Teaching Auction Strategy Using Experiments Administered via the Internet

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This article presents an experimental design we use to teach concepts in the economics of auctions, and implications for e-Business procurement. The experiment is easily administered and can be adapted to many different treatments. The chief innovation from an implementation point of view is that it does not require the use of a lab or class time. Instead, the design is implementable on any of the many web-based auction sites (here we use Yahoo!). The design presented here has been used to demonstrate how information is transmitted by bids in an auction, and how this can make it difficult for well-informed bidders to profit from their information, leading to disincentives for relatively informed bidders to enter an auction. Consequently an auction may sometimes be an ineffective mechanism for procurement, compared to other options. The broad pedagogical contribution of the auction experiment is to show how information can dramatically affect market outcomes and bidder incentives.

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Auction design and bidding behavior have become increasingly important aspects of applied economics. The sale of licenses for mobile telephone service (and other uses of the electromagnetic spectrum) has brought the economics of auctions into mainstream policy debate. The issues involved in these complex auction designs have been the focus of much industry and academic discussion, in large part because the sums of money involved run to billions of dollars. See McMillan, Rothschild, and Wilson, R. (1997) for an introduction to this literature. Auctions have also become increasingly important for smaller value transactions through e-procurement, and the many auction sites on the Internet, including sites like eBay that are accessed by individual consumers, by large retailers, and by dealers who both buy and sell.

We report a simple way to introduce students to elements of this strategic environment that have been important in thinking about auction strategy and design. Our implementation is designed to be conducted using an existing auction web site. No software needs to be developed for the experiment, and students can access the auction platform after class, from any computer with Internet connection. Other potential bidders who might access the auction but are not students of the class are excluded by the design of the experiment: the good that is sold is a voucher, which is worthless for anyone except class participants.

We use the Yahoo! web site to run our auctions.[1] The auctions offered by this site are ascending auctions that allow bidders to enter a proxy bid (called a "maximum bid"). As

[1] Yahoo! auctions can be found at: http://auctions.shopping.yahoo.com/. Many of the other auction sites could also be used, but it is important to look at the specific rules for the auction site. In the following section we discuss, for example, a major difference between the closing rules for Amazon and eBay auctions; on Yahoo!, either of the options may be chosen by the seller.

subsequent proxy bids by other bidders come in, the bid of the bidder in question automatically rises by the minimum increment until the second highest submitted proxy bid is exceeded (or until his own maximum is exceeded by some other bidder). At the end of the auction, the bidder who submitted the highest proxy bid wins the object being auctioned and pays a price that is a small increment above the second highest maximum (proxy) bid.[2] Thus the Yahoo! auction can be viewed as an ascending second price auction.

In the experimental setting presented here, participants experience the importance of information asymmetries in determining the outcome of the auction. The motivating example we give is of antiques auctions in which both dealers and consumers participate. The dealers have better information than the final consumers, but less willingness to pay (since a dealer needs to buy at a price low enough to resell at a profit to a consumer.) The consumers can thus outbid dealers, but can't identify whether the object for sale is valuable or not (and hence often buy from dealers, who can tell, and who can thus certify the objects they sell as genuine antiques of a certain provenance). A dealer in such an auction has a difficult strategic problem, because if he reveals his eagerness to buy a particular antique, he sets off a bidding war that he can't afford to win.

In our auction, relatively better informed bidders face an obstacle to making profits, because their bidding behavior is understood by their competitors as revealing the underlying value of the good. (Informed bidders are anonymous, but all bidders know that some bidders are informed.) This encourages late bidding by informed bidders, as

[2] The auction rules also allow bidders to enter an "exact bid." If an exact bid is the highest bid or proxy bid so far received, then the auction price rises to the amount of the bid (instead of an increment over the second highest bid). If the exact bit is not the highest bid so far, then it is treated no differently than a

they try to hide information by bidding so late that other less informed bidders are unable to respond. This setting serves to promote class discussion of, among other things, the role of information in auctions, the impact of the rules of the auction, bidder entry into an auction, and the attractiveness of auctions as compared with other transaction protocols, such as private negotiations.

In this article we present a simple implementation that draws out aspects of information economics that are important in the study of "single-sided" auctions. The design and resulting class discussion have also proved to be popular with students. We first present the experimental design and procedures, then outline how we organize the class discussion and presentation. We show a typical set of results, and consider other lessons that can be drawn from the experiments.

EXPERIMENTAL DESIGN

The experiments described below have been run in classes of executives attending short programs (typically one week) at The Harvard Business School. The numbers of students ranged between 40 and 80 per class. In the following, we illustrate the setup for a class of up to 80 students, each of whom participates as a bidder in an auction with, typically, 4 other bidders. The experimental design is best explained through the excerpt from the instructions (appendix).[3]

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proxy bid of the same amount, that is, the price rises to an increment above the second highest (exact or proxy) bid.

