Negotiation Theory

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What is Negotiation?

- Negotiation is a specialized and formal version of conflict resolution most frequently employed when important issues must be agreed upon

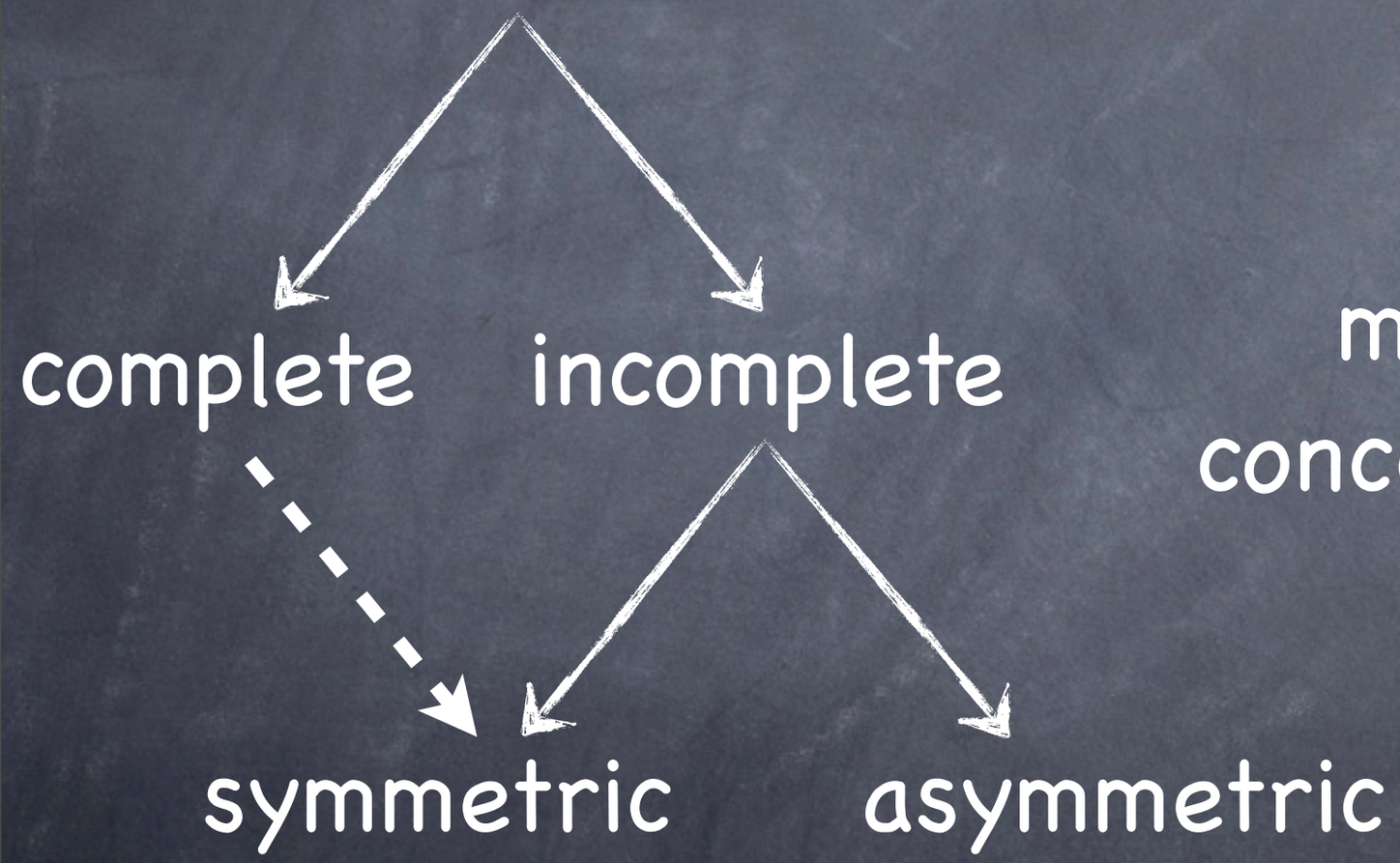
- Each negotiation is different, but there are some common basic elements:
  - The negotiating parties
  - The issues that are included in the negotiation
  - Best agreement to a negotiated agreement (BATNA).

