Sealed bid second price private value au

Sealed bid - each bidders places a bid
an envelope

second price:
After bids are submitted
highest bidder gets the item for sale
pass the second highest bid

example	value	bid
Alice	80	60
Bob	65	40
Craig	10	10
David	50	55

Alice gets the item
she pays 55

her profit: 80-55

Sealed Bid Auction: Second Price

Sorry!

You did not win the auction.

This is a 2nd Price auction.
You bid **$21**.

Your Value	Winning Bid	Price Paid	Your Payoff
$25	$93	$75	$0

Sealed Bid Auction: Second Price

Sorry!

You did not win the auction.

This is a 2nd Price auction.
You bid **$75**.

Your Value	Winning Bid	Price Paid	Your Payoff
$89	$83	$75	$0

My value 89

If I had bid 84 I would make profit $89-83=6$

Suppose my value is 80

Suppose highest bid of opponents is	how much I should bid	
40	anything above 40	(profit 40)
70	〃 〃 70	(profit 10)
78	〃 〃 78	(profit 2)
80	whatever I do	(profit 0)
82	below 82	(profit 0)
90	〃 90	(〃 0)

bidding own value will always give me the maximal profit that I could possibly make.

Dominant strategy

First price auction

the player who submit the highest bid wins, pays own bid

Player #	Answer
1	Bid slightly below value, only 1 or 2 below, as betting at my value will always return zero profits
2	I bid at where below my valuation.
3	0.9*my value
4	Bid right below your value. Not knowing your opponent's value will make it difficult to choose an optimal amount to bid, but you should never bid above your own value.
5	I will bid slightly below my value of the item.
6	I won't bid more than my value because that would result in a negative profit. I should also bid below my value to determine since bidding my value will result in 0 profit.
7	My winning strategy would be to bid as close to my value on the price as possible. I still get a profit in that case as opposed to a payoff of 0
8	To bid my own value.

my value is 80

for me having $100 and no printing gives the same utility like $20 + printing

how should we bid if knew opponents' highest bid

highest opponent bid	I should bid
40	41
70	71
~~78~~	79
83	

we can only make profit 0 and we must bid below 83

There is no dominant strategy

Bidding above 80 is completely stupid

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let's assume that the maximal opponent's bid has distribution $U(0, 100)$

my value is 80. how much should I bid?

Assume I bid b

expected profit = $\frac{b}{100} * (80-b)$

$\frac{b}{100}$: prob. that I win

$(80-b)$: profit if I win

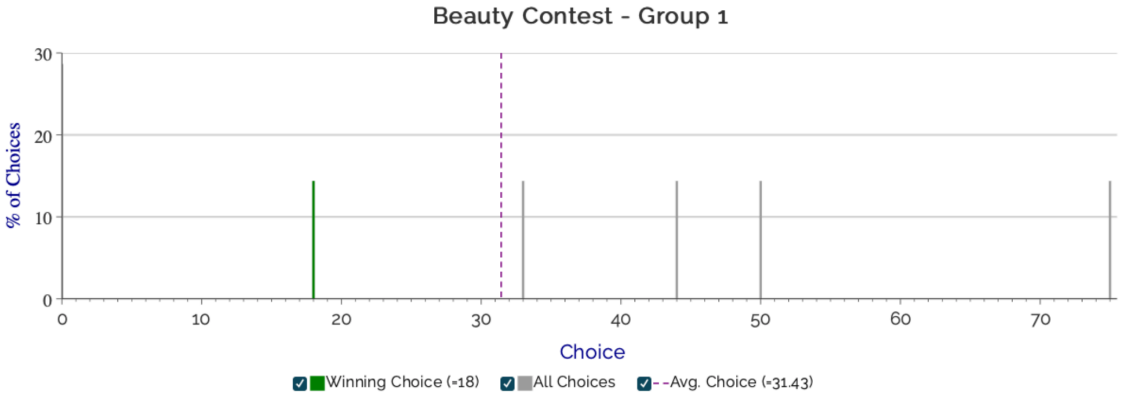
Jane's strategy: $\frac{78}{100} * (80-78)$

bid 60: $\frac{60}{100} * (80-60)$

optimal bid: 40

In a first price auction you should shade your value

Group #	# of Players	Avg. Choice	P	P * Avg. Choice	Winning Choice	# of Winners
1	8	31.43	0.67	20.95	18	1



Keynes' Beauty Contest

Professional investment may be likened to those newspaper competitions in which the competitors have to pick out the six prettiest faces from a hundred photographs, the prize being awarded to the competitor whose choice most nearly corresponds to the average preferences of the competitors as a whole ...

Suppose numbers picked by plays are

10 30 45 90 83

average = 51.6

2/3 * average = 33

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if the average is 100 → I should pick 67

if opponents are monkeys, pick random numbers between 0 and 100 → we chose around 33

if my opponents think that their opponents are monkeys, then my opponents will pick 33.
Therefore I should pick 22

An n-player (normal-form) game is given by sets $S_1, \ldots, S_n$ of (pure) strategies and for every player i a payoff function

$u_i : S_1 \times \dots \times S_n \longrightarrow \mathbb{R}$

S_i = set of strategies of player i

u_i = payoff function to player i

In Kayen's game:

$S_1 = S_2 = \dots = S_n = \{0, 1, \dots, 100\}$

$$u_i(s_1, \dots, s_n) = \begin{cases} 100 & i \in \operatorname{argmin} \left| s_i - \frac{2}{3} * s_1 \right| \\ 0 & \text{otherwise} \end{cases}$$

	L	M	R
T	(1,3)	(2,4)	(3,6)
B	(2,2)	(1,5)	(7,0)

$S_2 = \{L, M, R\}$

$S_1 = \{T, B\}$

If player 1 chooses T → player 1 gets 3
player 2 chooses R → player 2 gets 6

we say that strategy s_i' of player i dominates strategy s_i of player i

if for every $s_{-i} \in \prod_{j \neq i} S_j$

(whatever s_{-i} the opponent choose)

$$u_i(s_i', s_{-i}) \geq u(s_i, s_{-i})$$

$u_i(s_i', s_{-i})$: my payoff if I play s_i'

$u(s_i, s_{-i})$: my payoff if I play s_i

In second price auction, bidding own value dominates every other strategy. Such a strategy is called dominant strategy

First rule of rationality:
- If you have a dominant strategy → play
- don't play dominated strategies

In Kaynes fractional beuty contest

$S_1 = S_2 = \dots = S_n = \{0, 1, \dots, 100\}$

you win if you are closest to $\frac{2}{3}$ * average

choosing 100 is dominated

Everyone choose a number between 0 and 1

↓

average is between 0 and 100

↓

$\frac{2}{3}$ * average is between 0 and 67

67 is definitely better then 100

100 is dominated by 67 because 67 is closer to $\frac{2}{3}$ of the average regardless of

what opponents do ...

rational players should not pick above 67

If everyone is rational everybody pick number between 0 and 67

↓

average is between 0 and 67

$\frac{2}{3}$ * average " " 0 and $\frac{2}{3} * 67 = 45$

if all other players are rational we should play below 45

sequential elimination of dominated strategies

- eliminate dominated strategies to create a smaller game (eliminate every number above 67)
- repeat.

If only one strategy remain for each player, the game is dominant solvable

This is based on the assumption that

- all players are rational
- all players know that the opponents are rati
- " " " " all players know that

- all [illegible]

everyone is rational