[3] Complete instructions are presented in the appendix. Instructions are given in the class prior to the one in which the auction will be discussed, and the auction is established to end the evening before the class at which it will be discussed. The instructions are relatively context free, but the example of an antique auction with dealers as informed bidders and ordinary consumers as uninformed bidders is discussed in response to questions when the instructions are presented.

Thus informed bidders have precise information as to their valuation of the object, but have a lower value than their less informed counterparts. This makes it hard for the informed bidder to win in the auction. If the amount of cash in the envelope is only $40, then the maximum value the envelope can have is $62. The auction is a second price auction. Hence, an uninformed bidder with a coupon value of $22 can confidently bid $62 and expect to pay the second highest bid submitted (if his is the highest bid). If a price above $62 is observed, other bidders may infer that an informed bidder has placed the bid knowing that there is $70 in the envelope, that is, the value of *Y* is equal to $70. So if there is $40 in the envelope, the informed bidder can always expect to be outbid, and if there is $70 it is likely that his bid will reveal it, because he must bid above $62 to outbid the uninformed bidders.[4] As discussed in Roth and Ockenfels (2002), this gives informed bidders the incentive to try to place their bids very late in the auction, so as to win in the closing seconds before the deadline, and give uninformed bidders too little time to react.

The item to be auctioned was posted in the "Other: Other" category in order to make it unlikely for anyone other than the class participants to bid.[5] The auctions were called "ChTG1" through to "ChTG15" (adopted from the title of the one-week course "Changing the Game"), again to make it unattractive to external bidders. On the site itself the "item" was described as follows:

> This is item 1 for the Changing the Game exercise. For everyone except those who have been assigned to this auction in that class, the item is simply a piece of paper with this description written on it. For the members of the class assigned to this auction, the item will be redeemed as described in class.

[4] Another way in which an informed bidder can be the high bidder is if he manages to bid 62, the highest value of an uninformed bidder, before any uninformed bidder. Hence, by mimicking the highest value uninformed bidder, the informed bidder may remain the high bidder and thus hide his information.
[5] We have never had anyone other than a class participant bid in any of these auctions.

We show a screen-shot of an auction before any bids have been submitted in Figure 1.

[*Insert Figure 1 here*]

When the auction is posted on the site there are a number of options the instructor has to decide upon, all are fairly self-evident.[6] The most important of these is the ending time. In our experiments we set the auction to end between 10 and 11 pm the night before the class in which the experiment is to be discussed. The night before the class, the instructor monitors the auctions and makes transparencies from screen-shots of the bid histories to promote class discussion. A few examples are discussed in the following section.

In preparation for the auction, participants are given three pieces of paper. The first contains a general set of instructions for the auction. The second conveys the information specific to the participant, including coupon valuations, whether they are informed about the amount of cash in the envelope, their auction name, and its URL. The third piece of paper contains instructions on using Yahoo!. These documents are included in the appendix. We leave the exact number of participants in the auction slightly vague to accommodate variations in class sizes. We also explicitly ask bidders to make notes as they enter bids so that they can discuss their bidding strategy in class.

[6] The instructor can also choose whether to set a minimum price or a buy-it-now option. We set the minimal minimum price (US$ 0.01) and did not activate the buy-it-now option.

CLASS PRESENTATION OF RESULTS

Having just participated in the auction the previous evening, our students have always been eager to share their experiences. We typically start the presentation by looking at a snapshot of all the auctions together, before any of them have ended. A snapshot, from a recent class, in which there were 16 auctions is shown in Figure 2.

[*Insert Figure 2 here*]

We ask the class to look at the prices, from more than an hour before any auction closed, and to guess which auctions have $70 in the envelope. (We ask students not to comment at this point on the auction in which they participated.) In Figure 2, there are 7 auctions in which the price has already risen above $62, which would be the value of an envelope containing $40 to a bidder with the maximum, $22 coupon. So in those auctions there is good reason to believe that somebody thought that there might be $70 in the envelope.

We next look at the endings of particular auctions, starting with those whose early prices seemed to signal $70 envelopes. Recall that informed bidders have coupons that are worth no more than $8, so that the maximum an informed bidder can afford to pay for a high value envelope is $78. Figure 3 is typical; it shows that by the end of auction 12, an auction in which the price rose early, the bidding has surpassed what the informed bidder can afford. Now the bidders in the auction are invited to share their experiences, and the discussion tends to be about how the uninformed bidders figured out that the envelope was a valuable one, from the information revealed early in the auction.

