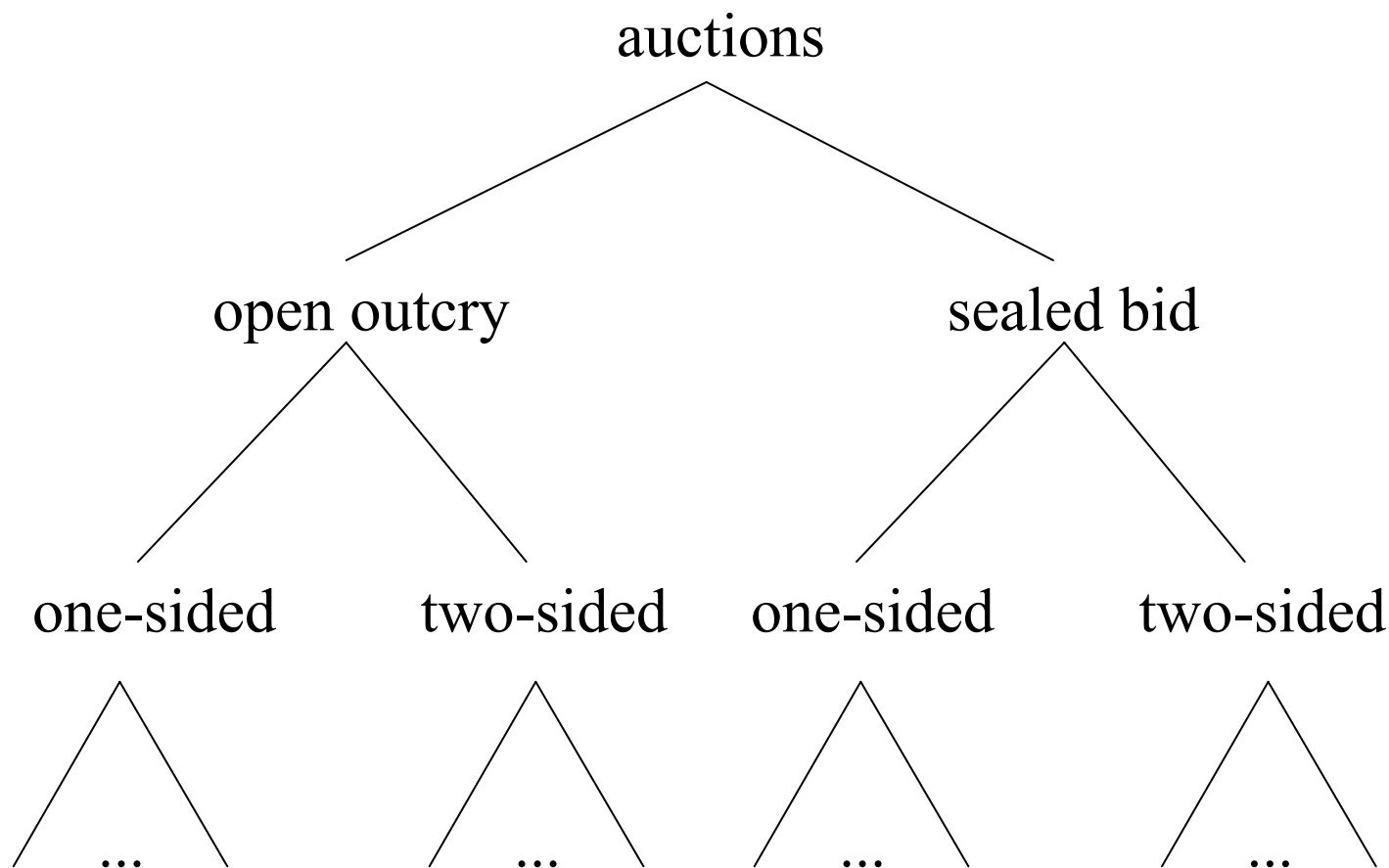

The Auction Space: Beyond Zoology

Yoav Shoham

What we've done so far: zoological categorization



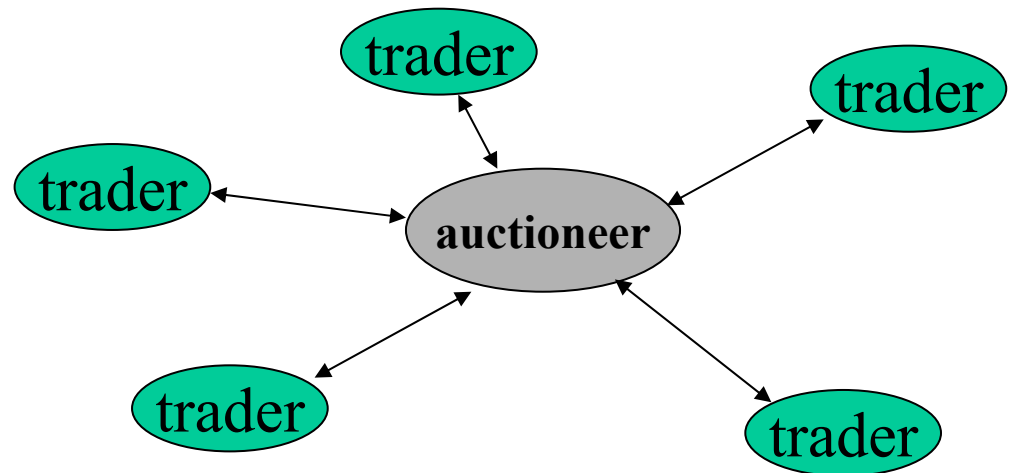
A deeper look at what auctions really are

Definition: An auction is any negotiation mechanism that is:

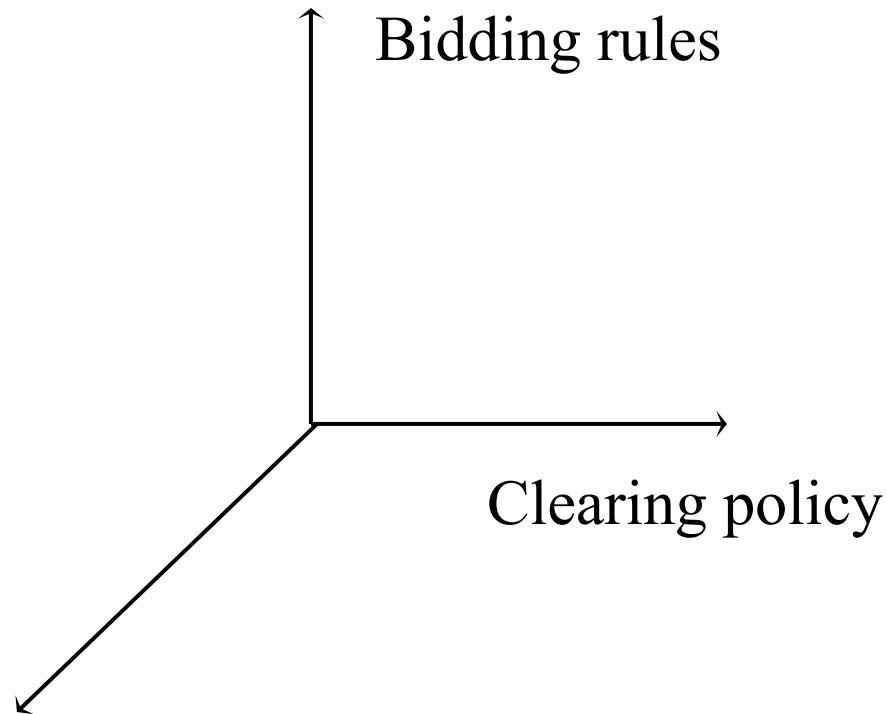
- Mediated
- Well-specified (runs according to explicit rules)
- Market-based (determines an exchange in terms of standard currency)

Auctioneer activities

- Receive Bids
- Disseminate Information
- Arrange trades (clear market)