System

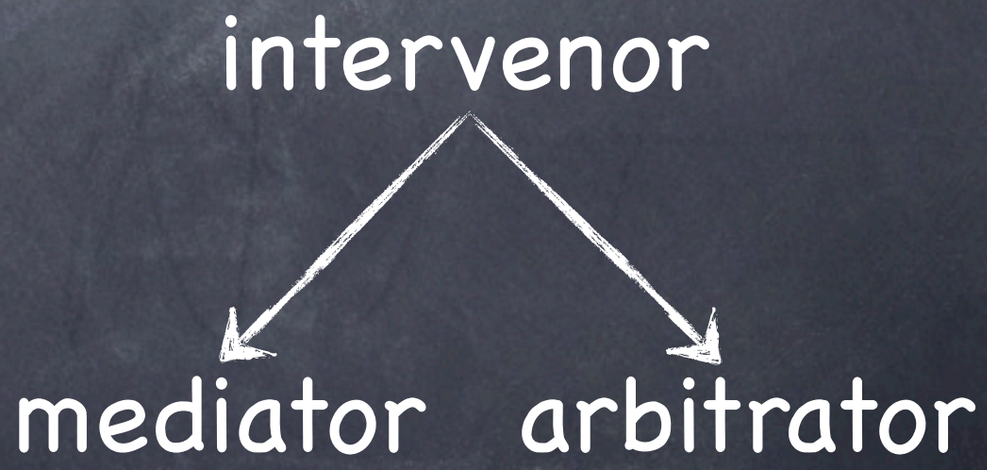
- N players
- Strategy set S
- Utility Function u
- Disagreement Point d
- Solution f(S, d)

Classification

Types of Negotiation



Types of Negotiation



Ways to end a Negotiation

- Pareto Optimal Point
- Nash Equilibrium Point
- Breakdown
  - Risk of Breakdown
  - Time Preference

Risk of Breakdown

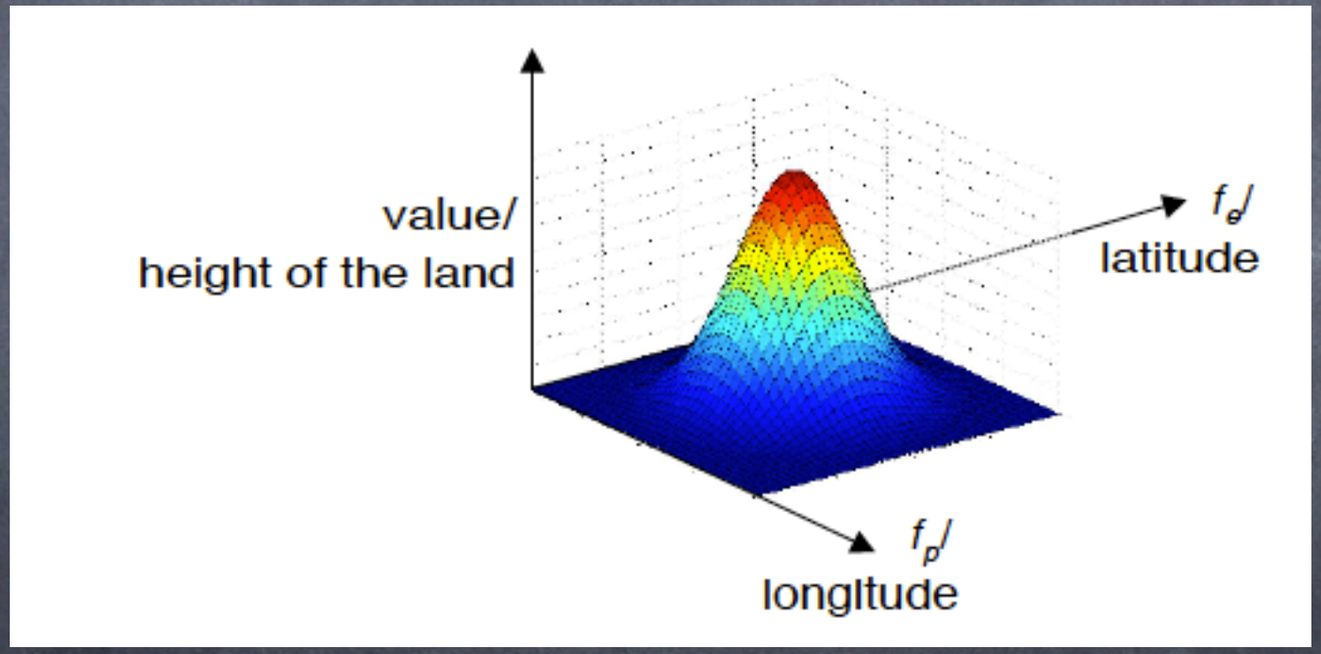
- example : "splitting Da $$"
- 2 players, 100$, taking turns,
  - 1st rejection -> -99$:O
  - 2nd rejection -> no money :'(