[*Insert Figure 3 here*]

After discussing auctions in which informed bidders failed to profit from their information, we turn to those in which they succeeded. We show auction 11 (in Figure 4), which was won by an informed bidder, whose winning bid came in literally at the last minute (19:23 Pacific Standard Time[7]), allowing him to win at a price of $75. This leads us naturally into the discussion of "sniping," as last minute bids are called on eBay, and the benefits to an informed bidder of bidding so late that others cannot exploit the information he reveals.

Often some informed bidder will have tried to bid at the last minute but failed to get the bid in on time, and this leads to a discussion of the fact that bidding late has risks as well as rewards.

The discussion turns to how the auction rules effect the ability of bidders to conceal their information by bidding late. Some internet auctions (such as eBay) have a fixed time at which the auction ends, like those used in this experiment. Other auctions, such as those run by Amazon, have a "soft close" rule. In those auctions, there is a scheduled end time, but if a bid is entered in the final ten minutes of scheduled time, the auction is extended, and doesn't end until ten minutes have passed without a bid. So, in a soft close auction, there is much less benefit to bidding late, because other bidders always have ten minutes to react to any bid. Roth and Ockenfels (2001) observed that, consequently, there is lots of late bidding on eBay, and very much less on Amazon. A graph from Roth and Ockenfels, demonstrating this, allows the class to see that, on eBay,

[7] Other auction sites, such as eBay, show times to the nearest second, and late bids there can be seen to occur in the very last seconds of an auction, not merely in the last minute.

many bidders find the solution that some informed bidders in the class found to the problem of using their information without losing it.

RESULTS FROM THE EXPERIMENT

The results described here are intended to be a guide for prospective instructors about what sorts of behavior to expect from the auction design. The data were collected in three executive education classes conducted at Harvard Business School in the Fall of 2001 and the two semesters of 2002. Forty auctions were conducted overall. The average profit of participants was $3.98. We paid out profits, whereas losses were imposed via an informal social obligation to buy classmates' drinks or dinner up to the amount lost in the auction. Obviously the size of the payoffs (and the cost of the demonstration) can be adjusted as desired by changing the coupon values and cash amounts[8].

We summarize those results that are germane to the lessons likely to be drawn from the exercise in Table 1. In one third of the auctions the value of the common element, *Y*, was $40, whereas the rest had values of $70. Losses to the high bidder, indicated by a negative amount in the Payout column, tended to be concentrated on those auctions with *Y* equal to $40 (losses by the winning bidder are a good opportunity to discuss the "winner's curse," see Kagel [1995]). Where a bid over $62 was entered we report whether an uninformed or informed bidder first made such a bid and whether this

[8] Auctions can be listed on Yahoo! for as little as $0.050 per auction for auctions that allow minimum bids to be as low as $0.01 (higher minimum bids cost more). In addition, following the auction close, there is a fee of 2 percent of the first $25 of the final sale price, plus 1 percent of the remainder of the price up to $1,000. Thus a typical auction of the kind described here, in which the winning price is below $100, costs less than $1.25 per auction. See http://help.yahoo.com/help/us/auct/afee/afee-02.html for details.

bid occurred more than 20 minutes from the end of the auction. We also indicate whether an informed bidder won the auction and whether his/her strategy involved a last minute snipe.

[*Insert Table 1 here*]

The results reveal that when the informed bidders win it is almost always by *sniping*, bidding at the last minute so as to reduce one's chance of being out-bid. A successful snipe bid allows the informed bidder to hide, and hence profit from his/her private information. This is probably the point students most strongly appreciate after taking part in the exercise. It is also worth noting that the sniping strategy is not fool proof. The in-class discussion revealed that in at least two instances (Fall 2001 auctions 6 and 7) informed bidders tried to snipe but were unsuccessful, being out-sniped by an uninformed bidder.

A more general lesson is that a large amount of bidding occurs in the last minutes of the auctions. A class discussion quickly clarifies the point that late bidding is useful for both concealing information and avoiding costly bidding wars. Thus in the data we see both informed and uninformed bidders using snipe bids. This behavior is most stark in our data in auction 15 of Spring 2002. In this auction the price was $4 right up until 3 minutes from the end of the auction. At this point bidders started to bid aggressively, trying quickly to gain advantage as information was revealed. Over the course of the next three minutes the price soared to $87. The winning bidder was uninformed and won with a snipe bid.

Conversely, when bidding occurs early in this environment it is never to the informed bidders' advantage. When an informed bidder makes an early high bid, it is invariably interpreted by the uninformed bidders as a signal that the value of *Y* is \$70 rather than \$40. Thus an informed bidder who shows his hand early rarely wins. This reinforces both the advantages of concealing information by bidding late and the efficiency of the auction in transmitting information.

