Signaling

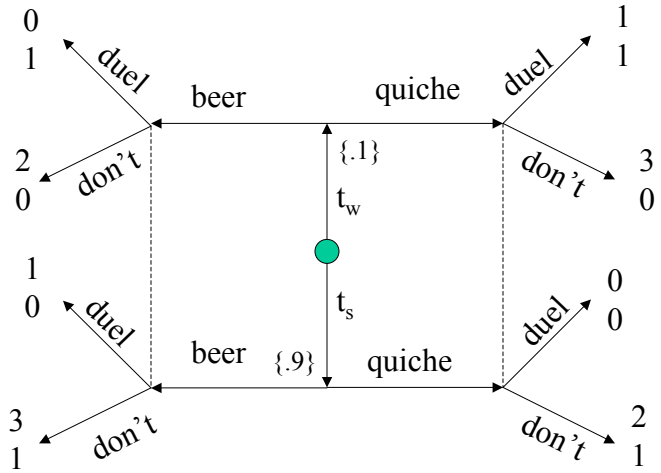
14.12 Game Theory
Muhamet Yildiz

Road map

1. Signaling games – review
   1. Pooling equilibrium
   2. Separating equilibrium
   3. Mixed
2. Job-market signaling (short, time permitting)
3. Review
4. Evaluations

Signaling Games

Beer – Quiche

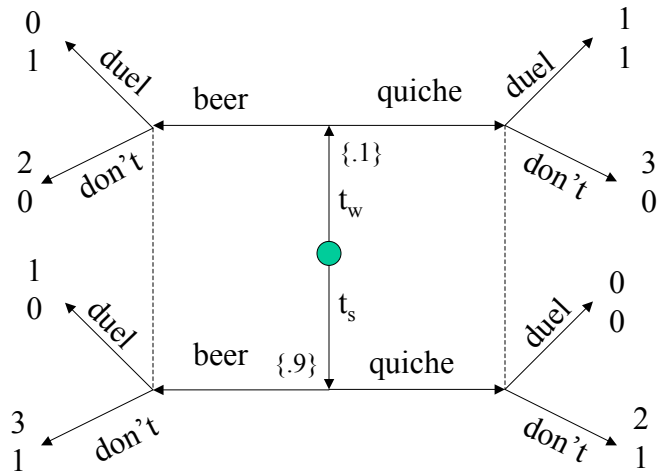


Signaling Game -- Definition

- Two Players: (S)ender, (R)eceiver

1. Nature selects a type t_i from $T = \{t_1,\ldots,t_I\}$ with probability $p(t_i)$;
2. Sender observes t_i, and then chooses a message m_j from $M = \{m_1,\ldots,m_I\}$;
3. Receiver observes m_j (but not t_i), and then chooses an action a_k from $A = \{a_1,\ldots,a_K\}$;
4. Payoffs are $U_S(t_i,m_j,a_k)$ and $U_R(t_i,m_j,a_k)$.

