

# Buying, Bidding, Playing, or Competing? Value Assessment and Decision Dynamics in Online Auctions

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We propose an analytical framework for studying bidding behavior in online auctions. The framework focuses on three key dimensions: the multi-stage process, the types of value-signals employed at each phase, and the dynamics of bidding behavior whereby early choices impact subsequent bidding decisions. We outline a series of propositions relating to the auction entry decision, bidding decisions during the auction, and bidding behavior at the end of an auction. In addition, we present the results of three preliminary field studies that investigate factors that influence consumers' value assessments and bidding decisions. In particular, (a) due to a focus on the narrow auction context, consumers under-search and, consequently, overpay for widely available commodities (CDs, DVDs) and (b) auction starting prices lead to higher winning bids, but only when comparable items are not available in the immediate context. We discuss the implications of this research with respect to our understanding of the key determinants of consumer behavior in this increasingly important arena of purchase decisions.

Web-based auctions have become one of the greatest successes of the Internet, success that has not diminished even after many other web-based services have lost their initial popularity. The growing importance of online auctions has attracted the attention of consumer researchers, who have studied such issues as herding behavior (Dholakia & Soltysinski, 2001), the impact of reserve prices (Häubl & Popkowski Leszczyc, 2001), the role of expertise (Wilcox, 2000), and the effects of auction formats (Lucking-Reiley, 1999). Still, our understanding of buyer (bidder) behavior in online auctions is rather limited. In particular, acquiring an item through online auctions is different in important ways from typical purchases of goods and services. Moreover, such differences can have significant influences on consumer preferences, decision processes, and satisfaction. At the same time, the fundamental aspects of consumer preferences, such as the difficulty of assessing the true values of products, are likely to apply to online auctions as they do to ordinary retail purchase decisions.

In this research we build on existing knowledge regarding consumer value assessment and preference construction to explore selected aspects of bidding behavior in online auctions. In particular, we present an analytical framework that highlights two key influences on bidding behavior: value assessment and decision dynamics. We outline the effects of these two aspects at three main stages of participation in an auction: (a) The decision whether to enter a particular auction, (b) bidding behavior while the online auction is in progress, and (c) bidding behavior at the conclusion of the auction. In addition to discussing various components of this framework, we report the results of three preliminary studies that provide some insights regarding the manner in which consumers assess the values of items in the online auction environment.

## INTRODUCTION TO ONLINE AUCTIONS

Although the Internet is a relatively recent phenomenon, long distance auctions by mail have existed for more than 100 years. Back in the 1870s, stamp dealers in the United States offered "mail-bidding" services for individuals who wished

TABLE 1  
A Framework of Online Bidding Behavior

<i>Auction Stage</i>	<i>Value Assessments</i>	<i>Decision Dynamics</i>
Auction choice/entry	Type of product Auction info (starting price etc.) Availability of comparisons Previous bidding activity Concurrent (observed) auctions of related items Planned vs. impulse bidding	N/A
Middle phase of the auction	Bids submitted by others Biased sample of others Local context focus Involvement	Escalation Self perception Endowment Attribute weights Utility of bidding & competing
End of auction	N/A	Winner vs. loser curse End rules Strategic late bidding

to bid on stamps without having to travel to the auction location. These bidders submitted their bids through mail, and the stamps were sold to the highest bidder at the price of one increment over the second highest bid (referred to as second price auctions). Similar auctions still operate today, not just for stamps, but also in auctions for wine, art, and other collectibles (Lucking-Reiley, 2000).

Electronic auctions on the Internet have several distinguishing characteristics, which explain their growing popularity. First, online auctions eliminate the geographical limitation of many traditional auctions, enabling people from all over the world to participate in any auction. Second, in terms of duration, Internet auctions can last for several days (usually a week) and allow asynchronous bidding, which gives both sellers and bidders more flexibility. Third, these web sites can run auctions at substantially lower operational costs than traditional auction houses and can thus charge lower commission fees and attract more sellers and buyers. These characteristics of online auctions account for their growing popularity as a way to buy and sell goods and services.