Nash's Axioms

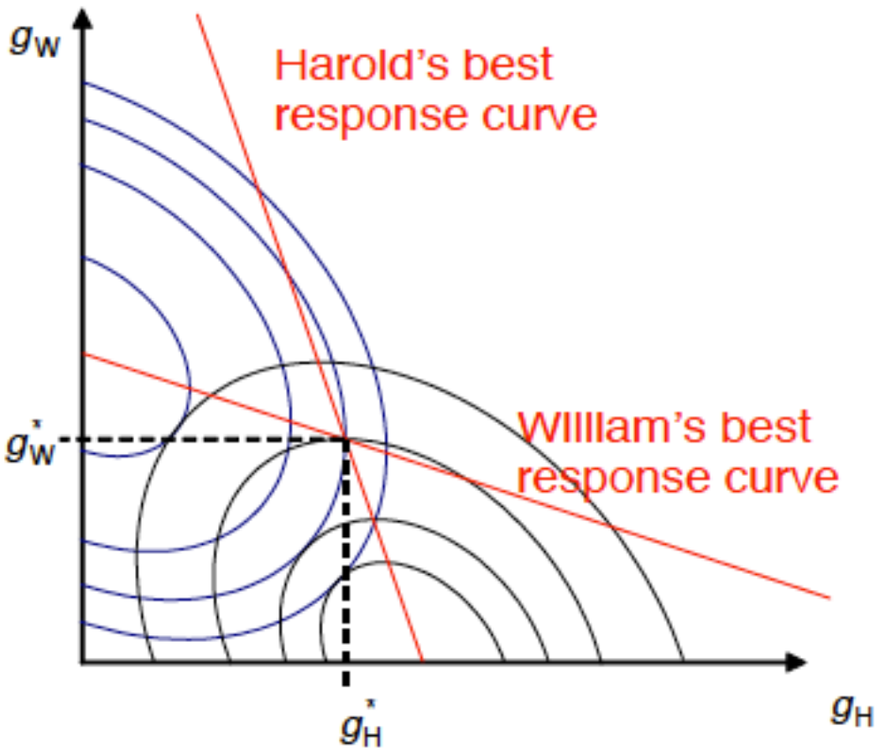
- Independence of Irrelevant Alternatives (IIA)
  - If $f(S,d) \in T \subset S$, then $f(T,d)=f(S,d)$
- Independence of positive linear transformations (IPLT)
  - Let $h_i(x_i)=\alpha_i x_i+\beta_i$, where $\alpha_i>0$, for $i=1,2$.
  - Suppose $a=f(S,d)$. Let $S'=h(S)$ and $d'=h(d)$. Then, $f(S', d') = h(a)$
- Efficiency
  - $f(S,d)$ is on the Pareto frontier of S
- Symmetry
  - Suppose $d'=(d_2,d_1)$ and $x \in S \Leftrightarrow (x_2,x_1) \in S'$. Then,
  - $f_1(S,d)=f_2(S',d')$ and $f_2(S,d)=f_1(S',d')$.