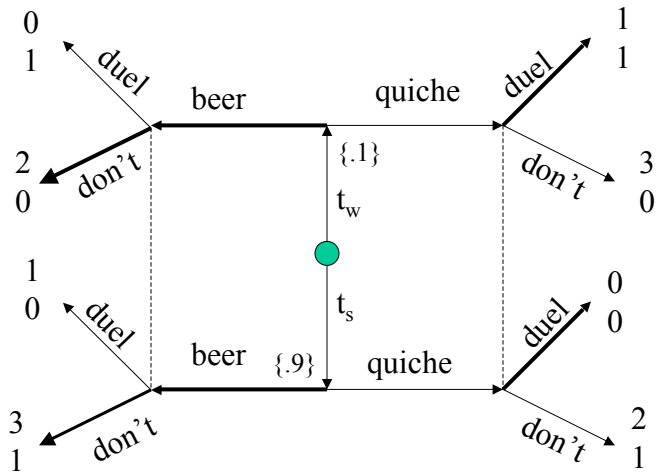
Beer – Quiche



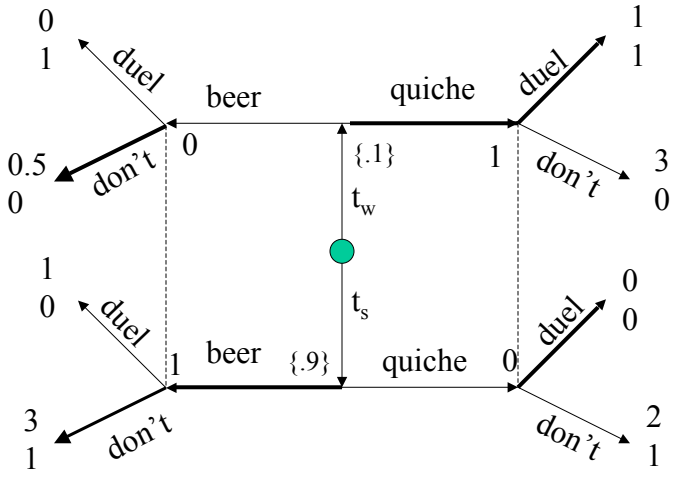
Types of Equilibria

- A **pooling equilibrium** is an equilibrium in which all types of sender send the same message.
- A **separating equilibrium** is an equilibrium in which all types of sender send different messages.
- A **partially separating/pooling equilibrium** is an equilibrium in which some types of sender send the same message, while some others sends some other messages.

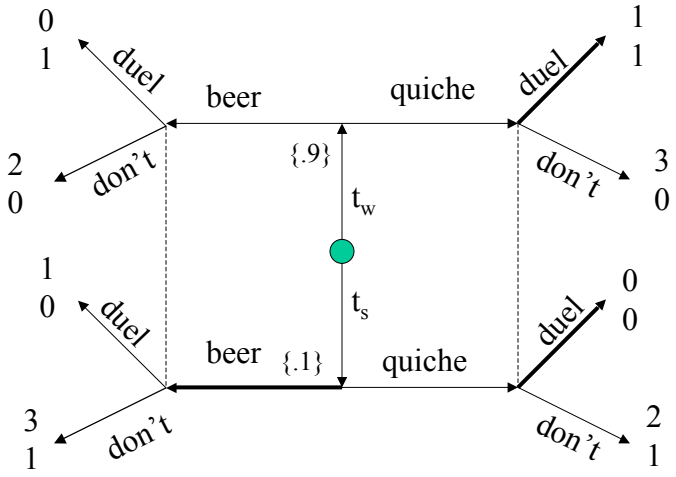
A Pooling equilibrium



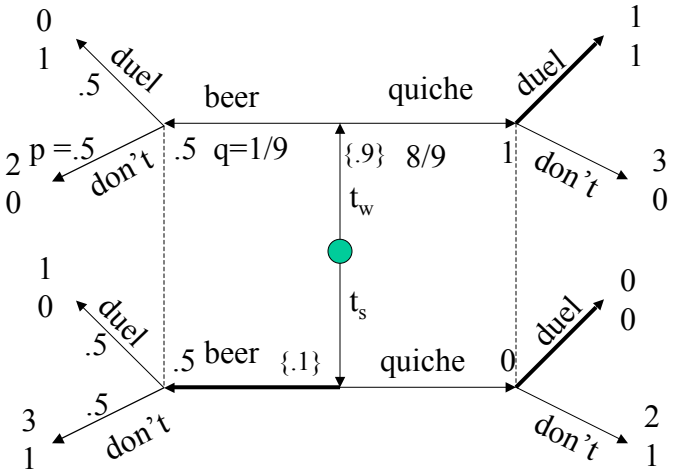
A Separating equilibrium



A Mixed equilibrium



A Mixed equilibrium



Job Market Signaling

Model

- A worker
  - with ability t = H or t = L (his private information)
    - Pr(t = H) = q,
  - obtains an observable education level e,
  - incurring cost c(t,e) where c(H,e) < c(L,e), and
  - finds a job with wage w(e), where he
  - produces y(t,e).
- Firms compete for the worker: in equilibrium,

