

The Effect of Size and Information on the Unique-Bid Auction



A study of how auction size and access to information affects the performance of a unique-bid auction.

The Technology Project

- To create an auction environment and allow human and robotic bidders to compete for a fictitious auction item.
 - Complex system modeling
 - Computer networking
 - Artificial Intelligence
 - Graphical interfaces and displays

The Unique-Bid Auction

Seller's Perspective:

- Seller sets a bidding range below value of item
- Seller determines a set number of bidders
- Bidders pay a bidding fee to the seller and submit their bids
- Winning bidder pays his/her bid and receives the item

Example:

- \$60,000 Cadillac for a maximum bid of \$120
- 6 000 bidders
- \$10 fee (\$60,000 to the auctioneer)
- Winning bidder gets a Cadillac for at most \$130
- Losing bidders lose \$10
- Seller gets at most \$120 profit

The Unique-Bid Auction

Bidders' Perspective:

- Bidders submit bid within the bidding range
- Item goes to the bidder who picks the highest value that no other bidder chooses.
- In event of tie, item goes to first bidder who picks correctly

Example:

- In Cadillac auction, bidding distribution is:

120, 120, 120,

119, 119, 119, 119,

118, 118,

117,

116,

115, 115,

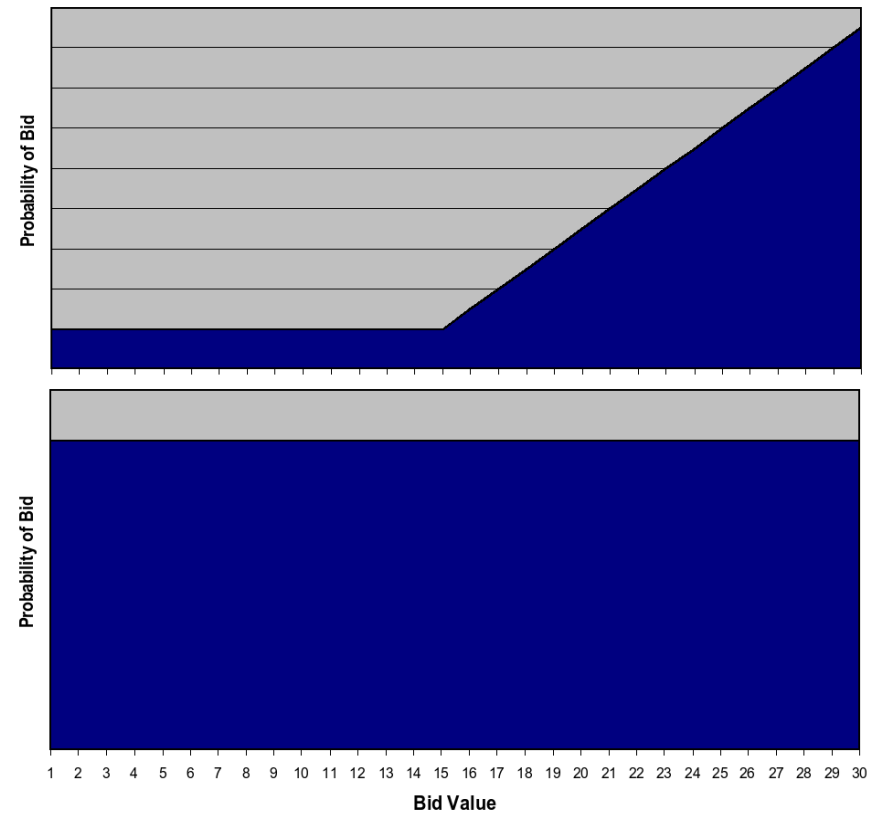
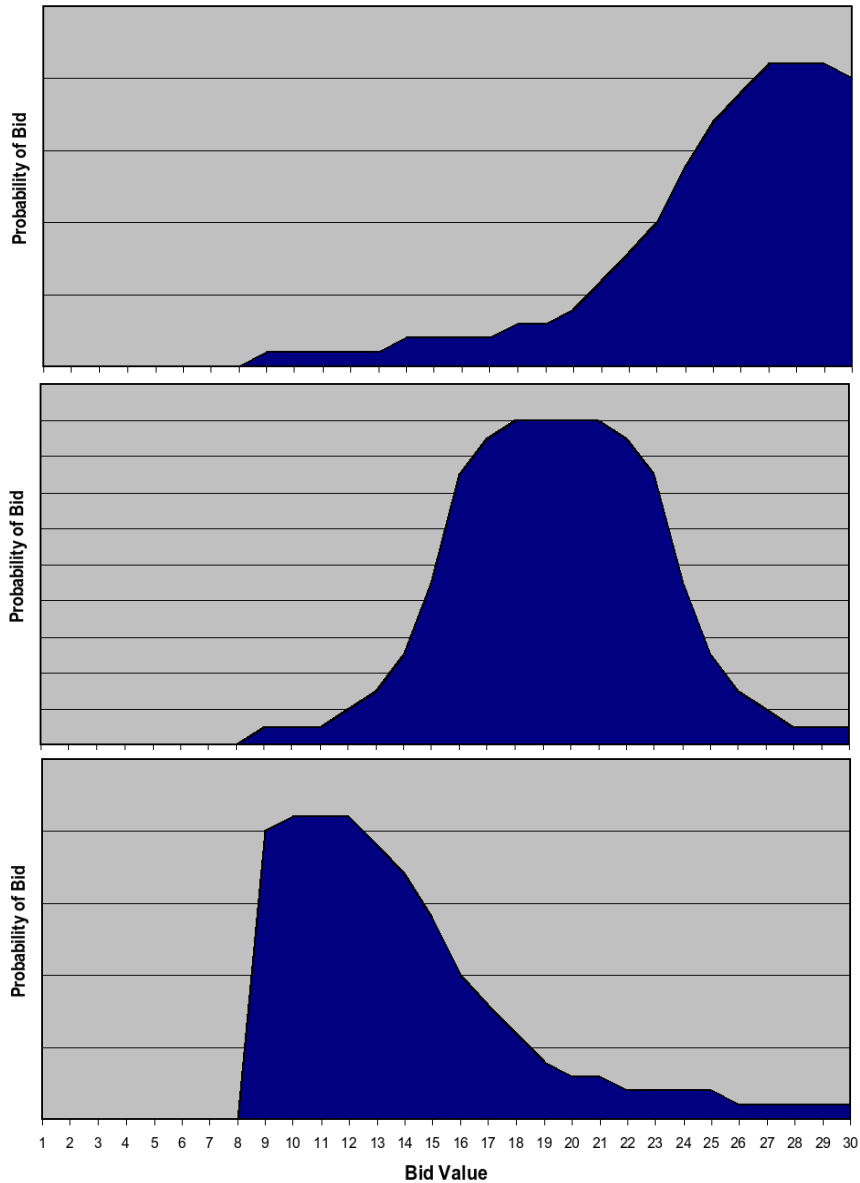
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Highest unique bid is 117