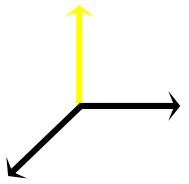


Auction Dimensions



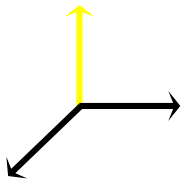
Information revelation policy

Bidding Rules



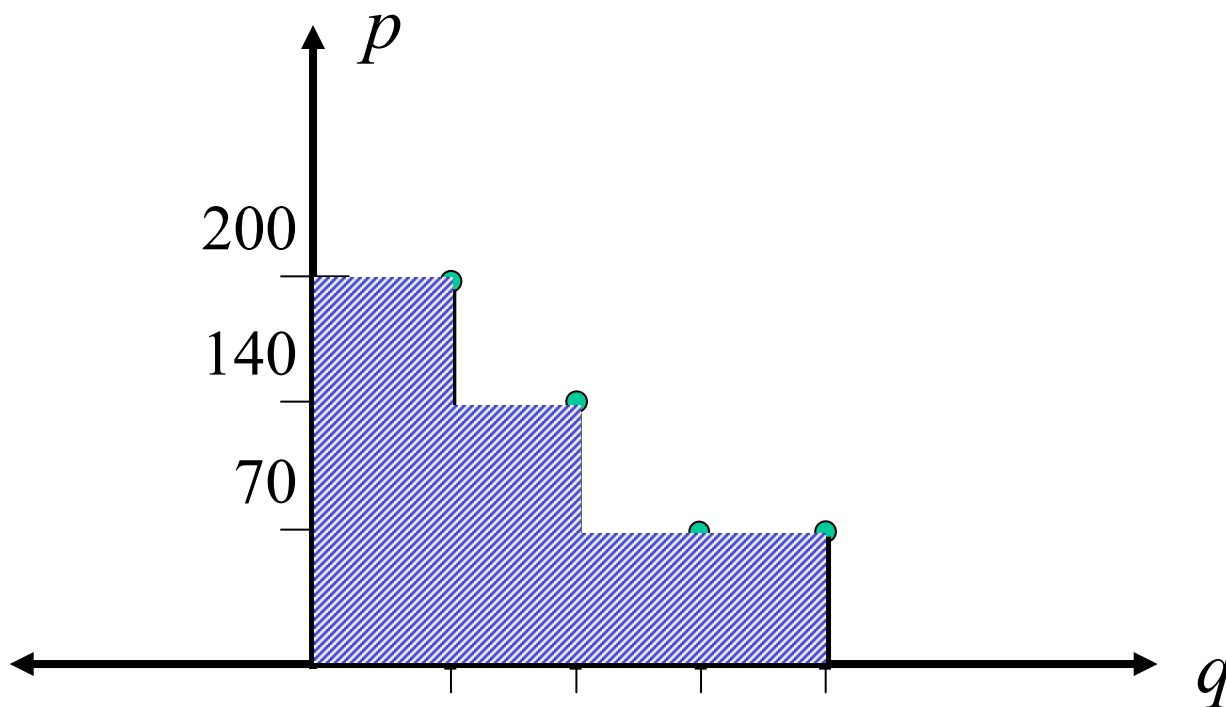
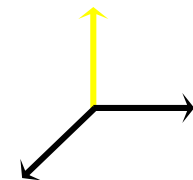
- Who can bid, when
- What is form of bid
- Restrictions on offers, as a function of
 - Trader's own previous bid
 - Auction state (everyone's bids)
 - Eligibility (e.g., financial)
 - ...
- Expiration, withdrawal, replacement

Single-Good Offers



- General form
 - schedule: [$q_1@p_1, q_2@p_2, q_3@p_3, \dots$]
 - “willingness” interpretation
- Common restrictions
 - Single price/quantity point [$q@p$]
 - Single unit [$1@p$]
 - Monotonicity
 - Divisibility (all-or-none)