$$w(e) = \mu(H|e)y(H,e) + (1-\mu(H|e))y(L,e).$$

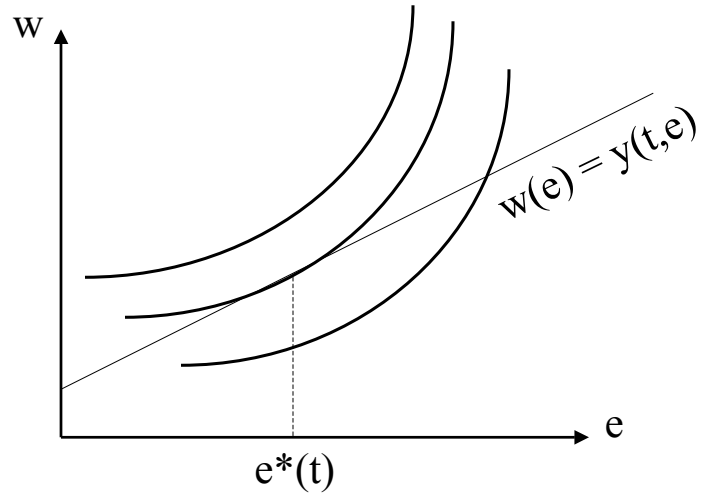
Equilibrium

$(e_H, e_L, w(e), \mu(H|e))$ where

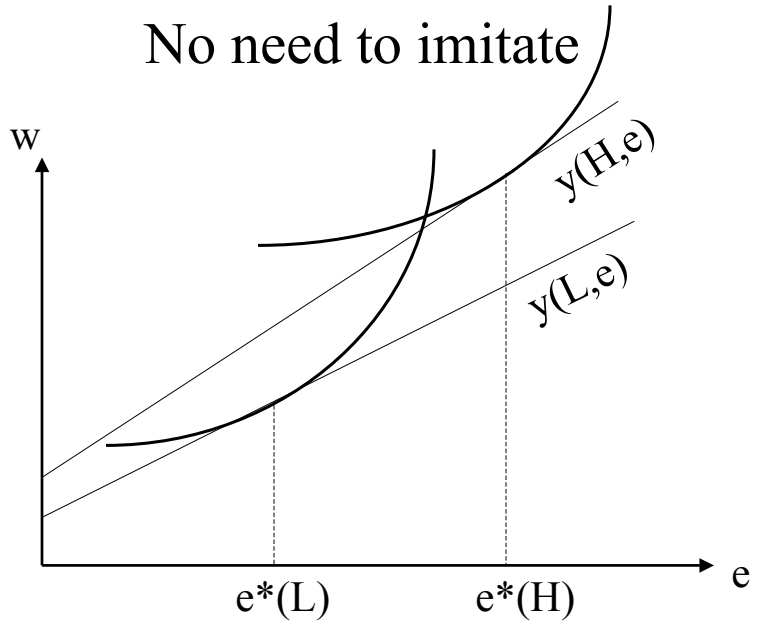
- $e_t = \text{argmax}_e\, w(e) - c(t,e)$ for each t;
- $w(e) = \mu(H|e)y(H,e) + (1-\mu(H|e))y(L,e)$;
- $$\mu(H|e) = \frac{qPr(e_H = e)}{qPr(e_H = e) + (1-q)Pr(e_L = e)}$$

