1 Entry Game

Kodak is contemplating entering the instant photo market and Polaroid can either fight the entry or accommodate.

A pure strategy of a player specifies an action choice at each decision node of that player.

- Kodak’s Strategies: $S_K = \{\text{In}, \text{Out}\}$
- Polaroid’s Strategies: $S_P = \{\text{Fight, Accommodate}\}$

Backward Induction Equilibrium.

- What should Polaroid do if Kodak enters.
- Given what it knows about Polaroid’s response to entry, what should Kodak do?
- At a Backward Induction Equilibrium, each player behaves optimally at every decision node in the game tree (that is, plays a sequentially rational strategy)
- $(\text{In}, \text{Accommodate})$ is the unique backward induction equilibrium of this entry game.
Let’s consider the normal form of this game in the following bi-matrix

<table>
<thead>
<tr>
<th></th>
<th>Fight</th>
<th>Accommodate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Out</td>
<td>(0,20)</td>
<td>(0,20)</td>
</tr>
<tr>
<td>In</td>
<td>(-5,0)</td>
<td>(10,10)</td>
</tr>
</tbody>
</table>

Set of Nash Equilibria= \{(In,A) and (Out, F)\}.

But note that (Out, F) is sustained by a non-credible threat by Polaroid.

Backward Induction eliminates such NE based on non-credible threats.

Kodak knows that if it plays in then Polaroid will Accommodate.

Backward Induction requires sequential rationality whereas Nash Equilibrium requires only rationality.

2 Another Example

This is the example in the Textbook Page 60.

Consider the last node that Player 1 has to move. Player 1 will choose T because 3 is better than 0.

Now consider the subgame that starts with Player 2 choosing Out or In. Player 2 knows that if he plays In Player 1 will choose T. Hence Player 2 knows that choosing
In will bring him 0 whereas choosing Out will bring him 1. Therefore player 1 will choose Out.

Now consider the very first node in which Player 1 has to choose between L and R. Player 1 knows that if she plays R, Player 2 will choose Out and hence Player 1 will end up with a payoff 1. If player 2 chooses L, she gets 2. Therefore, Player 1 will choose L.

Therefore the Subgame Perfect Equilibrium (SPE) of this game is as follows

- Player 1 chooses L
- Player 2, if called to move, chooses Out.
- Player 1 chooses T, if called to move in the last stage.
- In other words, to describe a SPE you need to describe the optimal strategy of each player at each possible decision node, even if that decision node is never visited in equilibrium.
- The unique SPE outcome of the above game is that Player 1 plays L in the first stage and the game ends. Player 1 gets a payoff of 2 and player 2 gets a payoff 0.