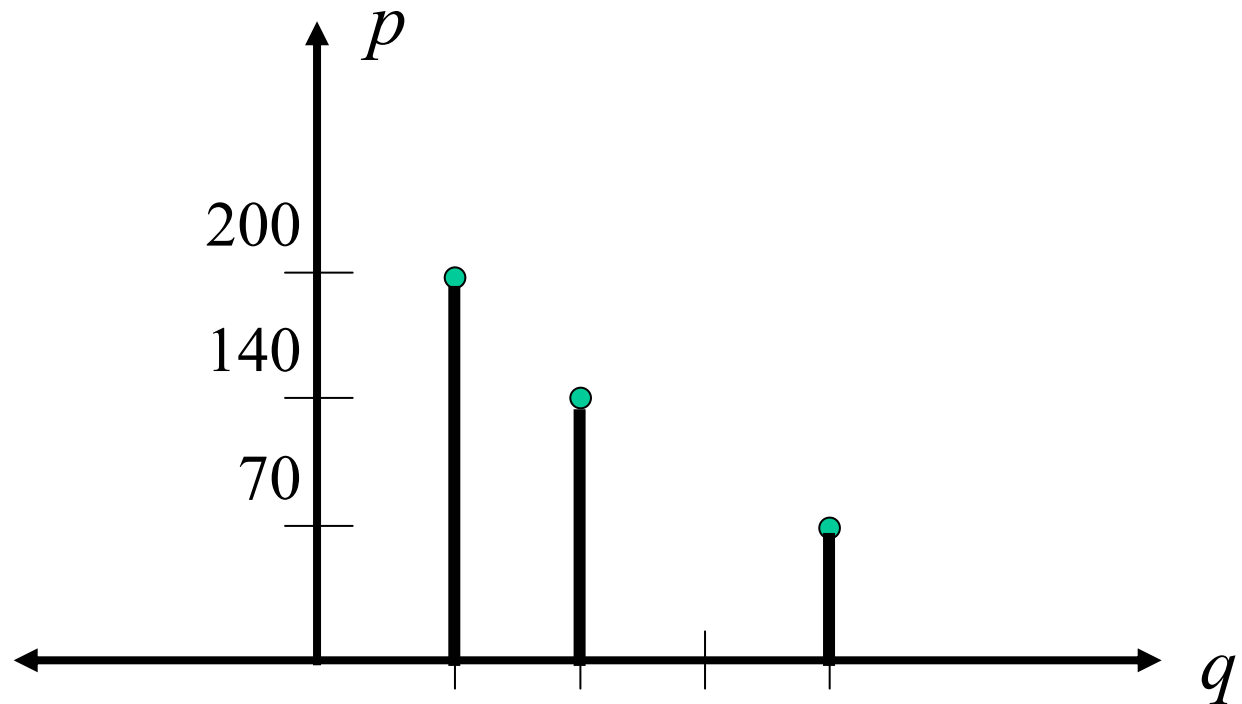
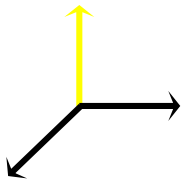
Price-Quantity Schedule