Robotic Bidders

- Robotic bidding strategy involves picking randomly from a probability distribution
- When bid does not win, the chance of bidding that value decreases
- For each round, the chance of bidding the winning value value increases

Original Bidding Distributions



Status bar

Bidder Interface

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Bidder: Player1

Round 19 Results: You Win!

Place:	Name:	Strategy:	Wins:
1	Player17	Computer	3
2	Player4	Computer	2
2	Player13	Computer	2
2	Player18	Computer	2
5	Player1	Human	1
5	Player6	Computer	1
5	Player11	Computer	1
5	Player12	Computer	1
5	Player15	Computer	1
5	Player16	Computer	1
5	Player19	Computer	1
5	Player24	Computer	1
5	Player32	Computer	1
5	Player34	Computer	1
15	Player2	Computer	0
15	Player3	Computer	0
15	Player5	Computer	0
15	Player7	Computer	0
15	Player8	Computer	0
15	Player9	Computer	0
15	Player10	Computer	0
15	Player14	Computer	0
15	Player20	Computer	0
15	Player21	Computer	0

Bidding:

Auction information

Number of Players: 40
Bidding Range: 1 - 30
Number of Rounds: 50

Bidding panel

Your Bid:

Strategy: Selected Bid

Automatic bidding strategies

Random in top percent of range

Random of the highest possible bids

Average of previous winning bids

Ranking of participants

Graph of previous round

Proceed button

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Auctioneer Interface

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Auctioneer

Round 17 Results: Player1 wins with 30. ← **Status bar**

Name of Experiment: <blank>

Round # 17 of 50

Place:	Wins:	Name:	Strategy:	Bid:
3	1	Player1	Human	30
13	0	Player2	Random	20
3	1	Player3	Random	29
3	1	Player4	Random	22
13	0	Player5	Random	13
3	1	Player6	Random	14
13	0	Player7	Random	21
13	0	Player8	Random	5
13	0	Player9	Linear	25
13	0	Player10	Linear	29
3	1	Player11	Linear	23
13	0	Player12	Linear	9
3	1	Player13	High	18
1	4	Player14	High	27
13	0	Player15	High	28
13	0	Player16	High	27
13	0	Player17	High	27
3	1	Player18	High	26
13	0	Player19	High	18
13	0	Player20	High	26
3	1	Player21	High	28
2	3	Player22	High	26
13	0	Player23	Low	13
3	1	Player24	Low	19
13	0	Player25	Low	22
13	0	Player26	Low	13
13	0	Player27	Low	9
13	0	Player28	Low	16

Force

Number of Players: 40

Bidding Range: 1 - 30 ← **Auction information**

Number of Rounds: 50

Graph of previous round

Round 17 Results

Proceed button

Save and Begin Round 18

Strategy:	# Players:	# Wins:	Wins/Player:	Win Range:
High	10	10	1.0	x
Low	9	1	0.11111111...x	
Middle	9	1	0.11111111...x	
Random	7	3	0.428571428...x	
Linear	4	1	0.25	x
Human	1	0	0.0	x

← **Summary of auction by strategy**

Summary of auction by bidder

The Economics Project

- To manipulate the auction environment to test the responses in the auction results.

Questions

When deciding on a value to bid, players need to evaluate the behavior of opponents.

- How does the size of the auction affect the behavior of the auction?

As the rounds progress, players are forced to reevaluate their bidding strategies.

- How does access to the previous round's information affect the behavior of the auction?