Paradoxically, this pattern of potential information flow can lead to the downfall of the uninformed bidders when an incorrect inference is made. Classroom discussion of bidding strategy will often draw out an uninformed bidder who felt that it made sense for him/her to bid a little over \$62 in order to see whether the bid is improved upon by someone else (who is assumed to be informed). In other words, one of the uninformed bidders often wants to test whether they are facing a 'high' *Y*. Naturally, another uninformed bidder might confuse this speculative bid as an informed bid and drive the price up. This is often the pattern of play when bidders lose money in the $Y = \$40$ treatment.

OTHER LESSONS TO BE DRAWN FROM THE EXPERIMENT

The primary pedagogical aim of the experiment is to illustrate how market outcomes can be affected by the distribution of information among the participants. This occurs in this instance because the bidders may reveal their information when they bid. The auction we create is related theoretically to the ascending auction considered in Milgrom and Weber (1982), where it is shown how bidders with affiliated values update their valuation estimates during the course of the auction, after observing bidding by

competitors. Our experience has been that the design presented here is effective in illustrating this recurrent theme in the auction literature, particularly in the common and affiliated value literature; that bidding conveys information about what bidders know.

Aside from demonstrating the fact that markets can be surprisingly efficient in transmitting information, we find that the design here is also good for introducing more applied ideas in market design. In particular we have found it useful for discussing issues surrounding bidder participation in auctions and the design of ending rules.

The tendency for the informed bidders to make no profit after revealing their information can discourage their participation. This mirrors the important point in auction design that agents need to be presented with positive rents to give them an incentive to participate in a market. In the auction presented here, the auctioneer, by providing the market participants with ways to obtain information about their competitors, has discouraged the informed bidders from participating. This disincentive for participation could negatively affect the revenue of an auction, particularly where there are costs to the bidder for entering the auction (e.g. cost for preparing bids). In class this point often leads naturally into a discussion of why firms are sometimes reluctant to participate in many auctions suggested by the proponents of e-Business procurement.

The experiment also illustrates how ending rules matter in the auction. The ending of auctions is a source of considerable debate, particularly in the FCC spectrum auctions where a set of complex activity rules is used. The discussion of the Roth and Ockenfels (2002) comparison of eBay and Amazon is a good jumping off point for the observation that different design decisions lead to different bidder behavior and hence different auction results. Also, if the instructor wishes to draw this out, the Yahoo! auctions allow

both a fixed ending time and a soft close, allowing the design presented here to be easily modified.[9]

The previous point is a useful platform from which to develop a discussion of mechanism design for procurements (sales). Although students are generally familiar, at least at some level, with the idea that auctions can drive prices very low (high), they tend not to understand when an auction may not be preferred to some other mechanism, such as a negotiation, or what type of auction to run. This experiment serves as an illustration that, depending on the information of the auctioneer, a negotiation may be preferred to an auction if some bidders have private information that they have a vested interest in not revealing. Similarly, the tradeoffs between the secrecy in sealed-bid auctions and the price discovery implicit in open outcry auctions are easy to draw out. Here the success of the late bidding strategy, often referred to as *sniping*, essentially turns this auction into a sealed bid auction. In contrast, an Amazon style soft close maintains the ascending style of auction suggested by the auction's outward appearance.

CONCLUDING REMARKS

We present a simple way to teach aspects of auction strategy in class. Students access a specific auction on an Internet auction site, and bid for a voucher that is worthless to anyone except for the participants of the class. The setup of the experiment is strikingly simple, and the cost is low.

The auction we conduct is an ascending-price auction with asymmetric information among bidders about the value of the good. The participants learn several

[9] We have run sessions with both treatments and find it can work well at drawing out this distinction, depending on how deeply the informed bidders think through their bidding strategies.

lessons through their participation. Most importantly, they demonstrate to themselves that bids convey information about the respective bidders' private signals. In our auction, this implies that it is difficult for informed bidders to make profits, because their bidding behavior is understood by their competitor as revealing the underlying value of the good. As a consequence, late bidding occurred very frequently, with informed bidders attempting to place bids just in time so that uninformed bidders could not outbid them.

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APPENDIX

Here we present the instructions given to participants in the experiment.

YAHOO AUCTION

GENERAL INSTRUCTIONS

Please read Yahoo! Auction Registration Instructions. Make sure you complete: "Sign up now".

General Instructions for Yahoo!

In this exercise you will be bidding for an envelope that contains cash and a coupon. The amount of cash will either be $40 or $70. The coupon will have a different value to each bidder. The value to a bidder *i* of winning the envelope will be the amount of money in the envelope (*Y*) plus his/her individual value (*Z(i)*).

