# Prisoner's Dilemma

## Competitive Strategy, Lecture 4

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# Overview of Today

- Introduction to Game Theory
- Static Games
- Competitive Analysis

# Game Theory vs Price Theory

- In Price Theory, rival actions were fixed
  - Monopoly, MC, PC
- In Game Theory, rival actions are conditional on your actions
  - Cournot, Bertrand, Stackelberg
- Better tool to understand...
  - Dynamics of competition/cooperation
  - Real world positioning
  - Value of commitment
  - Network effects

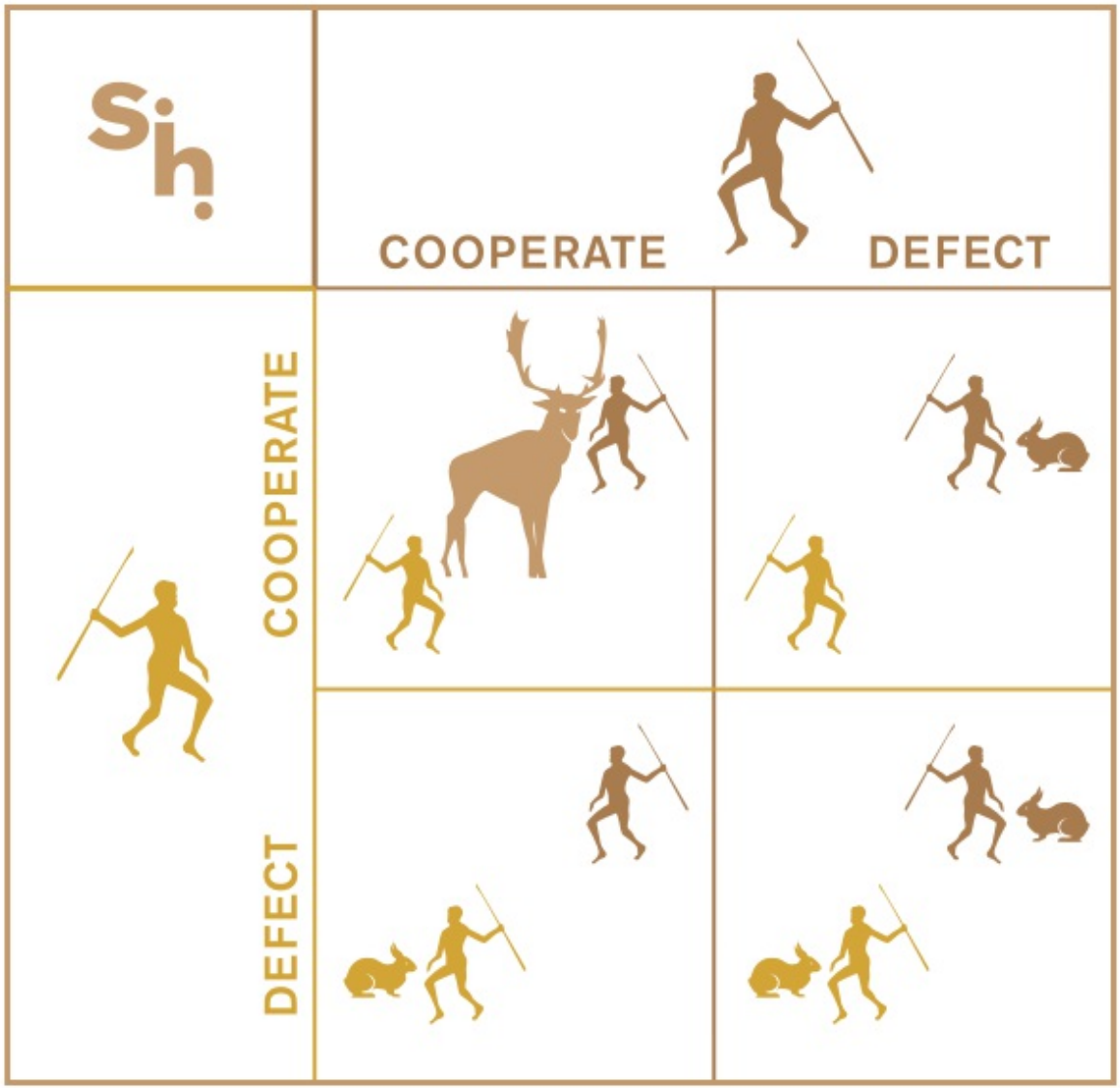
# Game Definitions

- Players
- Actions (aka moves)
- Payoffs
- Timing
  - Simultaneous (aka static), e.g. rock-paper-scissors
  - Sequential (aka dynamic), e.g. tic-tac-toe
- Information and randomness beyond the scope of this course