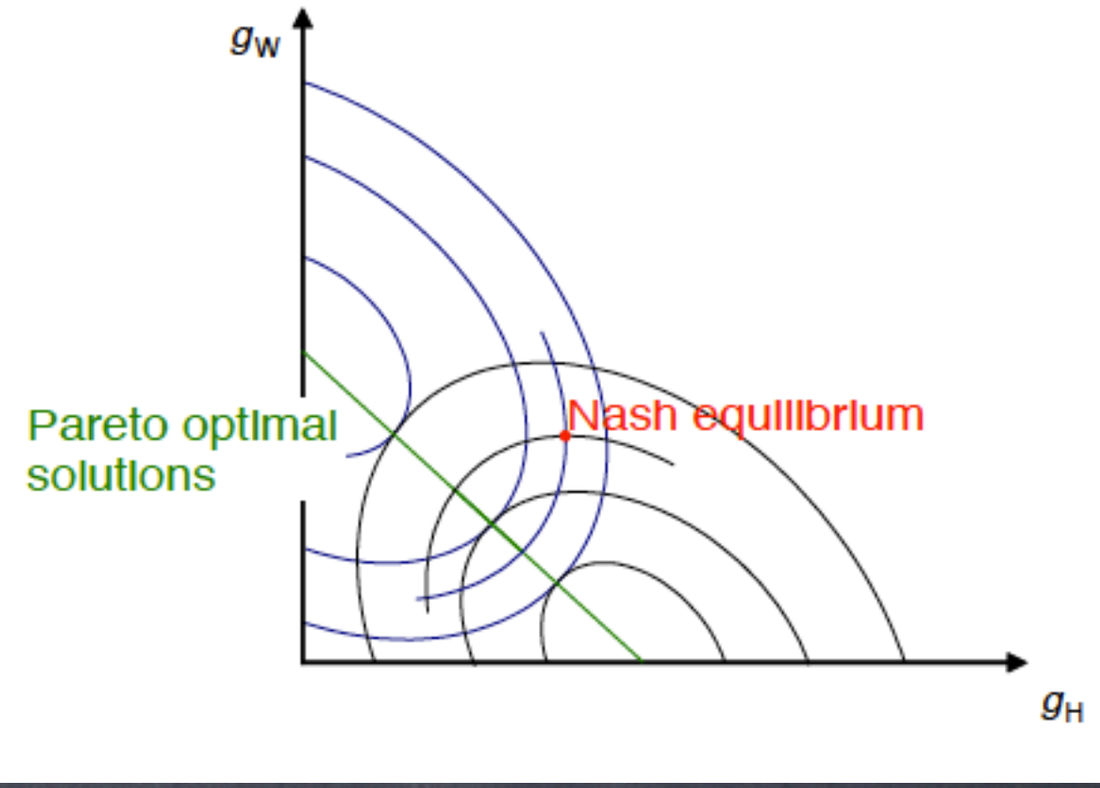
N.E. & Pareto Optimal

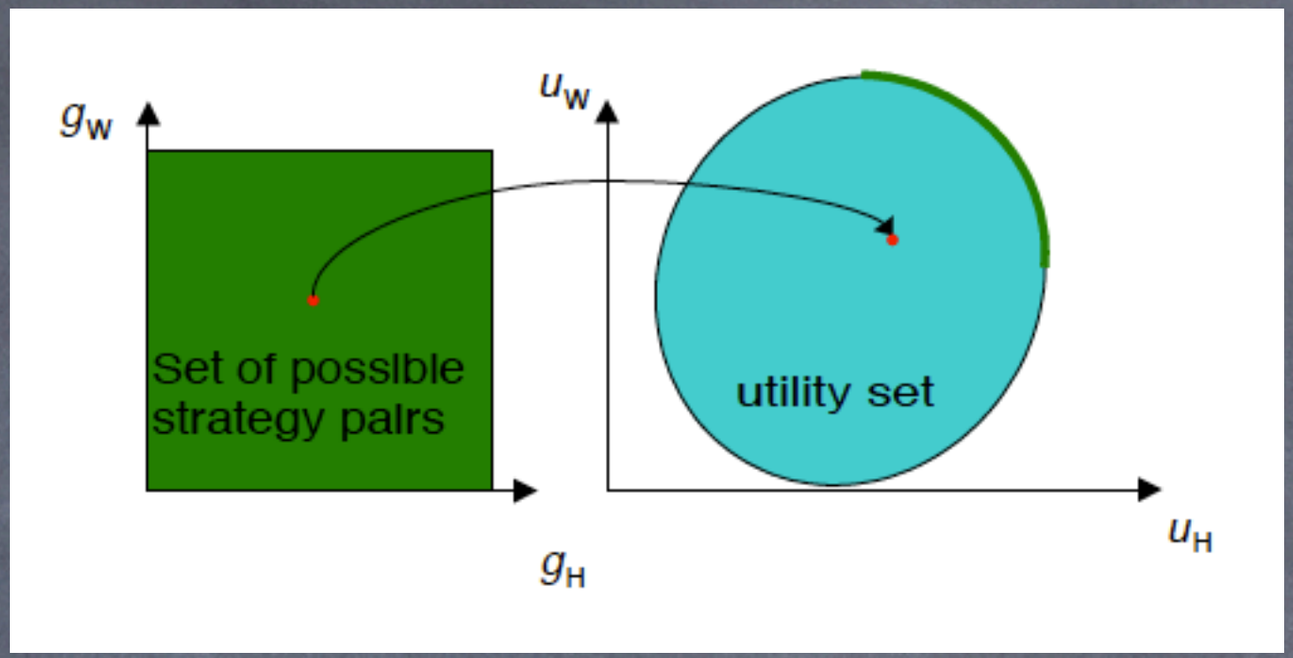
- goat problem -> w/o intermediate & complete info