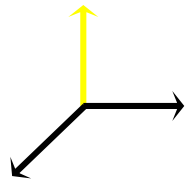
Offer: $[1@200, 2@140, 4@70]$

$[10@200, 20@140, 40@70]$

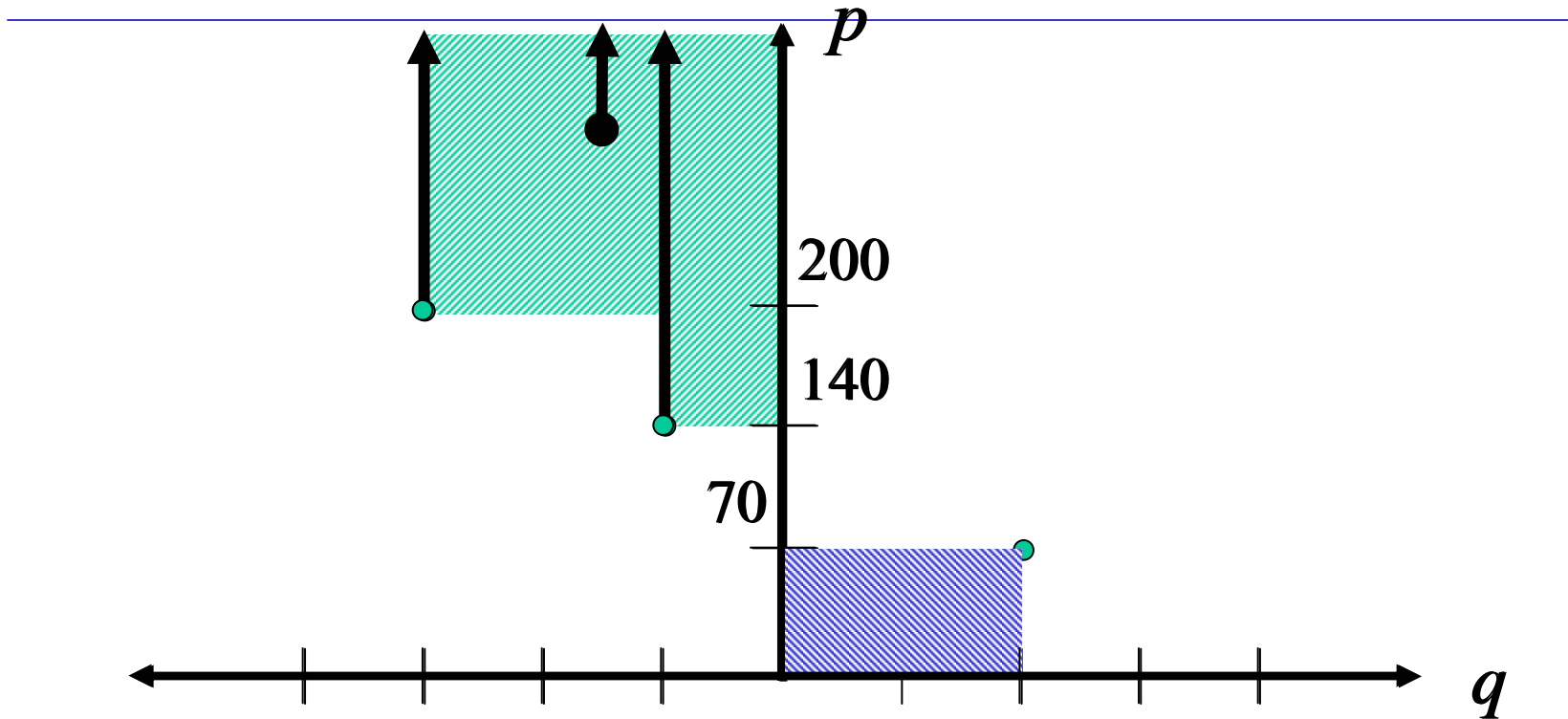
Indivisibility (All-or-None)



Offer: [10@200, 20@140, 40@70] **AON**



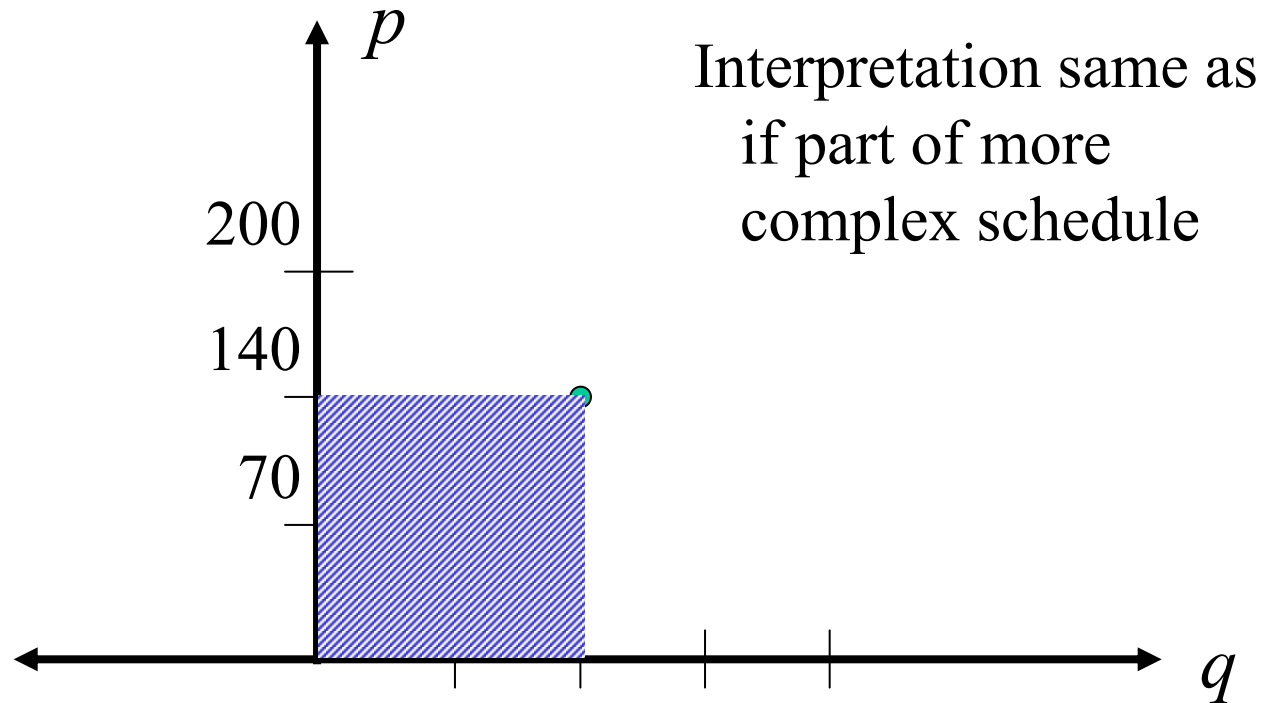
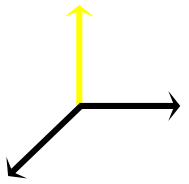
Sell Offers



