Reaching Agreements

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Janyl Jumadinova
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- How do agents reach agreements when they are self-interested?
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In an extreme case (zero-sum encounter) no agreement is possible – but in most scenarios, there is potential for mutually beneficial agreement on matters of common interest.

The capabilities of negotiation and argumentation are central to the ability of an agent to reach such agreements.
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Mechanisms, Protocols, and Strategies

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- The mechanism defines the “rules of encounter” between agents.
- Mechanism design is designing mechanisms so that they have certain desirable properties.
- Given a particular mechanism, how can a particular strategy be designed that individual agents can use?
Desirable properties of mechanisms:

- Convergence/guaranteed success
- Maximizing social welfare
- Pareto efficiency
- Individual rationality
- Stability
- Simplicity
- Distribution
An auction takes place between an agent known as the auctioneer and a collection of agents known as the bidders.
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Auction Parameters

Goods can have:

- private value
- public/common value
- correlated value

Winner determination may be:

- first price
- second price
Auction Parameters

Bids may be:
- open cry
- sealed bid

Bidding may be:
- one shot
- ascending
- descending
English Auctions

- Most commonly known type of auction:
  - first price
  - open cry
  - ascending

Dominant strategy is for agent to successively bid a small amount more than the current highest bid until it reaches their valuation, then withdraw.

Susceptible to: winner's curse, shills
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Dutch auctions are examples of open-cry descending auctions:

1. The auctioneer starts by offering the good at an artificially high value.
2. The auctioneer lowers the offer price until some agent makes a bid equal to the current offer price.
3. The good is then allocated to the agent that made the offer.
4. No dominant strategy in general.
5. Also susceptible to: winner's curse.
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- good is allocated to agent that made highest bid
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Best strategy is to bid less than true valuation.
Vickrey Auctions

- Vickrey auctions are:
  - second-price
  - sealed-bid

- Good is awarded to the agent that made the highest bid; at the price of the second highest bid.
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- Bidding to your true valuation is dominant strategy in Vickrey auctions – truth telling

- Vickrey auctions susceptible to antisocial behavior.
Multiple Item

Ideas of these auctions apply to multi-unit auctions as well.
Lies and Collusion

- The various auction protocols are susceptible to lying on the part of the auctioneer, and collusion among bidders, to varying degrees.
- All four auctions (English, Dutch, First-Price Sealed Bid, Vickrey) can be manipulated by bidder collusion.
- A dishonest auctioneer can exploit the Vickrey auction by lying about the 2nd-highest bid.
- Shills can be introduced to inflate bidding prices in English auctions.