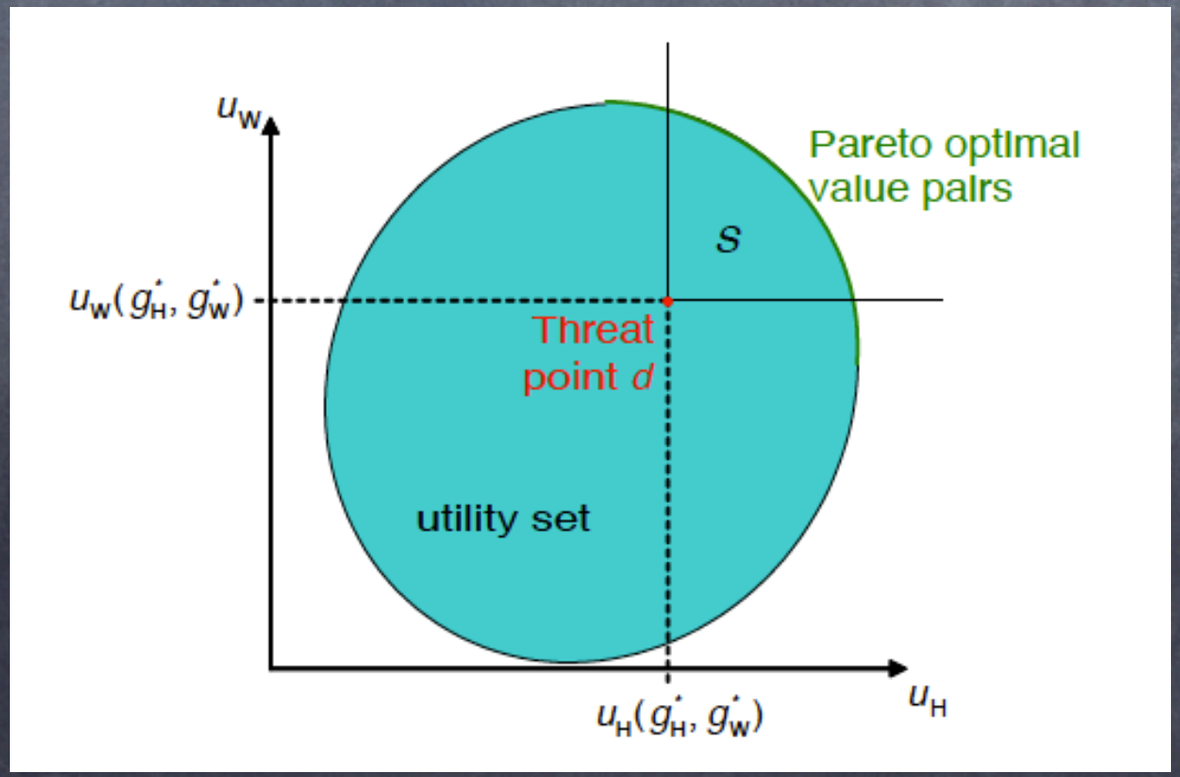


N.E. vs P.O.

