Strategy: An Introduction to Game Theory

Week 7: Evolutionary Stable Strategy, Repeated Games

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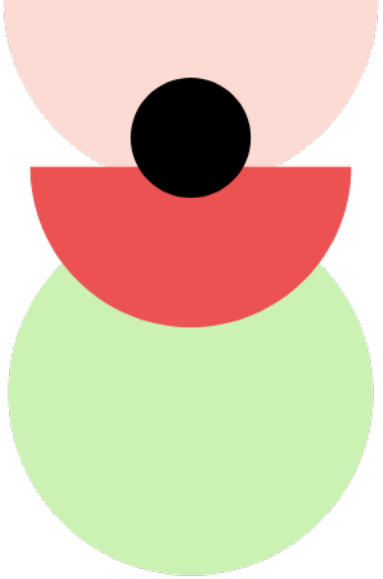


Recap

- Dominant Strategies
- Nash Equilibrium
- Mixed Strategies
- Extensive Form Games
- Bayesian Games
- Bayesian Auctions

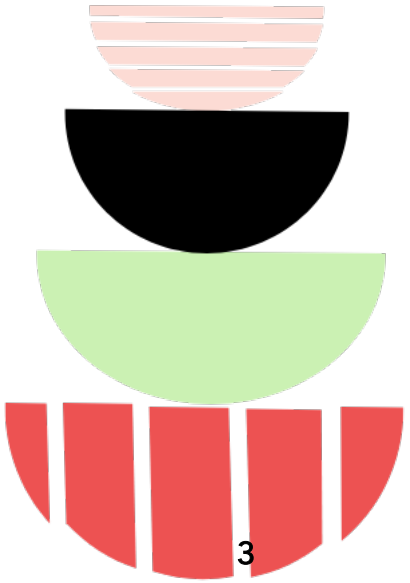
Evolutionary Stable Strategy

Refer to the game table which shows the fitness of two populations of beetles.

Find the Evolutionary Stable Strategy.

Easley & Kleinberg Ch 7

Beetle 2/ Beetle 1	Small	Large
Small	5,5	1,8
Large	8,1	3,3



Evolutionary Stable Strategy

Consider following the two-player, symmetric game where x can be 0, 1, or 2. For each of the possible values of x, find all (pure-strategy) Nash equilibria and all evolutionarily stable strategies.

Player A \ Player B	X	Y
X	1,1	2,x
Y	x,2	3,3

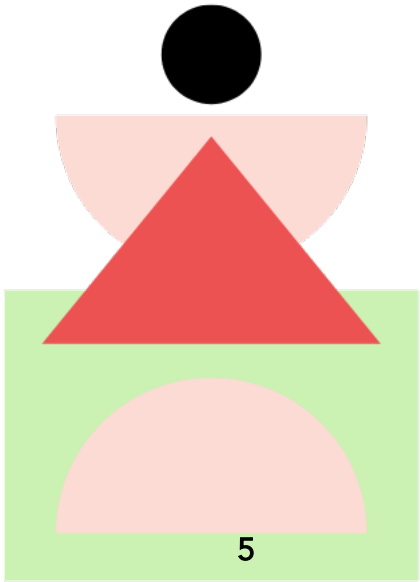
Easley & Kleinberg
Ch 7, Ex 4

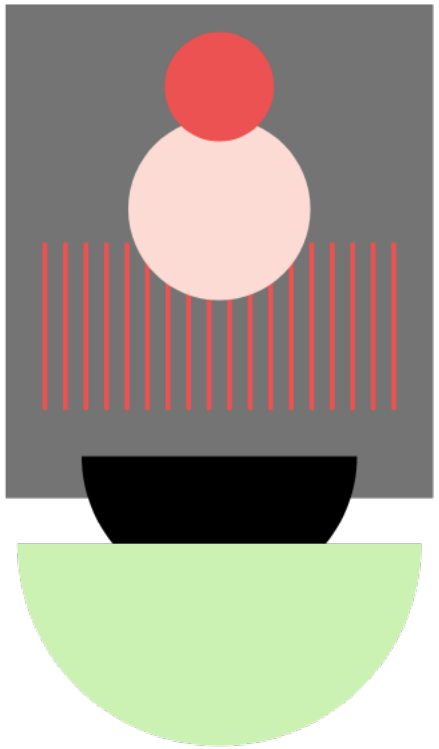
Stage Game

Consider the two-period repeated game. Is there a subgame perfect equilibrium of this repeated game in which (A, X) is played in the first period? Explain your answer.

P1/P2	X	Y
A	5,6	0,0
B	8,2	2,2

Watson Ch22, Ex 3





Repeated Games

Consider the two-period repeated game with no discounting. Describe a subgame perfect equilibrium in which the players select (U, L) in the first period.