In each auction there will be four or five eligible bidders. Some of them will be *Informed* (about how much money (*Y*) is in the envelope) and the others will be *Uninformed*. In each auction there will be one or two informed bidders and three or four uninformed bidders.

Informed: Informed bidders know the value of *Y*. Furthermore, the coupon value, *Z(i)*, of informed bidders can be any of $2, 4, 6, 8, where each of these numbers have equal probabilities. (So the item is worth no more than $\$Y + 8$ to any informed bidder.)

Uninformed: Uninformed bidders do not know the value of *Y*. Furthermore *Z(i)* of uninformed bidders can be any of $14, 16, 18, 20, 22 where each of these numbers have equal probabilities. (So the value of the item is always higher for every uninformed bidder than for any informed bidder.)

There are two ways in which you can bid in Yahoo!. In each case you are asked to enter a price in the field "Maximum Bid". You then have to choose between "Bid up to this amount on my

behalf" and "Bid this exact amount". In the first case Yahoo! will place a bid on your behalf, at the lowest possible increment. That means the new "current bid" equals the previous bid in the auction plus the bid increment. Essentially these are the rules of a second price auction, where the person with the highest maximum bid wins the auction at a "current bid" of one bid increment above the second highest maximum bid. (However, the current bid will never be higher than the price you entered in the field "Maximum Bid"). If you chose "Bid this exact amount" the "current bid" jumps to the exact amount you entered.

Your earnings are determined in the following way. If you do not win the auction, your earnings are zero. If you win the auction, your earnings are the value of the item to you minus the "current bid" in the auction. That is we will pay the winner of each auction $Y + Z(i)$ and the winner will pay us the winning final price in the auction, that is, the final "current bid". (Note that the difference between the two payments can be positive, in which case you earn money, or negative, in which case you lose money.)

The following document is the form containing the participants' private information. Bold entries are by way of example.

This letter contains your private information for the class exercise on Yahoo! auctions. This information is for you only, and you are not supposed to share it with your colleagues. This information contains the auction in which you are eligible to bid, whether you are informed or not (in case you are informed you learn the amount of cash in the envelope) and information about your private value for the coupon in the envelope.

You are assigned to auction **1**, which means you are eligible to bid only in the auction for item ChTG**_1**, which you find at: **http://page.auctions.shopping.yahoo.com/auction/.**

This auction ends today (Wednesday) at **22:23** Boston time (on Yahoo! you see pacific daylight time: **7:23pm**, that is, **19:23** PDT).

This "Auction does not get automatically extended", which means it will close exactly at **10:23** p.m.

You are **informed** (*informed/uninformed*).

(*If Informed*): The value of *Y*, that is, the value of cash in the envelope, in *your* auction is $ **70** .

Your personal value of the coupon in the envelope in *your* auction, i.e. *your Z(i)*, is $ **4** .

Please do not bid on any auction other than the one you are assigned to.

Please keep a record of your bidding behavior, to discuss it in class.

Finally we present the instructions for using Yahoo! auctions:

YAHOO! AUCTION

REGISTRATION INSTRUCTIONS

Registering for Yahoo!: Please use as a user ID the first letter of your first name and your last name. If you use a different Yahoo! ID, please send an email with your full name and your Yahoo user ID in the subject line of your email to Auction@fas.harvard.edu.

1. Go to www.yahoo.com
2. Click on auctions, you are at http://auctions.yahoo.com/
3. Click (on the upper right) sign in.

4. If you do not have a Yahoo ID yet, click: Sign up now! You come to a page where you are asked all kinds of questions.
5. Once you finished and have a Yahoo ID, go back to the auctions home page: http://auctions.yahoo.com/
6. You are now ready to go to the auction page you have been informed about in your instructions.
7. You may have to verify your credit [or debit] card at various points in the bidding and signing up, but all transactions will be settled in cash in class.

