

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

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## Abstract

The purpose of this project is to simulate a unique-bid auction environment and to conduct an economically valid test on the auction market. This project is an exercise in complex-systems modeling, computer networking, artificial intelligence, and graphical interfaces and displays. With the creation of the auction environment, the auctions size and the bidders access to information are altered and the changes in the auctions performance are evaluated.

## 1 Introduction

### 1. Problem Statement

To create an environment to run a multiplayer, sealed-bid, unique-bid auction and to determine the effect of size and access to information on the performance of the auction.

### 2. Purpose and Goal

The purpose of this project is to create a complex-systems model with elements of computer networking, artificial intelligence, and graphical interfaces and displays.

The unique-bid auction is a relatively undiscovered tool for auction markets. It has been previously disregarded as useless because it generates significant profit for the buyer instead of the seller. However, the international community appears to be opening to the new style of auction. There is

already an online auction website that sells items using a variation of the unique-bid auction. If this new auction format is to become successful in the global community, more must be understood about its properties, patterns, and characteristics.

## **2 Previous Work**

No academic work on the unique-bid auction has been published. The auction is rarely used by auctioneers because the significant profit goes to the winning bidder, with a slight profit for the seller. However, this type of economic research through computer simulation is similar to the research of experimental economics, a relatively new study in which economic theory is questioned and tested through the use of human simulations.

There is an online auction, UniqueAuction.com, that incorporates a variation on the unique-bid format. This website has experienced moderate success, which may be an indicator of the potential fiscal uses of the unique-bid auction.

## **3 Procedure**

This project is coded in the Java Programming Language. A round of the auction starts on the Auction computer. After establishing the size (number of bidders) and the range (the set of acceptable bids), the Auction prompts the Bidder computers for their bids. To maintain consistency of the auction outcomes, the Auction also accepts bids from robotic players. These programs follow artificially intelligent strategies based on the same information given to the human participants. After the Auction receives all of the robotic and human bids, it determines the winning bid, registers the results from the round, and gives each human player graphical displays of the outcomes (the amount of data in these displays will vary within the economic test). After this, the next round begins.

## **4 Progress**

This quarter, I have refined the saving function of the Auctioneer and have learned to establish a network connection between the computers of the lab.

My goal for the next quarter, in addition to conducting my experiments, is to use the network connection to create bidder interfaces on every computer so that a class of students could compete against one another.

## **5 Testing and Analysis**

The Auctioneer program prints to a text file the current and past status of the auction and its bidders after every round so as to save data if the program is terminated before it reaches the end. The data contained within these files can be exported to Microsoft Excel and is analyzed through graphing it.

## **6 Conclusion**

Results of this experiment are not yet known. However, it is expected that the value of the winning bids will decrease when the number of participants increases. Furthermore, the value of the winning bids is predicted to increase when the information given to the participants is increased. When these experiments are completed, the economic community will know more about a developmental and potentially successful auction format.