

2-5-Exercise





Game Theory Course:

Jackson, Leyton-Brown & Shoham

Example - Soccer Penalty Kicks

Mixed strategies in sports and competitive games



Game

Theory was trategies zero-sum probability Online

Example - Soccer Penalty Kicks

Online • Mixed strategies in sports and competitive games Be unpredictable

Example - Soccer Penalty Kicks

Be unpredictable

Mixed strategies in sports and competitive games

• How do equilibrium strategies adjust to skills?

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kiacs - goali (gave)

Game

## Mixed strategies in sports and competitive games

Example - Soccer Penalty Kicks

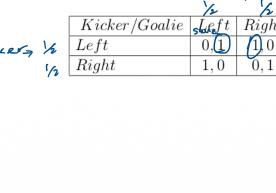
Be unpredictable

Game

• How do equilibrium strategies adjust to skills?

 Should a kicker(who kicks penalty kicks(worse to the right than left kick more often to the left than right?

Example - Soccer Penalty Kicks



Example - Soccer Penalty Kicks 9+0-75(1-2)=1-2

Kicker/Goalie

kicker payott chay- Gootia payott adjust 7 Gootia made adjustment - equilibrum adjust

Example - Soccer Penalty Kicks

• In a mixed equilibrium, the goalie's strategy must have the kicker

indifferent

indifferent

indifferent

Game

Game

or p = 1/1.75 = 4/7

Example - Soccer Penalty Kicks

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• p probability goalie goes left; Kicker indifferent: (1-p)1 = p.75

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Game

### • Goalie goes Left more often than Right (4/7 to 3/7) kicker still goes Left and Right with equal probability

Example - Soccer Penalty Kicks

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Example - Soccer Penalty Kicks

Game

• In a mixed equilibrium, the goalie's strategy must have the kicker indifferent

• p probability goalie goes left; Kicker indifferent: (1-p)1=p.75

• Goalie goes Left more often than Right (4/7 to 3/7), kicker still

goes Left and Right with equal probability

• (Goalie's) strategy adjusts, and the kicker actually adjusts to kick more to their (weak) side!

ullet The Goalie has a slight advantage now, and wins 4/7 of the time

Example - Soccer Penalty Kicks Game

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Online

# • The Goalie has a slight advantage now, and wins 4/7 of the time

 If the goalie still played equal probability, then the kicker could always go left and win 1/2 the time instead of 3/7

Game Theory ullet The Goalie has a slight advantage now, and wins 4/7 of the time

• By adjusting the strategy to keep the kicker indifferent, the Goalie takes advantage of the kicker's weak right kick and wins more often!

• If the goalie still played equal probability, then the kicker could

always go left and win 1/2 the time instead of 3/7

Summary - Mixed Strategies - Soccer Penalty Kicks

• A players must be indifferent between the actions he or she randomizes over

Do players really do this?!

Interesting comparative statics