

# **CS378**

# **Autonomous Multiagent Systems**

## **Spring 2004**

**Prof: Peter Stone**  
**TA: Mazda Ahmadi**

Department of Computer Sciences  
The University of Texas at Austin

Week 12a: Tuesday, April 13th

# Good Afternoon, Colleagues

---

Are there any questions?

# Logistics

---

- Final tournament times
  - M-F 10:30am, 12:30, 2:30pm?

# Logistics

---

- Final tournament times
  - M-F 10:30am, 12:30, 2:30pm?
- Next week's readings

# Logistics

---

- Final tournament times
  - M-F 10:30am, 12:30, 2:30pm?
- Next week's readings
- Questions required on Thursday!

# Distributed Rational Decision Making

---

**Self-interested, rational agent**

# Distributed Rational Decision Making

---

**Self-interested, rational agent**

- Self-interested:

# Distributed Rational Decision Making

---

## Self-interested, rational agent

- Self-interested: maximize own goals
  - No concern for global good



# Distributed Rational Decision Making

---

## Self-interested, rational agent

- Self-interested: maximize own goals
  - No concern for global good
- Rational:

# Distributed Rational Decision Making

---

## Self-interested, rational agent

- Self-interested: maximize own goals
  - No concern for global good
- Rational: agents are smart
  - Ideally, will act *optimally*

# Distributed Rational Decision Making

---

## Self-interested, rational agent

- Self-interested: maximize own goals
  - No concern for global good
- Rational: agents are smart
  - Ideally, will act *optimally*

The protocol is key

# Evaluation Criteria

---

- Social welfare
- Pareto efficiency
- Stability

# Evaluation Criteria

---

- Social welfare
- Pareto efficiency
- Stability
- Individual Rationality

# Evaluation Criteria

---

- Social welfare
- Pareto efficiency
- Stability
- Individual Rationality
- Efficiency (computational, communication)

# Voting vs. auctions

---

- Voting: maximize social good
  - result affects all

# Voting vs. auctions

---

- Voting: maximize social good
  - result affects all
- Auctions: maximize profit
  - result affects buyer and seller



# Class Discussion

---

Irvin Hwang on auctions (and candy bars)

# Auctions

---

- Valuations:

# Auctions

---

- Valuations:
  - private value

# Auctions

---

- Valuations:
  - private value
  - common value

# Auctions

---

- Valuations:
  - private value
  - common value
  - correlated value

# Auctions

---

- Valuations:
  - private value
  - common value
  - correlated value
- Types:
  - first-price open-cry (English)

# Auctions

---

- Valuations:
  - private value
  - common value
  - correlated value
- Types:
  - first-price open-cry (English)
  - first-price sealed-bid

# Auctions

---

- Valuations:
  - private value
  - common value
  - correlated value
- Types:
  - first-price open-cry (English)
  - first-price sealed-bid
  - descending (Dutch)



# Auctions

---

- Valuations:
  - private value
  - common value
  - correlated value
- Types:
  - first-price open-cry (English)
  - first-price sealed-bid
  - descending (Dutch)
  - second-price sealed-bid (Vickrey)

# Auctions

---

- Valuations:
  - private value
  - common value
  - correlated value
- Types:
  - first-price open-cry (English)
  - first-price sealed-bid
  - descending (Dutch)
  - second-price sealed-bid (Vickrey)

**Revenue equivalence: private-value, risk-neutral**

# Auctions

---

- You value a bunch of flowers at \$100

# Auctions

---

- You value a bunch of flowers at \$100
- What strategy if auction is:
  - English

# Auctions

---

- You value a bunch of flowers at \$100
- What strategy if auction is:
  - English
  - first-price sealed-bid

# Auctions

---

- You value a bunch of flowers at \$100
- What strategy if auction is:
  - English
  - first-price sealed-bid
  - Descending

# Auctions

---

- You value a bunch of flowers at \$100
- What strategy if auction is:
  - English
  - first-price sealed-bid
  - Descending
  - Vickrey

# Auctions

---

- You value a bunch of flowers at \$100
- What strategy if auction is:
  - English
  - first-price sealed-bid
  - Descending
  - Vickrey
- What if it's an antique?



# Auctions

---

- Vickrey, English are truthful

# Auctions

---

- Vickrey, English are truthful
- First-price sealed-bid: bidders bid lower than values

# Auctions

---

- Vickrey, English are truthful
- First-price sealed-bid: bidders bid lower than values
  - Private value case: why?

# Auctions

---

- Vickrey, English are truthful
- First-price sealed-bid: bidders bid lower than values
  - Private value case: why?
- In common (and correlated) value case, bids lower in all mechanisms

# Auctions

---

- Vickrey, English are truthful
- First-price sealed-bid: bidders bid lower than values
  - Private value case: why?
- In common (and correlated) value case, bids lower in all mechanisms
  - Why?