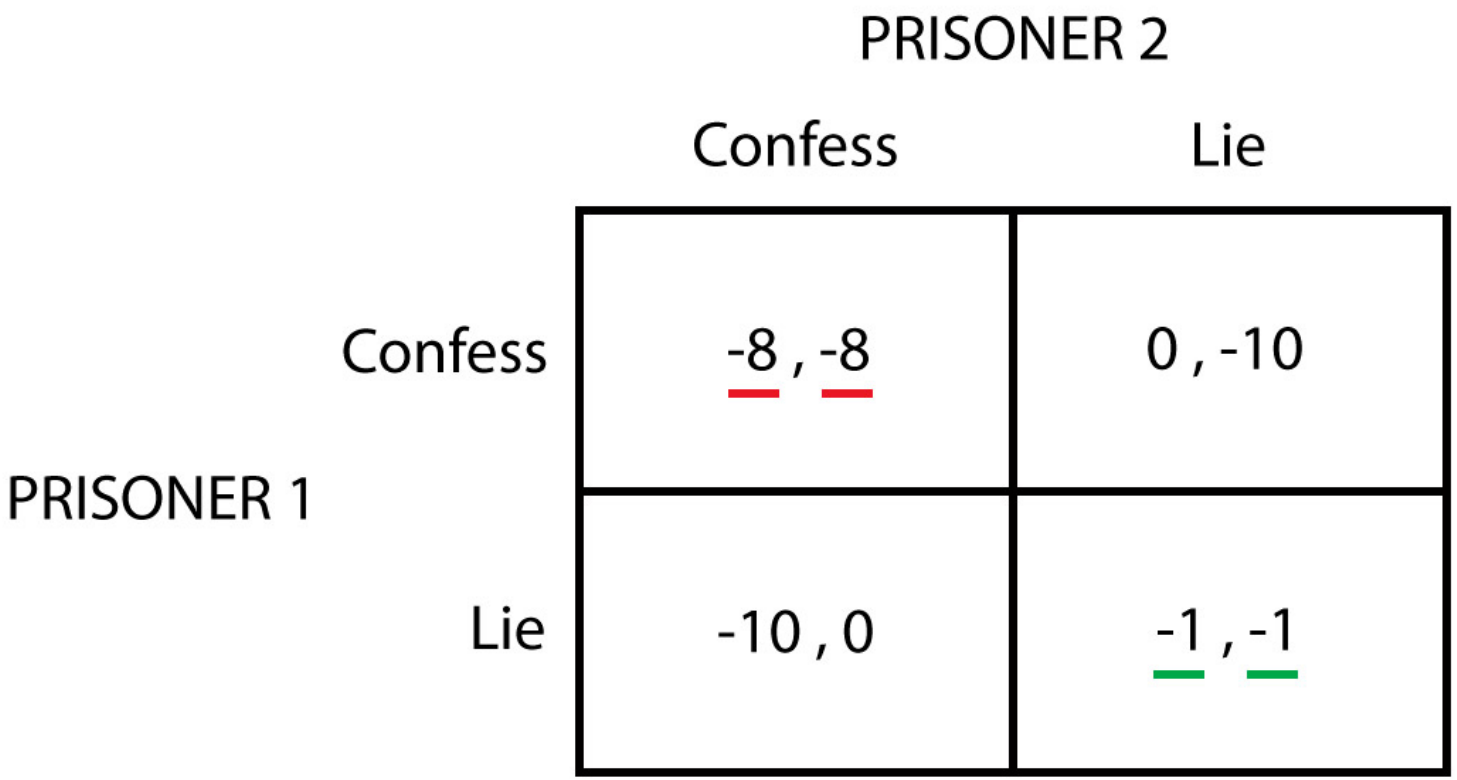
# Best Responses

- Solutions are *predictions* of how players will act
- Strategies are fully-specified plans
  - For every decision point, what's your move?
- Solutions are mutual best response strategies
  - No player can do better by unilaterally changing strategy
- Solving is easy
  - For each player, write out each decision point and best response
  - Equilibrium is when best responses coincide

# Example 1: Stag Hunt Cooperation



# Example 2: Prisoner's Dilemma Competition



# Bertrand Game

- Firms compete on prices, all goods and consumers identical
  - Undercutting rival's price means getting all the demand
  - Only Nash Equilibrium is P=MC
- If goods are differentiated, cannot get all the demand, but similar logic

# Repeated Play

- Problem: Too much competition?
  - "solitary, poor, nasty, brutish, and short."
- Solution: *repetition*
- Often occurs at a "reasonable" focal point
  - Retail: Department stores mark-up of 200%
  - Oil: OPEC maintains certain historical market shares

# Profits with Punishment