Offer: $[-3@200, -1@140]$

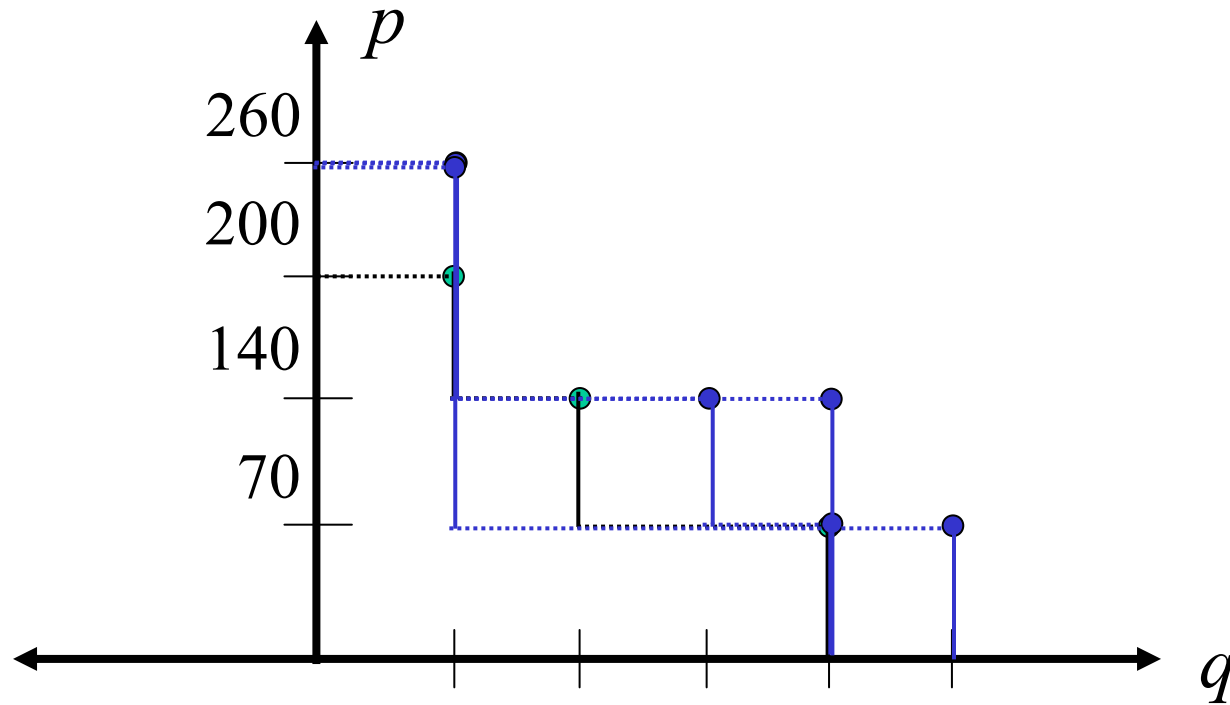
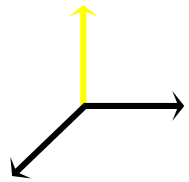
$[-3@200, -1@140, 2@70]$

Single PQ Points



Offer: $[2@140]$

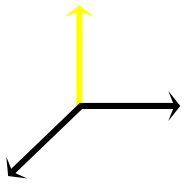
Bid Dominance



Current offer: [1@200, 2@140, 4@70]

