

# Game Theory Project

**Name-**Divyanshu Tiwari

**Roll No-** 220108022

**Email-** harendra501134@gmail.com

**1). The ascending - bid (English) auction** - An English auction is an open ascending-bid auction where participants openly bid against each other, and the highest bidder wins the item. The price paid is determined by the highest bid, and all participants can see the bids placed by others. The auction continues until no one is willing to bid higher. English auctions are commonly used in various settings, including art auctions and online marketplaces.

**2). The second - price, sealed - bid (Vickrey ) auction** - A Second Price Auction, also known as a Vickrey Auction, is an auction in which the highest bidder wins the item but pays the price submitted by the second-highest bidder. This format encourages truthful bidding, as participants aim to bid their true valuation of the item to maximize their utility.

## Game on English Auction

### CANVAS BIDDING

**Objective:** The objective of this game is to test players' bidding skills under time pressure and strategic constraints.

#### Game Mechanics:

**Players:** 4

#### Rules:

- There are 5 Paintings for auctions.
- Each player starts with 15 bid tokens.
- Each Painting is presented in each round, and players have a limited time (e.g., 30 seconds) to bid.
- Bids must be made in ascending order. Once a player passes, they cannot re-enter the bidding for that round.
- The highest bidder wins the item and pays their bid amount.
- The winner of the English Auction Challenge is determined based on both the total value of items won and the bid tokens remaining after all rounds have been played.
- Players can bid any number of bid tokens up to a maximum limit of half of their starting bid tokens (e.g., a maximum bid of 7 tokens if starting with 15 tokens).

#### Assumptions while analyzing the data

- Players are skilled at making quick decisions and adapting to the game's constraints.
- Players aim to maximize their utility, considering not only winning items but also managing their bid tokens efficiently.
- Each player can listen to the others bid.
- Each player value the paintings according to their sense.

#### Outcomes of the Experiment:

The English Auction Challenge results in intense bidding wars, with players trying to outsmart each other within the time limit.

#### Best Strategy:

In the English Auction Challenge, players must assess opponents quickly and bid aggressively while avoiding overbidding.

One should try to bid less in starting and also should pass when there is a much high bidding by someone, this type of strategy is best for winning this game. We should wait till last second and should not exceed our valuation of the painting.

## **Conclusion**

The English Auction Challenge emphasizes time-sensitive decision-making and strategic adaptation.

**Bidding Strategies:** Players in the game must develop and adapt bidding strategies to maximize their chances of acquiring valuable canvas pieces. This includes assessing the potential value of each canvas and determining how much to bid.

**Risk Management:** Players must strike a balance between bidding aggressively to win valuable canvases and conserving their bidding tokens for future rounds. Overbidding can deplete resources, while underbidding may result in missed opportunities.

## Game on Second Price Auction

### CRYPTOSTRATEGIA

**Objective:** NFT Auction Showdown is a game designed to simulate a Second Price Auction for NFTs, where players strategically bid to acquire valuable digital assets while maximizing their utility.

#### Game Mechanics:

**Players:** 3

#### Rules:

- Each player starts with a set number of virtual tokens (e.g., 100 tokens).
- There are 7 NFTs in total.
- All players participate in the auction for the selected NFT.
- Players submit sealed bids for the NFT.
- Each player can bid a maximum of 50 tokens in a single bid.
- Bidding ends after a set period of 60 seconds or when all players pass.
- The highest bidder wins the NFT but pays the second-highest bid amount.
- The winning player receives the NFT and pays the second-highest bid amount in virtual tokens.
- The virtual tokens used in the winning bid are subtracted from the winning player's token balance.
- After all rounds are complete, the player with the highest total value of acquired NFTs wins the game.

#### Assumptions while Analyzing the Data:

- Players act rationally to maximize the total value of NFTs they acquire.
- No collusion or communication between players.
- Players aim to win NFTs while conserving virtual tokens for future rounds.
- Virtual tokens have no real-world value.
- Each player values the NFTs according to their own sense.

#### Outcomes of the Experiment:

- The data will show which NFTs were acquired by each player in each round and the corresponding bid amounts.
- The player with the highest total value of acquired NFTs at the end of the game wins.

**Best Strategy:**

- Bidding your true valuation for an NFT is the dominant strategy, as it maximizes the chance of winning without overpaying.
- Players must assess the value of NFTs and their opponents' valuations to determine their bids accurately.
- Efficiently managing virtual tokens throughout the game is crucial.
- Bidding with not so lower as well as not much higher has more chances of winning.

**Conclusions:**

- NFT Auction Showdown simulates the Second Price Auction for NFTs, promoting strategic bidding and efficient resource management.
- Players who accurately assess NFT values and bid their true valuations are likely to perform well.
- The game offers insights into bidding strategies, valuation assessment, and the dynamics of Second Price Auctions in NFT markets.

LINK OF SPREADSHEET WITH DATA -

[https://docs.google.com/spreadsheets/d/1LSbg634\\_lckPXRN-Efn23C6qZFAXatQf0pxrqnJrEgk/edit?usp=sharing](https://docs.google.com/spreadsheets/d/1LSbg634_lckPXRN-Efn23C6qZFAXatQf0pxrqnJrEgk/edit?usp=sharing)