Online auctions present not only a new marketplace for transactions, but also a new domain for consumer decision-making. Of course, some fundamental aspects of consumer decision making, such as preference construction and the impact of the choice context (for a review, see Bettman, Luce, & Payne, 1998), are likely to apply to auctions as they do in regular purchase decisions. However, the unique characteristics of the online auction environment raise important new conceptual issues and are likely to impact consumer decision making in significant ways. In particular, there are at least three key characteristics of auction-based purchases that are likely to influence consumer decision making (see Table 1):

1. Multi-stage process—Unlike fixed price purchases, auctions take place over time, forming a sequence of dependent decisions. A consumer first decides whether

to enter a particular auction, which is often followed by a series of bidding decisions, leading to the final bidding decision determining the “winner” of the auction.

2. Value signals—The online auction environment provides different types of value cues that bidders can rely on.

3. Decision dynamics—The fact that multiple bidding decisions are made during the auction process suggests that earlier decisions can dynamically impact subsequent decisions.

The rest of the article is organized as follows: We first elaborate on the components of our framework—the three phases of participation in an online auction, value assessment, and decision dynamics. Using these components, we outline an analytical framework and identify key influences on bidding decisions at each phase (see Table 1). We then report the results of three preliminary field studies that investigate aspects of bidders’ value assessments.

### FRAMEWORK COMPONENTS: AUCTION PHASES, VALUE ASSESSMENT, AND DECISION DYNAMICS

#### Auction Entry Decisions

The first decision a consumer needs to make is whether to enter an auction. For example, a consumer visiting the eBay.com web site on any particular day can choose from millions of ongoing auctions (5,782,213 on September 1, 2001), with many more auctions at other online auction sites. Thus, when visiting an online auction site, consumers need to decide whether they are interested in a particular item type, whether to enter a specific auction for that item, and whether to also enter other auctions for this product type.<sup>1</sup> In the context of our framework, entry decisions involve value assessment and not deci-

sion dynamics, because, by definition, the consumer has not made any previous decisions at the entry stage.

**Value Assessment.** The reliance on cues available in the auction environment to assess value is consistent with a great deal of decision research, which has shown that consumers often have difficulty assessing the values of goods and services, including everyday products such as paper towels and pens (e.g., Simonson & Tversky, 1992). Instead, in many cases, consumers refine and construct their value assessments and preferences when faced with the need to make decisions (for a recent review, see, Bettman, Luce & Payne, 1998). Preference construction has been shown to be sensitive to the framing of options (e.g., Levin & Gaeth, 1988; Tversky & Kahneman, 1986), characteristics of the decision task (e.g., Fischer, Carmon, Ariely & Zauberman, 1999; Nowlis & Simonson, 1997; Tversky, Sattath, & Slovic, 1988), and the choice context (e.g., Huber, Payne, & Puto, 1982).

Preference uncertainty and construction are fundamental characteristics of consumer decision making, and there is no reason to believe that they will not apply to decisions involved in online auctions. Thus we expect that participants, in online auctions will be influenced by various value indicators, which will impact their preferences and willingness, to bid for an auctioned item. It is important to note, although, that the particular value indicators relied on in the context of an online auction might be quite different from those typically considered in fixed-price purchases.

Value assessments in online auctions, are expected to be influenced by the specifications of the item being auctioned. Of particular interest are the item's starting price, its reserve price (the minimum price at which the seller is willing to sell the item; see Häubl & Popkowski Leszczyc, 2001), the number of bids submitted up to that point, the rate of bidding, and in some cases (assuming some bidders are known for their domain expertise), the identity of bidders (Ockenfels & Roth, 2001). Regarding the initial price, there might be two conflicting theories. First, a low starting price might enhance the attractiveness of entering the auction, leading to a higher final price. Alternatively, the initial price could work as an anchor (Tversky & Kahneman, 1974), which signals low value and thus leads to fewer bidders and low bids. We believe that both processes might operate, and their relative weights might depend on factors, such as whether the product offered is such that the allure of its low starting price has the potential to generate emotional involvement and cause a bidding frenzy.

This analysis does not mean that starting price and other value signals impact bidding under all conditions. In particular, salient reference prices are likely to diminish the influ-

ence of value cues. For example, the starting price of a compact disk, for which many consumers have a well-established reference price, is likely to have a relatively small effect on the final price. Similarly, to the extent that consumers can easily compare the focal item with comparable items, the effect of starting price and other cues is likely to be reduced. Furthermore, domain expertise is likely to influence the degree to which a consumer relies on extrinsic value indicators. Later, we describe preliminary empirical investigations regarding the effect of starting price and the availability of reference auctions on bidding behavior.