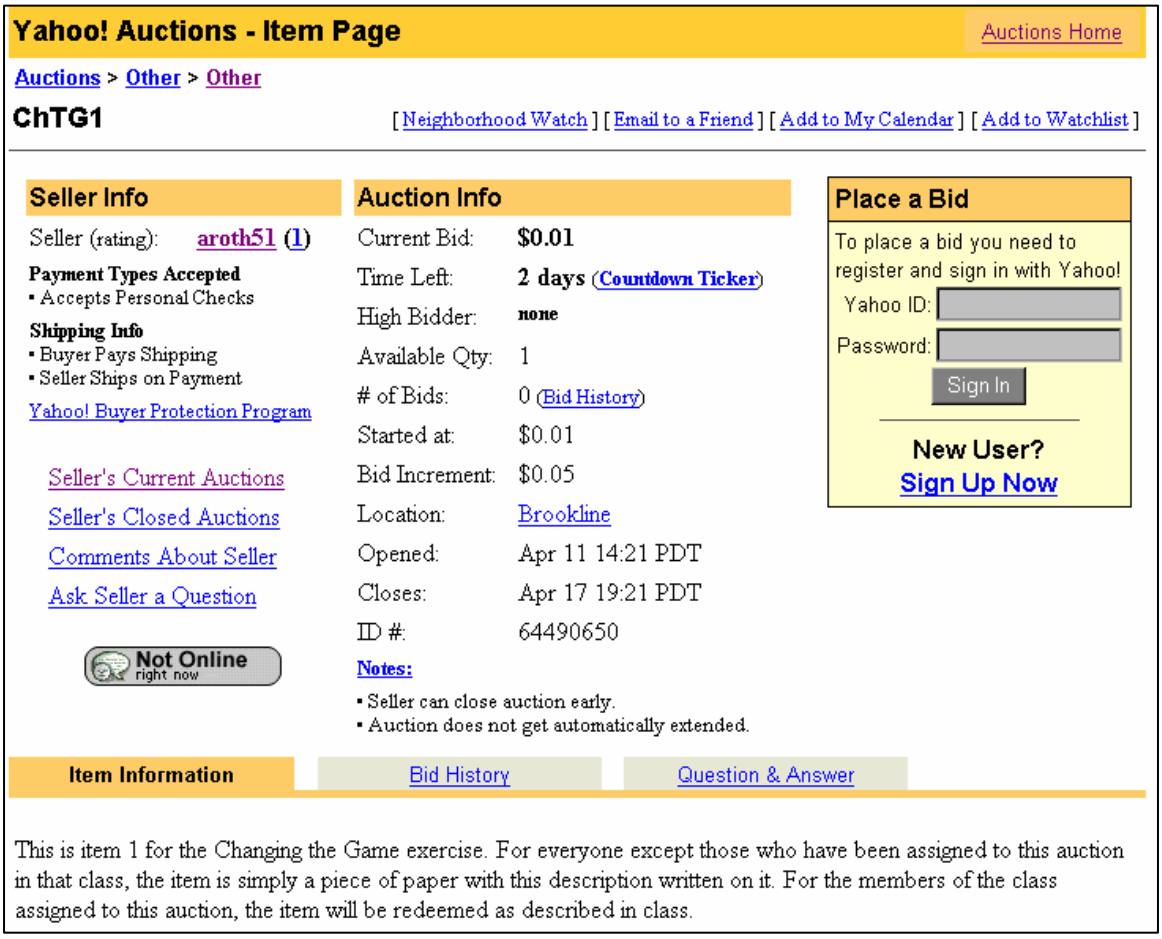

Figure 1: The bidding screen

ID	Title	Current Bid	Bids	High Bidder	Time Left
70446567	ChTG1	$61.90	8		1 hr 13 min
70446587	ChTG2	$45.50	8		1 hr 15 min
70446597	ChTG3	$49.00	3		1 hr 16 min
70446605	ChTG4	$60.00	4		1 hr 18 min
70446614	ChTG5	$58.00	12		1 hr 19 min
70446628	ChTG6	$63.00	10	The bidder IDs have been removed from this figure.	1 hr 20 min
70446665	ChTG7	$45.00	21		1 hr 22 min
70446690	ChTG8	$58.00	16		1 hr 23 min
70446762	ChTG9	$77.00	11		1 hr 26 min
70446776	ChTG10	$57.00	9		1 hr 27 min
70446786	ChTG11	$22.50	2		1 hr 28 min
70446799	ChTG12	$74.00	5		1 hr 30 min
70446815	ChTG13	$65.00	6		1 hr 32 min
70446822	ChTG14	$74.00	3		1 hr 33 min
70446838	ChTG15	$62.50	2		1 hr 34 min
70446843	ChTG16	$77.00	18		1 hr 36 min

Figure 2: With over an hour to go, seven auctions already have prices greater than $62.

