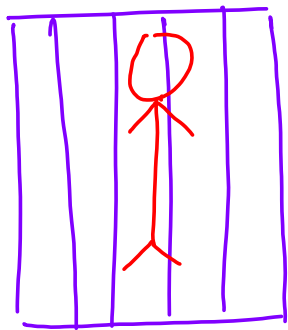
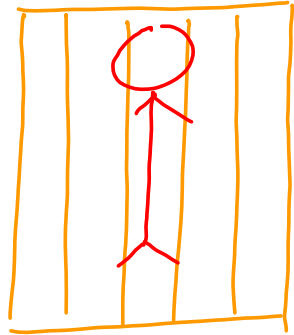


## Prisoner's Dilemma:



$P_1$



$P_2$

accused of a major  
Crime

- No eyewitness
- to get one or both  
to CONFESS

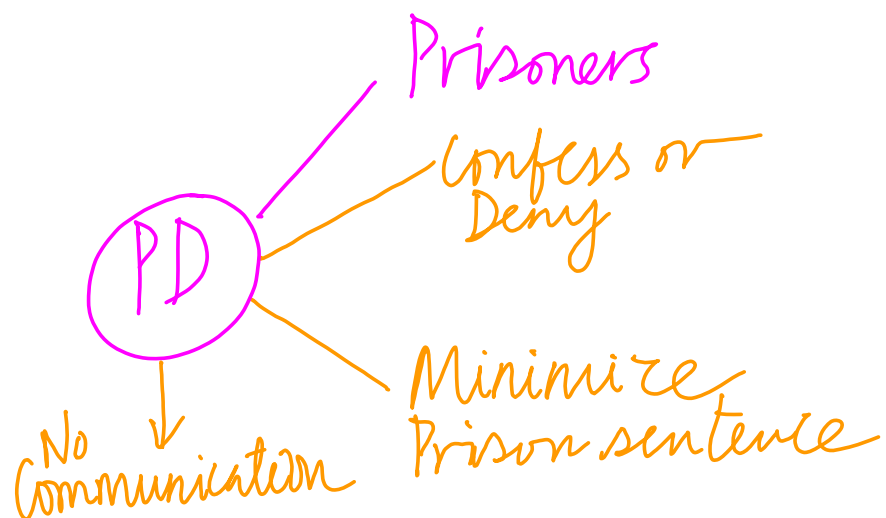
Both prisoners are interrogated in separate rooms — No communication allowed between them.

- 2 Possible Actions
- Confess (C)
  - Deny (D)

If both deny, each gets 1yr sentence.

If both confess, each gets a prison sentence of 3 years.

— If one confesses, and other denies, confessor walks free or 0 yr, one who denies gets a sentence of 4 yrs.



## Game Table:

| $P_1 \backslash P_2$ | C      | D      |
|----------------------|--------|--------|
|                      | $C_1$  | $D_1$  |
| C                    | -3, -3 | 0, -4  |
| D                    | -4, 0  | -1, -1 |

'strategic'

Payoff is determined by action of individual together with actions of competitors.

Set of Players.  $\{P_1, P_2\}$

Set of rules -

$A_i$  denotes action set of player  $i$

$$A_1 = \{C, D\}$$

$$A_2 = \{C, D\}$$

action set of  $P_2$

action set of  $P_1$

Set of outcomes,  $O$

$$O = A_1 \times A_2$$

$$= \{(C, C), (C, D), (D, C), (D, D)\}$$

$u_i(0)$   
 $u_1(0), u_2(0)$   
→ payoffs

$u_i(a_i, a_{-i})$  actions of rest  
 $u_1(a_1, a_2)$   
 $u_2(a_2, a_1)$

$$U_i(\underline{a}_i, \underline{a}_{-i})$$

Utility or payoff  
of  $i^{\text{th}}$  player.

$$U_1(c, c) = -3$$

Player 1 confesses      Player 2 confesses



$U_1(C, D) = 0$

Player 1  
Confesses

Player 2  
Denies

$U_2(C, D) = 0$

Player 2

Player 2  
Confesses

Player 1  
Denies

$$u_1(C, C) = -3$$

$$u_1(C, D) = 0$$

$$u_1(D, C) = -4$$

$$u_1(D, D) = -1$$

$$u_2(C, C) = -3$$

$$u_2(C, D) = 0$$

$$u_2(D, C) = -4$$

$$u_2(D, D) = -1$$

$U_i(a_i, a_{-i})$

↑  
Player  $i$

↑  
action of  
Player  $i$

↑  
action of  
all players  
other than  $i$

Why is PD useful  
in practice:

Retail Price war

2 Shops, Retail  
chains,

Prices - High (H)  
- Low - (L)

Handwritten game tree diagram illustrating a signaling game between a Bank and a Company.

**Bank's Initial Move:**

- Deny:** Leads to a node where the Company chooses between **Simple market** and **Retail chains**.
- Confess:** Leads to a node where the Company chooses between **Online retail stores** and **Simple market**.

**Company's Move:**

- Simple market:** Both Bank types (H and L) choose **H**. Payoff:  $(500, 500)$ .
- Retail chains:** Bank type **H** chooses **H**, Bank type **L** chooses **L**. Payoff:  $(0, 750)$ .
- Online retail stores:** Bank type **H** chooses **L**, Bank type **L** chooses **L**. Payoff:  $(750, 0)$ .
- Simple market (after Confess):** Both Bank types (H and L) choose **L**. Payoff:  $(250, 250)$ .

**Payoffs (Bank, Company):**

- Deny, Simple market, H:**  $(500, 500)$
- Deny, Retail chains, H:**  $(0, 750)$
- Confess, Online retail stores, L:**  $(750, 0)$
- Confess, Simple market, L:**  $(250, 250)$