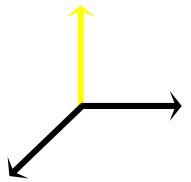
New offer: [1@260, 3@140, 4@70]

Dominance Special Cases



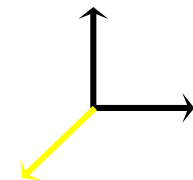
- Single PQ Point
 - Higher price and quantity
 - Higher price, same quantity
 - Same price, higher quantity
- Single Unit
 - Higher price

Dominance Fine Points, Issues



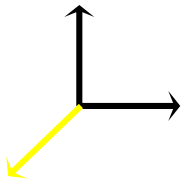
- Can require increase (NE) or decrease (SW)
- Can distinguish buy and sell side
 - Increase *strengthens* buy, *weakens* sell
 - Need increase on both sides to ensure price progression
- Adding AON weakens offer, dropping strengthens

Information Revelation



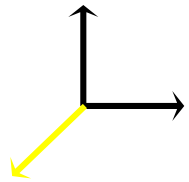
- When to reveal information
- What information
- To whom





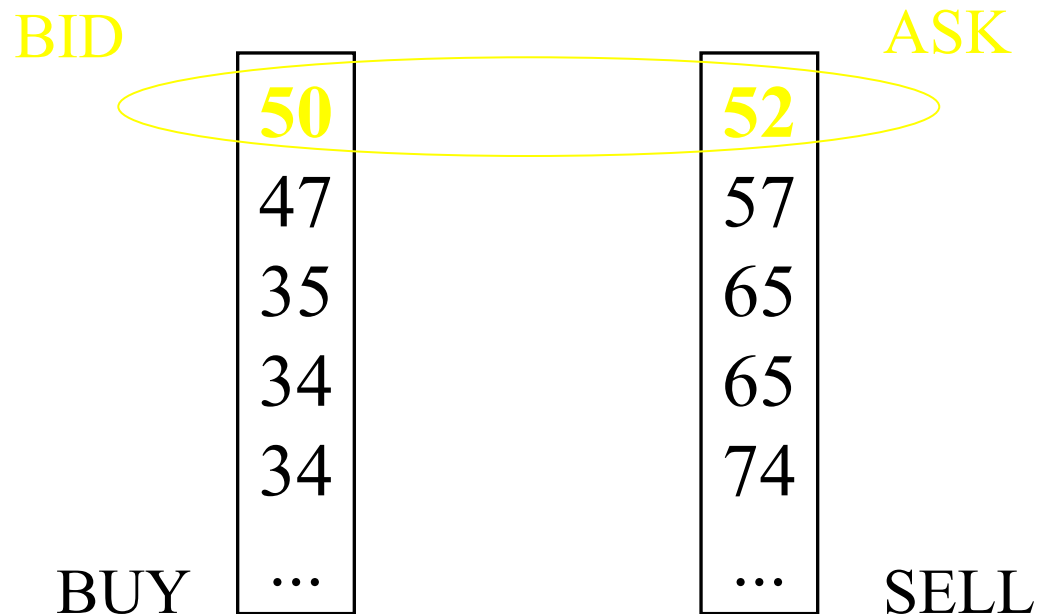
Price Quotes

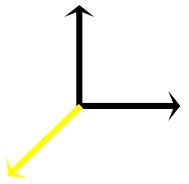
- Generic term for auction summary info revealed at periodic or event-driven times
- “Current Price”
 - ASK quote: Amount buyer would have to offer to be a winner, in current state
 - BID quote: Analogous, for seller
- Other info: quantities, trader IDs, etc.



“Bid-Ask” Spread

- Terminology comes from familiar CDA, as in financial exchanges.