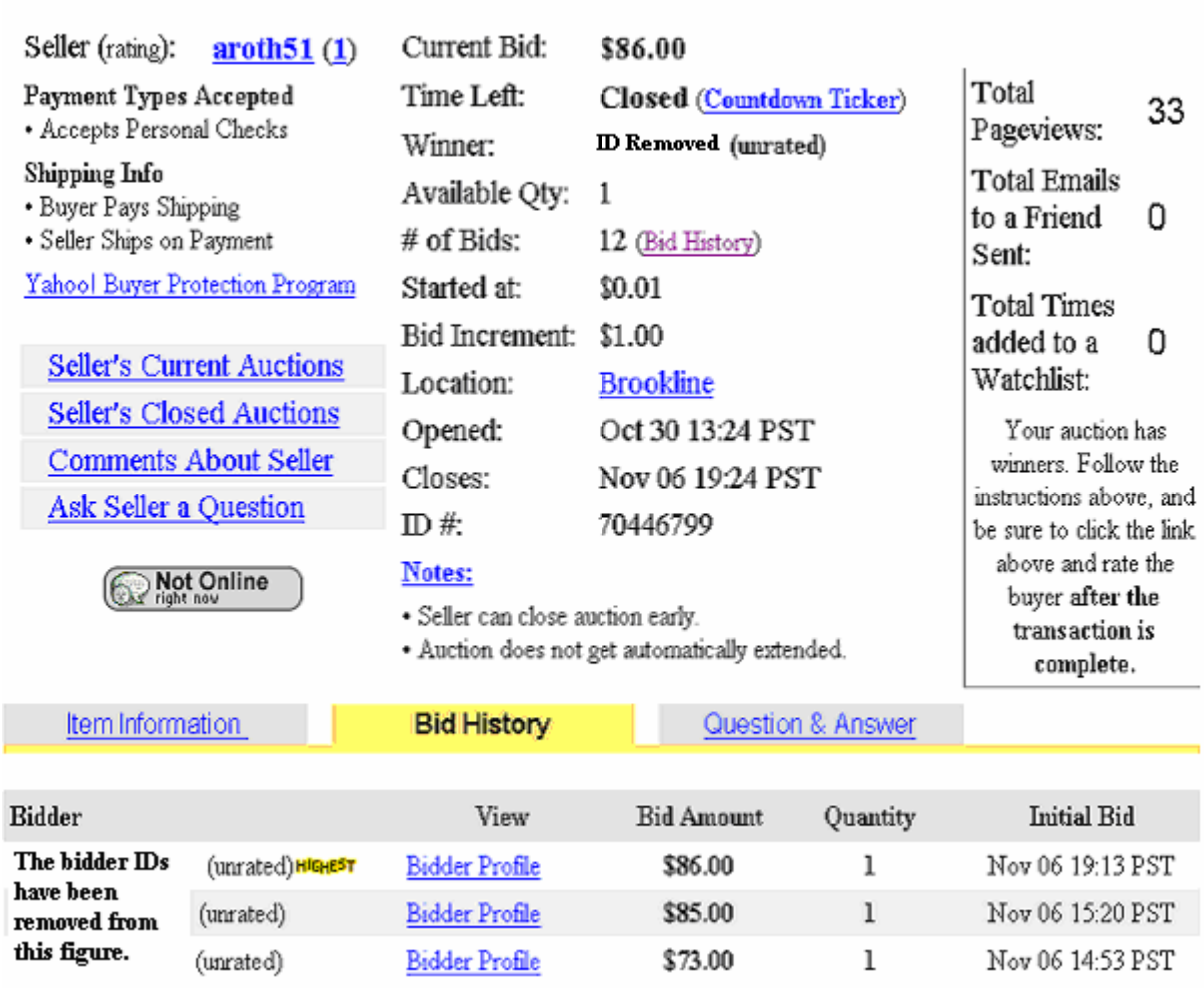

Figure 3: Auction 12 at the end: An uninformed bidder wins for $86.