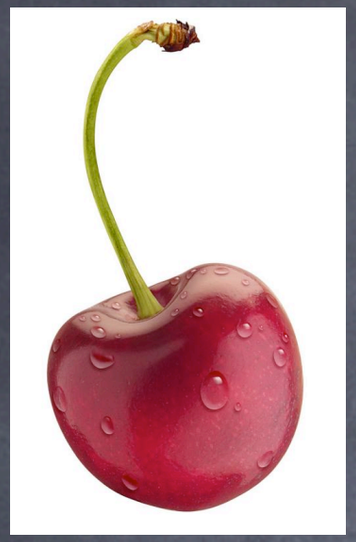

g_W
Harold's best response curve
William's best response curve
g_W^*
g_H^*
g_H


g_W
Pareto optimal solutions
Nash equilibrium
g_H

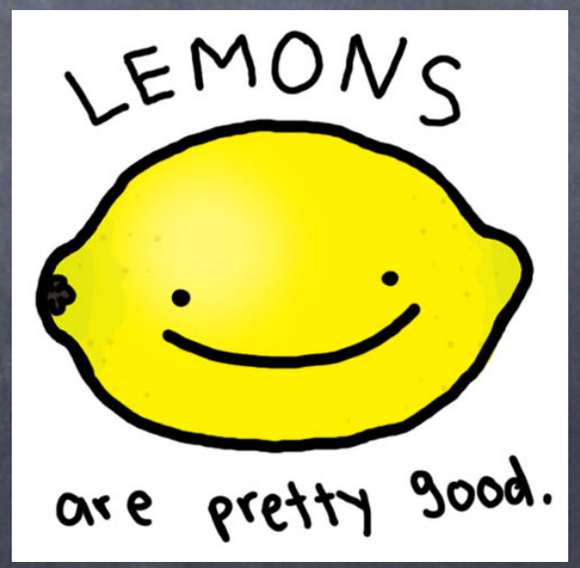

g_W
u_W
Set of possible strategy pairs
utility set
g_H
u_H


u_W
Pareto optimal value pairs
S
$u_W(g_H^*, g_W^*)$
Threat point d
utility set
$u_H(g_H^*, g_W^*)$
u_H