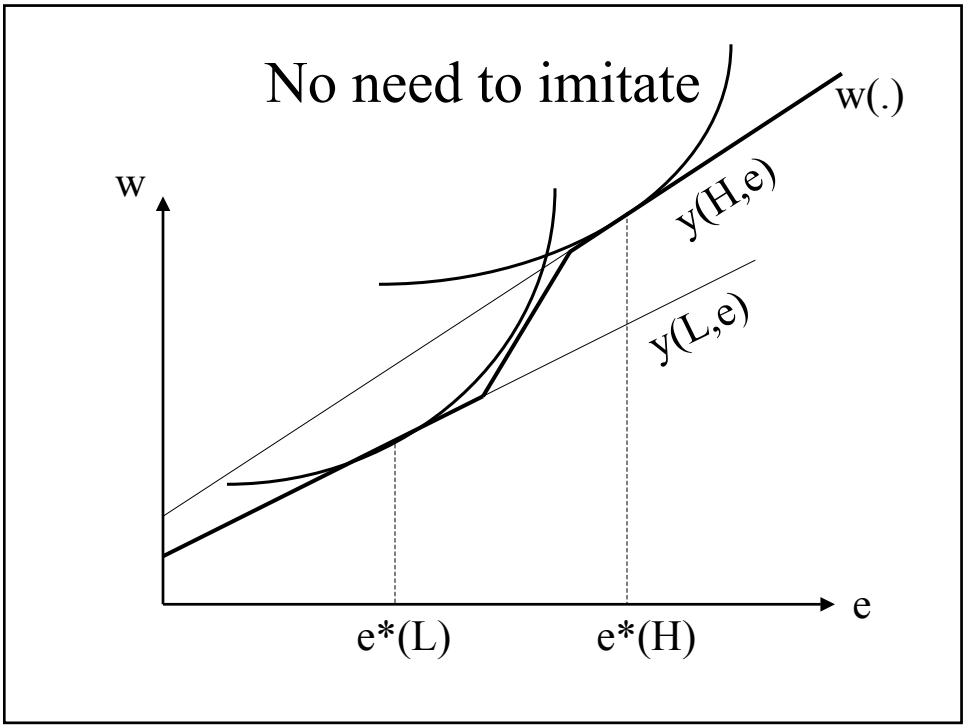
  whenever well-defined.

