

Population Games and Normal Form Games

Game Theory

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Pairwise Contest Games

Population: χ .

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$$u(\sigma, \chi) = \sum_{s, s' \in S} \sigma(s) \chi(s') u(s, s')$$

Pairwise Contest Games

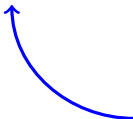
Population: χ .

$$u(\sigma, \chi) = \sum_{s, s' \in S} \sigma(s) \chi(s') u(s, s')$$

Prob of σ
playing s



Prob of meet-
ing s'



$$\begin{pmatrix} u(s, s), u(s, s) & u(s, s'), u(s, s') \\ u(s', s), u(s', s) & u(s', s'), u(s', s') \end{pmatrix}$$

Theorem.

If σ^* is an ESS in a pairwise contest population game then for all $\sigma \neq \sigma^*$:

1. $u(\sigma^*, \sigma^*) > u(\sigma, \sigma^*)$ OR
2. $u(\sigma^*, \sigma^*) = u(\sigma, \sigma^*)$ and $u(\sigma^*, \sigma) > u(\sigma, \sigma)$

Conversely, if either (1) or (2) holds for all $\sigma \neq \sigma^*$ in a two player normal form game then σ is an ESS.