1\2	L	M	R
U	8,8	0,9	0,0
C	9,0	0,0	3,1
D	0,0	1,3	3,3

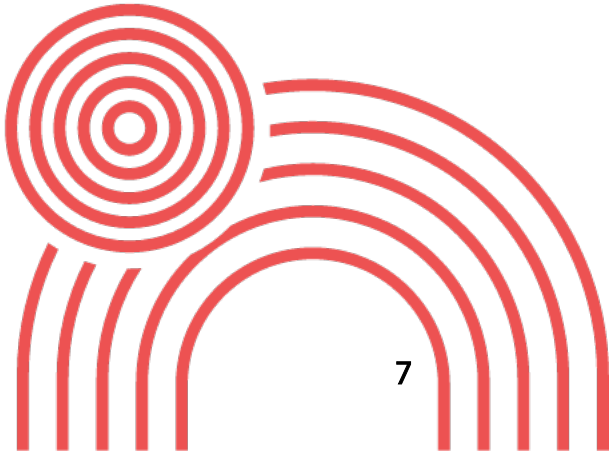
Watson Ch22, Ex 1

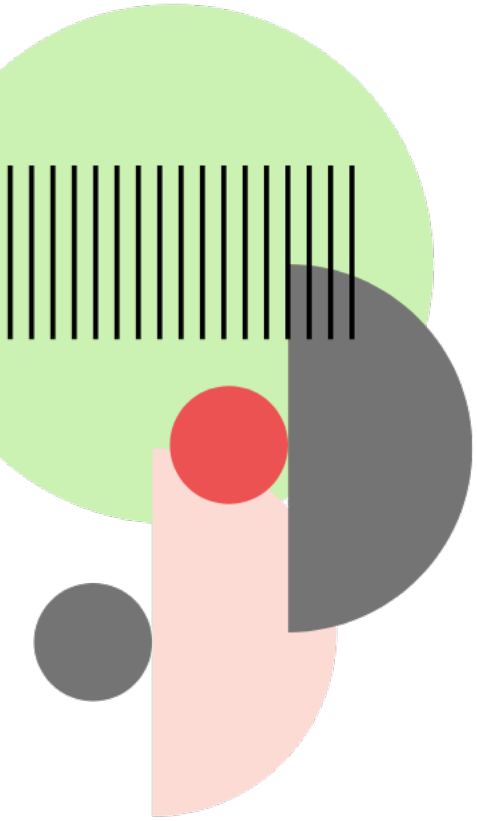
Time Discounted Payoffs

Two players are forming a firm. The value of their relationship depends on the effort each expends. Suppose person i's utility from the relationship is $x_j^2 + x_j - x_i x_j$, where x_i is person i's effort and x_j is the effort of the other person (i=1,2). Assume $x_i, x_j \geq 0$. Compute each partner's best response function & find NE. Is this NE pareto efficient?

Now suppose that the partners interact over time, modeled as infinitely repeated game. **δ** is the discount factor of both players. Under what conditions can the partners sustain some positive effort level $k = x_1 = x_2$ over time?

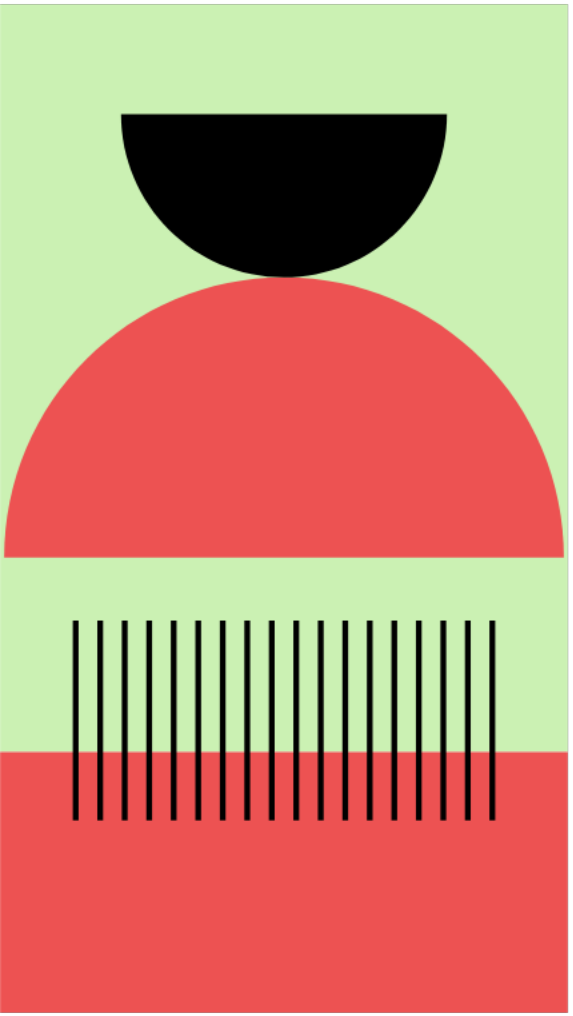
Watson Ch22





Reference Reading

1. ***An Introduction to Game Theory*** by Martin Osborne
2. ***Strategy, An Introduction to Game Theory*** by Joel Watson
3. ***Networks, Crowds, and Markets: Reasoning About a Highly Connected World*** by David Easley, Jon Kleinberg



If you have questions,

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