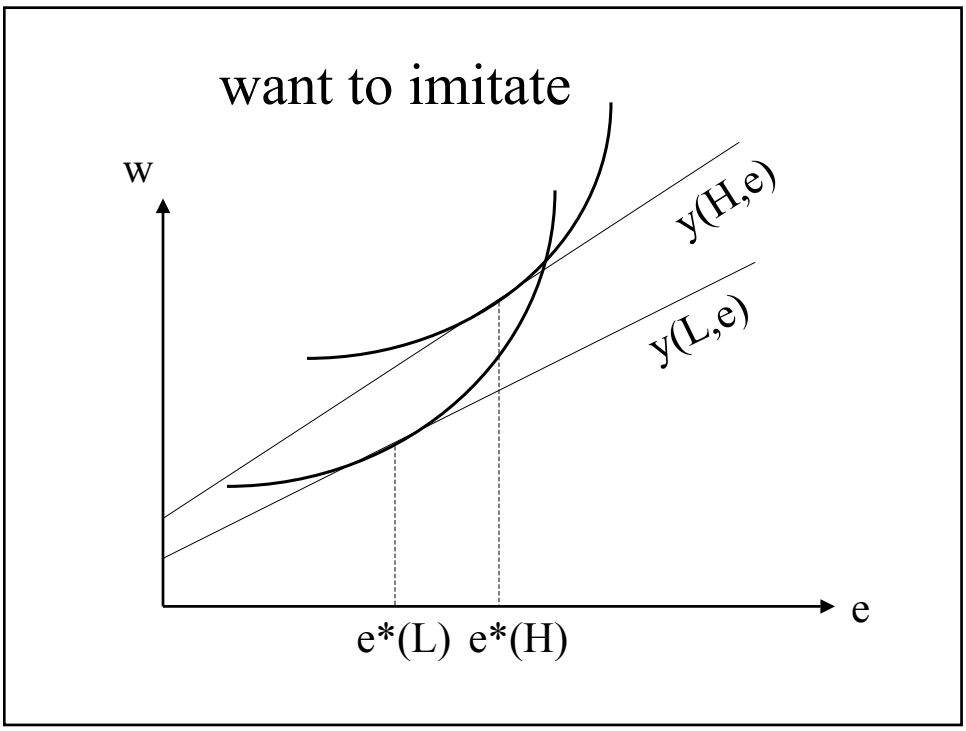
If t were common knowledge



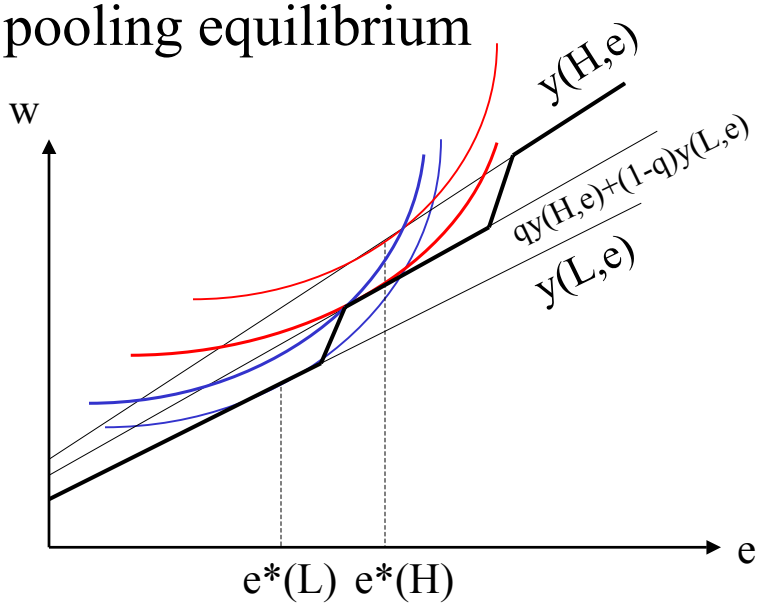
No need to imitate



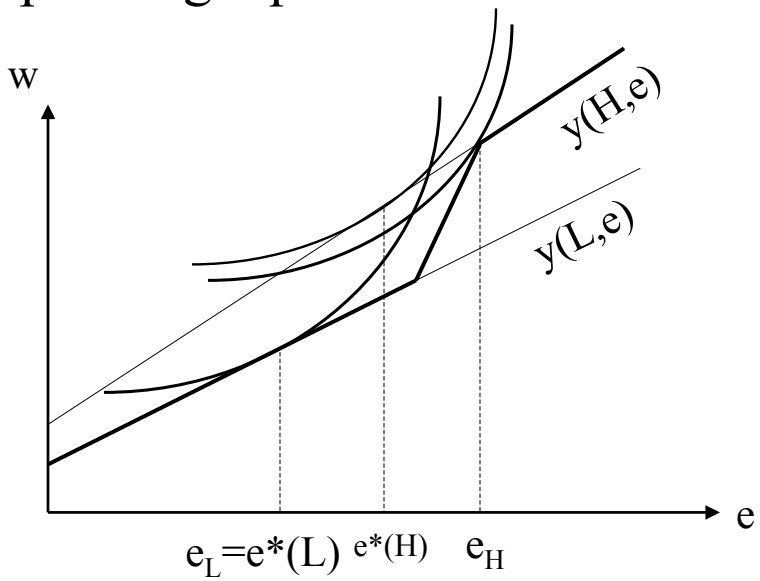

No need to imitate
w(.)
w
y(H,e)
y(L,e)
e
e*(L)
e*(H)


want to imitate
w
y(H,e)
y(L,e)
e
e*(L)
e*(H)

A pooling equilibrium



A separating equilibrium



An intuitive separating equilibrium