Chapter 16
Backward induction: Reputation And Duels

In the first half of the lecture, we consider the chain-store paradox. We discuss how to build the idea of reputation into game theory; in particular, in setting like this where a threat or promise would otherwise not be credible. The key idea is that players may not be completely certain about other players' payoffs or even their rationality. In the second half of the lecture, we stage a duel, a game of pre-emption. The key strategic question in such games is when; in this case, when to fire. We use two ideas from earlier lectures, dominance and backward induction, to analyze the game. Finally we discuss two biases found in Americans: overconfidence and over-valuing being pro-active.

Chain Store Paradox: You might want to behave as someone else in order to deter people from their actions.

Duel

Let $P_i(d)$ be Player i's probability of hitting if i shoots at distance d.

Fact A: Assuming no one has thrown, if player i knows (at distance d) that j will not shoot tomorrow (at d-1) then i should not shoot today.

Fact B: Assuming no one has thrown, if player i knows (at distance d) that j will shoot tomorrow (at d-1) then i should shoot if i's probability of hitting at d $P_i(d) >= 1 - P_j(d-1)$ j's probability of missing tomorrow.

Therefore, $P_i(d) + P_j(d-1) >= 1$.

The first shot should occur at d*.

At d = 0, player 2 should shoot because probability to hit is 1.

Player 1 knows that 2 will shoot tomorrow so player 1 if $P_1(1) + P_2(0) > 1$ so shoot.

At d = 2, player 2 knows player 1 will shoot. So player 2 should shoot if $P_2(2) + P_1(1) > 1$ so shoot.