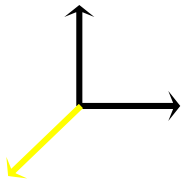




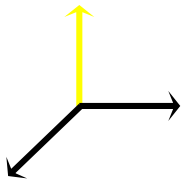
Quotes in Common Auctions

- English
 - BID: highest price so far
 - ASK: + delta
- Dutch
 - BID: undefined
 - ASK: “clock”
- CDA: BID-ASK spread
- Sealed:

Price Quote Timing



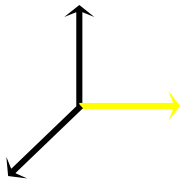
- At specified intervals
- On each bid
- On inactivity
- On market clears



Beat the Quote

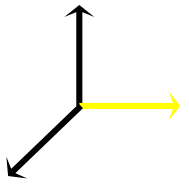
- General: New offer must increase (or maintain) magnitude of “winning” amount, according to current quote.
- Single-Unit: Buy offer price must meet or beat ASK (and Sell/BID).
- Multi-Unit: OK to ignore “out of the money” amounts.
- Can be applied in conjunction with Beat-your-Own (Dominance).

Clearing Policy



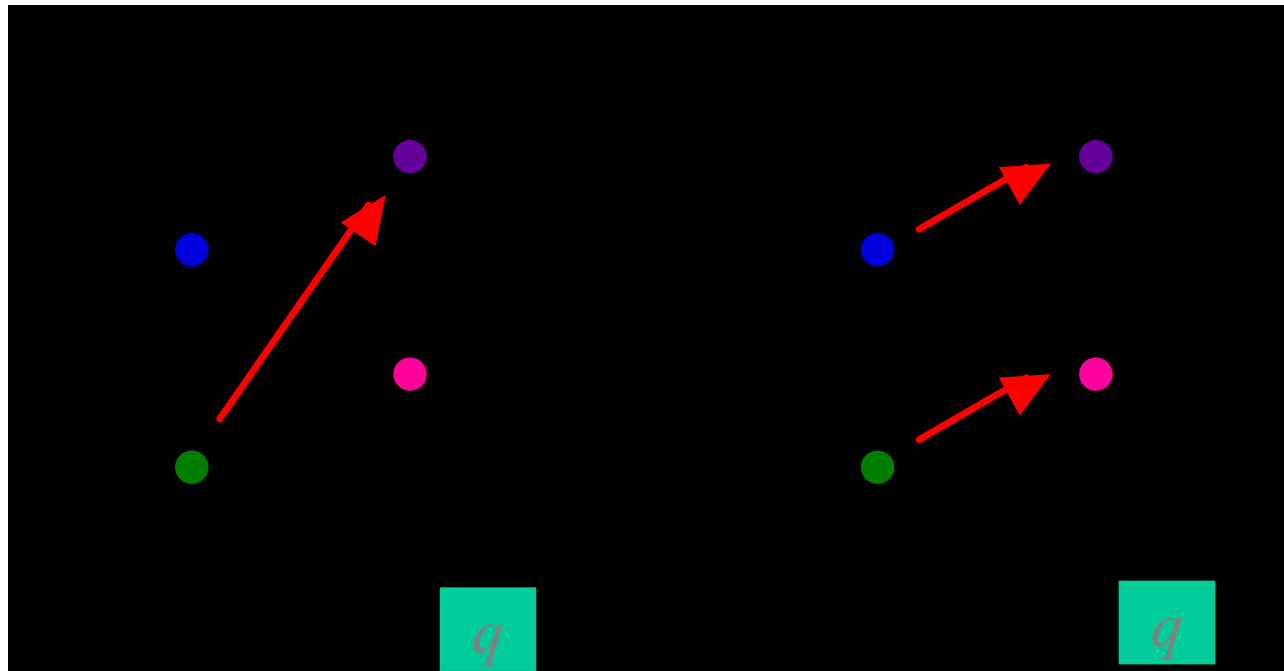
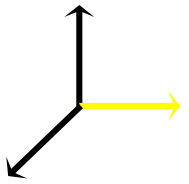
- *Clear*: Translates offers into agreed trades, according to specified rules.
- Policy choices:
 - When to clear
 - Who gets what (*allocation*)
 - At what prices

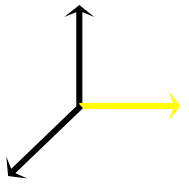
Clear Timing



- At specified intervals
- On each bid
- On inactivity
- On other designated events

Allocation





Pricing Policy

- Uniform vs. Discriminatory
- First (worst winning) vs. Second (best losing)
- Buyers' vs. Sellers'
- Earliest vs. Latest
- Anywhere in between...

That's it!