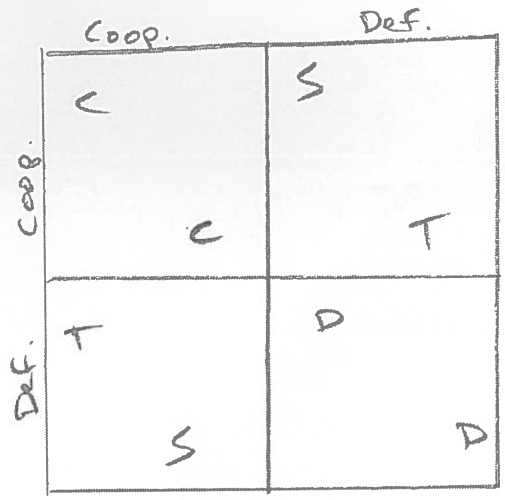
The Prisoner's Dilemma



(A)

- Actions are {cooperate, defect}
- Assume $T > C > D > S$.
- Actions are taken simultaneously in any period.

(1) One-period

- Propose each set of strategies and check whether any actor wants to deviate unilaterally from them. If so, proposal is not a Nash eq.

Coop - Coop ? Not Nash
Coop - Def ? Not Nash
Def - Coop ? Not Nash
Def - Def ? Nash

(2) Infinitely-repeated with discounting and punishment strategies, where δ is the discount factor (shadow of future), 0 to 1

- Proposed strategy: Play cooperate in period 1 and continue, but play Def. if counterparty ever plays Def. To check if this is Nash, check whether either actor would want to defect unilaterally, in any single period. If and when he would, the strategy is not Nash.

– Deviation from cooperation:

$$T + \delta \frac{D}{1-\delta} > \frac{C}{1-\delta} \rightarrow C < \underbrace{\delta D + T - \delta T}_{f(D,T,\delta)}$$

$\frac{\partial f}{\partial D} > 0$, $\frac{\partial f}{\partial T} > 0$, $\frac{\partial f}{\partial \delta} < 0$.

– Deviation from punishment:

$$S + \delta \frac{P}{1-\delta} \geq \frac{D}{1-\delta} \rightarrow S < D.$$

Strategy is easier to sustain as D and T shrink and as δ grows.

Alternative condition shown in class:

$$\delta < \frac{T-C}{T-D}.$$