each player's strategy S dominant if it strictly dominates other strategies.**
A particular fact F is said to be common knowledge between the players if each player knows F, each player knows that the other knows F, each player knows that everyone knows F, etc. That each player knows F is common knowledge to all players.

Harrington gives an example of lack of common knowledge:

A cell phone call without follow up confirmation from the invitee.

St. Peter repeatedly asks only saints may enter.

Common knowledge:

Perfect recall assumed.

Memento Movie: Leonard Shelby.

Leonard Shelby’s imperfected recall:

Things known early will know it later.

“No forgetting.”

"Ransom": Tom Mullen vs. Jimmy Shaker.

Mel Gibson.

Changed rules of the game.

No game changer.

Evolutionary game mutagens.