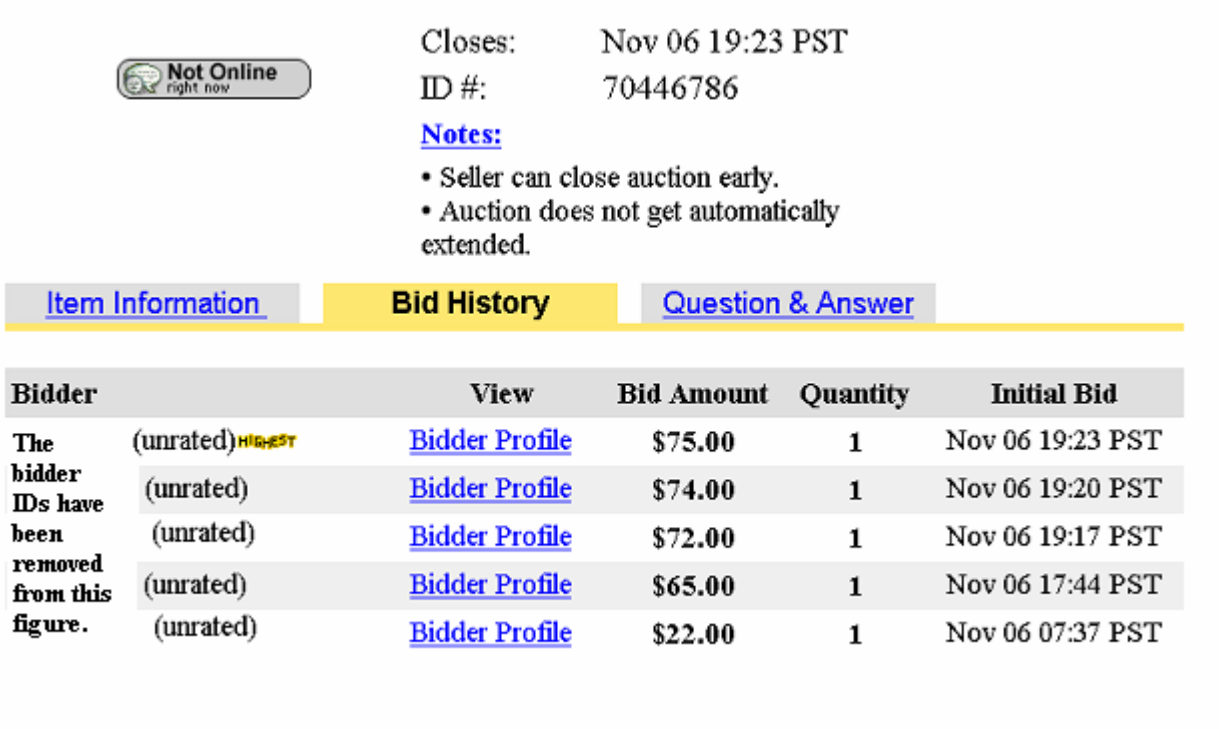

Figure 4: An informed bidder cashes in at the last minute.

TABLE 1: A Summary of Results from Three Classroom Sessions

Auction	Value of Y (in US$)	Value of the winner's Z(i) (in US$)	Winning Bid (in US$)	Payout (in US$)	1st Bid over $62 (if any)			Winner: I=Informed U=Uninformed	Did the winner snipe?
					By Uninformed	By Informed	>20 Minutes left		
Fall 2001									
1	40	18	75	-17	X		X	U	
2	40	16	81	-25	X			U	
3	40	22	11.52	50.48				U	
4	70	8	64	14		X		I	X
5	70	20	71	19		X	X	U	
6	70	20	72	18		X		U	X
7	70	20	77	13	X		X	U	X
8	70	22	66	26		X		U	
9	70	6	71	5		X		I	X
Spring 2002									
1	40	22	60	2				U	X
2	40	14	60	-6	X			U	
3	40	20	65	-5	X			U	X
4	70	18	92	-4		X	X	U	
5	70	4	66	8	X			I	X
6	40	20	79*	-19	X			U	X
7	40	22	65	-3	X		X	U	
8	70	18	91	-3		X	X	U	
9	70	6	74.5	1.5		X		I	X
10	70	6	64	12		X		I	X
11	70	20	90	0		X	X	U	
12	70	2	63.1	8.9		X		I	X
13	70	6	71	5		X		I	X
14	70	18	79	9		X	X	U	
15	70	18	87	1		X		U	X
Fall 2002									
1	40	18	61.9	-3.9				U	
2	40	20	54.5	5.5				U	
3	40	20	68	-8	X			U	X
4	40	14	61	-7				U	
5	40	18	60	-2				U	
6	70	18	84	4	X		X	U	
7	70	2	71	1	X			I	X
8	70	20	58	32				U	
9	70	16	79	7	X		X	U	
10	70	4	58	16				I	X
11	70	6	75	1		X	X	I	X
12	70	22	86	6		X	X	U	
13	70	8	73	5		X	X	I	
14	70	6	84	-8		X	X	I	
15	70	8	76.5	1.5		X	X	I	
16	70	18	80	-2		X	X	U	
Totals					12	20	16	13=I 27=U	17

Note: We define a snipe bid as any bid that occurred in the last minute of the auction, which is the smallest time interval that can be seen on the auction results page shown after the auction closes. This makes it hard to show bids occurring any closer to the end of the auction. However, it becomes apparent when watching the auctions in real time that snipe bids usually occur in the last ten seconds of the auction.

*In this auction a bidder made a mistake entering a snipe bid of $7900.00. Although he quickly explained his mistake in an email, the auction closed before the bid could be corrected. For the purpose of discussion, we use his intended bid of $79.00. Yahoo also reduced the $39.93 listing fee based on a $7900 closing price when we explained the mistake in an email.