Lemon Problem

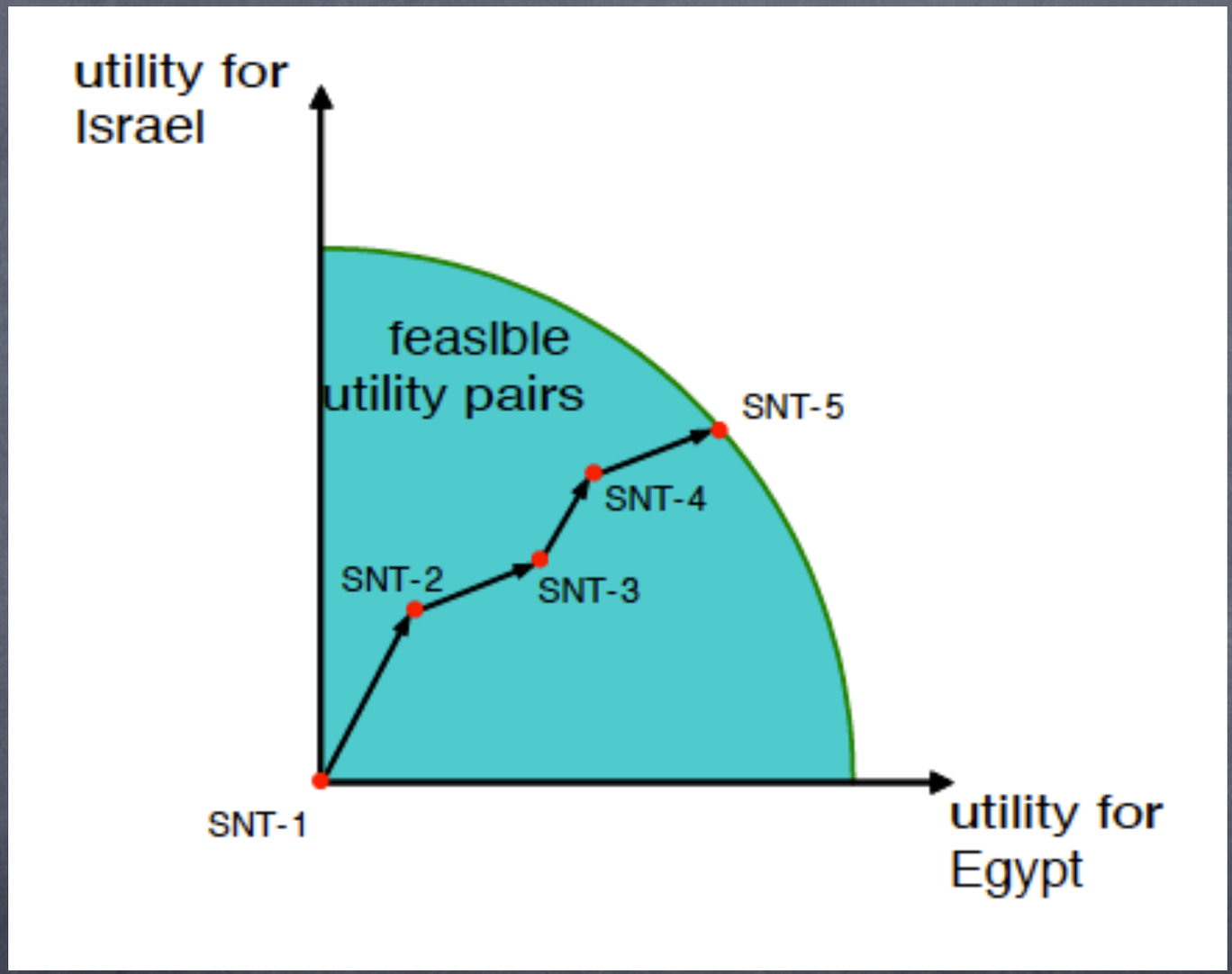


- w/o intermediate
- incomplete info
- information asymmetry

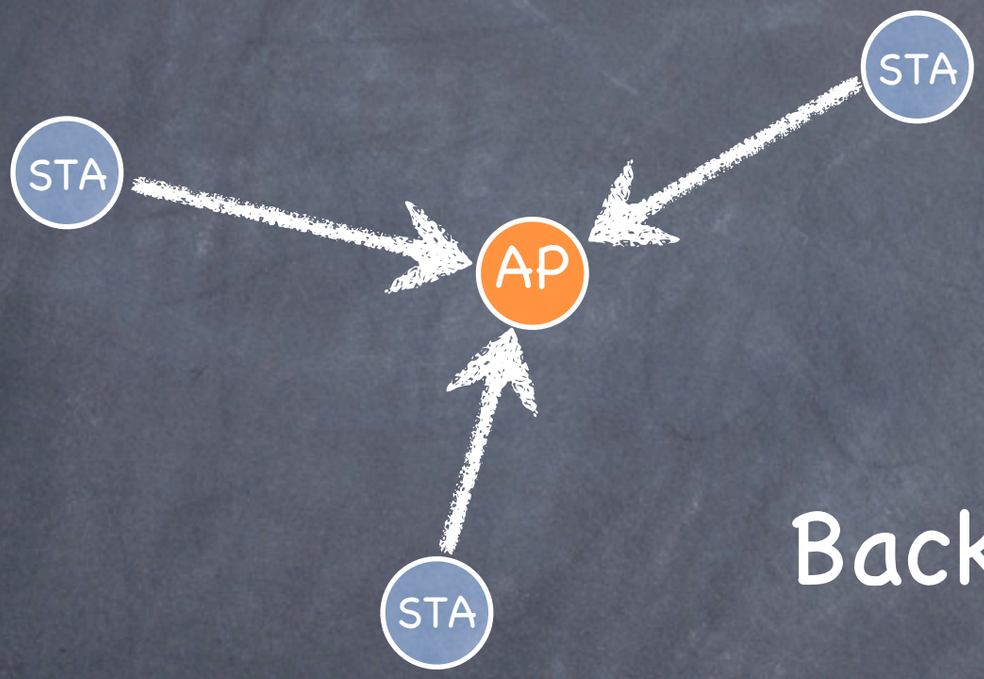


War Affair

- SNT: Single Negotiation Text (Fisher & Ury)
- Real-Life Application:
  - Middle East Peace: Egypt vs Israel (1978)
  - 7 issues
  - Mediator: a U.S. team
  - Carter: Nobel Peace Prize 2002


utility for
Israel
feaslble
utility pairs
SNT-5
SNT-4
SNT-2
SNT-3
SNT-1
utility for
Egypt

