Rationality and Dominated Strategies

Rational players do not play dominated strategies

To obtain rational outcomes of a game – eliminate dominated strategies

For strictly dominated strategies, the order of elimination does NOT matter

It matters for the weakly dominated strategies – some reasonable outcomes are also eliminated

	L	C	R
T	1,2	2,3	0,3
M	2,2	2,1	3,2
B	2,1	0,0	1,0

Order: T, R, B, C → (M,L): 2,2

Order: B, L, C, T → (M,R): 3,2

Existence of dominant strategies (and DSE)

Not guaranteed!

Coordination game

	L	R
L	1,1	0,0
R	0,0	1,1

Football or Cricket?

	F	C
F	2,1	0,0
C	0,0	1,2

If dominance cannot explain reasonable outcome – Refine the equilibrium concept

Nash Equilibrium (Nash 1951)

"No player gains by a unilateral deviation"

A strategy profile (s_i^*, s_{-i}^*) is a pure strategy Nash equilibrium (PSNE) if $\forall i \in N$ and $\forall s_i \in S_i$

$$u_i(s_i^*, s_{-i}^*) \geq u_i(s_i, s_{-i}^*).$$

Football or Cricket?

	F	C
F	2, 1	0, 0
C	0, 0	1, 2

A best response view:

A best response of player i against the strategy profile s_{-i} of the other players is a strategy that gives the maximum utility, i.e.,

$$B_i(s_{-i}) = \{s_i \in S_i : u_i(s_i, s_{-i}) \geq u_i(s_i', s_{-i}), \ \forall s_i' \in S_i\}$$

PSNE is a strategy profile (s_i^*, s_{-i}^*) s.t.

$$s_i^* \in B_i(s_{-i}^*), \ \forall i \in N.$$

PSNE gives stability – once there, no rational player unilaterally deviates

Question: Relationship between SDSE, WDSE and PSNE?