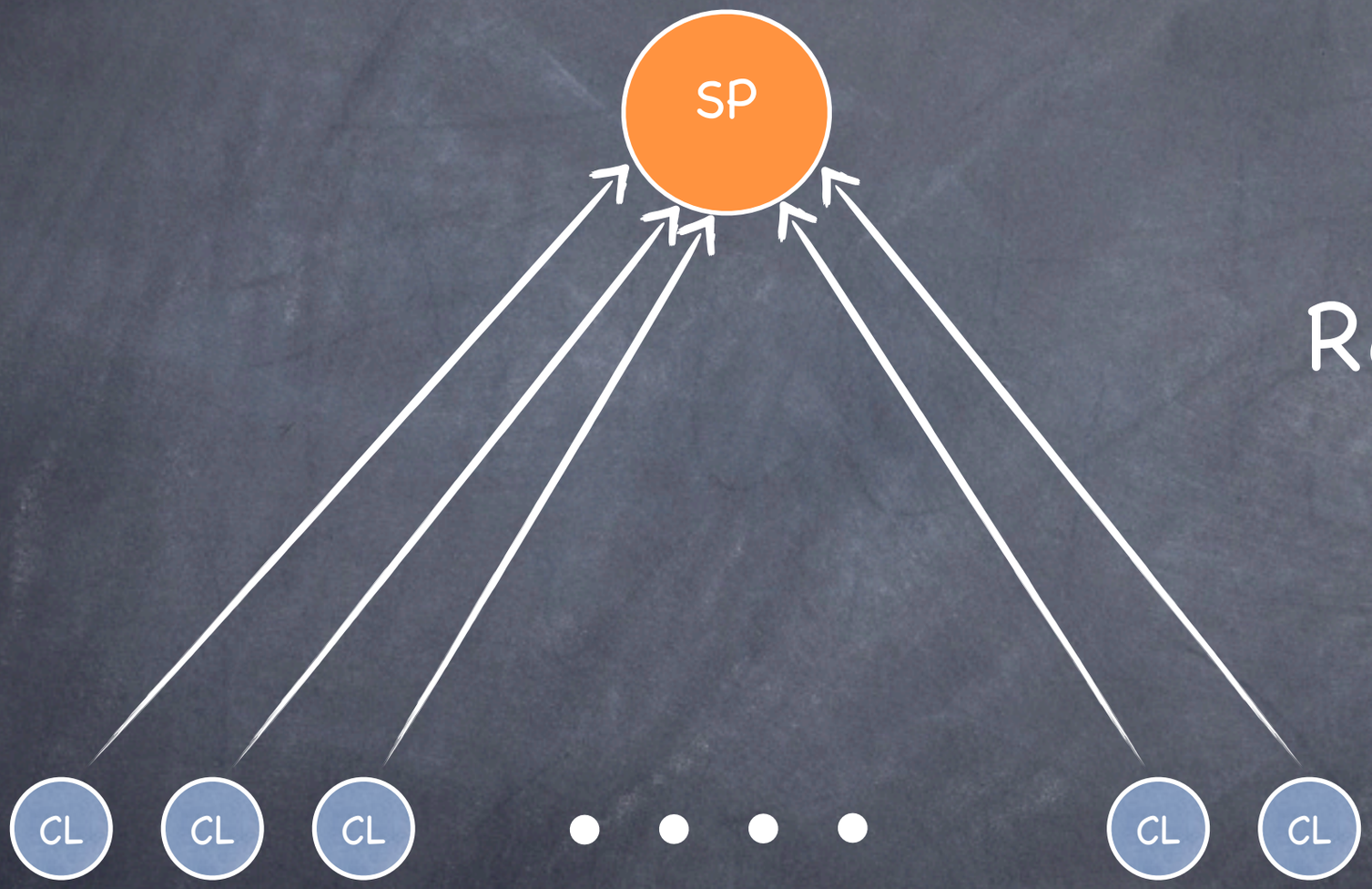
Appz 1/3



Back-Off Timer Negotiation

incomplete
symmetric
make concessions
w/o intervenor

Appz 2/3



Rate Negotiation

incomplete & symmetric

joint improvements & mediator | arbitrator

Appz 3/3

Sensor

Sensor

Fusion Center

Sensor

Sensor

Sensor

Sensor

Sensor

Sensor

Sensor

Sensor

Sensor

Sensor

Transmission Negotiation

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Kala Xristougennaaa!!!