Decisions to enter auctions are likely to depend on the purpose and context of the visit, and whether it involves impulse or planned bidding. For example, in some cases the auction entry and selection decisions are made simultaneously with limited pre-planning, such as when a consumer happens to notice an auctioned item that appears particularly attractive. Alternatively, a consumer in need of a particular product might conduct a deliberate search for the needed item, which might be defined at a general category level (e.g. "I'd like to buy a kite as a gift") or have very detailed specifications ("I am looking for a 5 ft string for a triangular stunt kite").

It is also important to consider the type of auctioned products that consumers would consider bidding on. We propose that consumers might often bid on items that they would not have considered purchasing in an ordinary retail environment. First, in the early stages of an auction, prices (e.g., the current highest bid) tend to be very attractive, making the decision to enter the auction, appear easy and risk free. Second, whereas there is usually little uncertainty that a decision to purchase an item will result in its acquisition, a decision to enter an auction often does not lead to the purchase of that item. Such lower commitment at the initial auction entry stage as well as the possibility of getting these products at a very low price makes the initial bid easier to justify and less likely to invoke feelings of guilt. As a result, consumers might submit bids for products that they have some reservations about purchasing, such as luxuries (Kivetz & Simonson, 2001) and self-gifts (Mick, 1996). We thus expect that items such as collectibles, cruises, and exotic goods, will be more popular in online auctions than in ordinary fixed price environments.

### Bidding During the Auction

The middle phase of auctions spans from the time that a bidder places an initial bid until just before the end of the auction (which is discussed separately in the next section). During this phase, a consumer needs to decide whether and how much to raise their bid, or whether to drop out. In the middle stage of the auction consumers can update their value assessments based on others' bids. While such updating is desirable for public value goods, multiple bidding is also apparent in private value second price auctions, when theoretically they

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<sup>1</sup>Note, that the decision to enter multiple auctions is particularly interesting and difficult, because in most cases, consumers are interested in one, and only one item.

should not occur (Ockenfels & Roth, 2001). Based on the frequency of multiple bids we suggest that decision dynamics are likely to play a key role at this phase.

*Value Assessment.* As the auction progresses, new bidders enter the auction and previous bidders increase their offers or drop out. These additional bids, in turn, can provide the consumer with information about the product's market or intrinsic value in cases of public value auctions.<sup>2</sup> As was the case with starting prices, a greater number of bids and persistent and aggressive bidders are likely to have dual effects. On the one hand, such behavior is an indicator that the item is perceived as valuable and attractive. On the other hand, the degree to which an item is seen as a "bargain" is negatively correlated with its price. The relative weight of these conflicting influences can depend on the degree to which the consumer is quality versus cost-sensitive, with more bids enhancing perceived quality and diminishing the perceived "bargain."

It is important to note that reliance on others' bids in online auctions may often lead consumers to overestimate the value of the auctioned item, because those who continue to bid represent the sub-segment for whom the item has the highest value. Participants who considered the item and chose not to submit a bid are unobservable, creating a biased sample of the value of the item for others. The magnitude of such bias increases as the online auction progresses, with new bids representing an ever-decreasing proportion of those who are "still in the running" for the good in question.

Another key aspect of value assessment is the role of the local context of a specific auction relative to other accessible information about the auctioned item and related products. Consistent with prior research on context effects (e.g. Huber et al., 1982; Simonson, 1999; Simonson & Tversky, 1992), when making bidding decisions, consumers may focus on the set of options presented to them and pay surprisingly little attention to the "global context," which includes other auctions or fixed price offerings of similar products. Such tendencies to focus on the local context can decrease the amount of external search that consumers will engage in during an auction as well as the way they evaluate the auctioned item. Later we describe a study that tests this prediction by examining how prices that auction "winners" pay compare with regular, readily available, online retail prices of the same goods.

A final issue regarding value assessment during the auction relates to the level of involvement of typical bidders. Holding the product category constant, participating in an auction is likely to require greater involvement of the consumer than a purchase of the same item in a fixed price market. The bidding process, the evaluation of the auctioned item, and the tracking of other bidders all require the consumers to be highly in-

involved, even for "low involvement" goods. This is a significant factor, considering that a great deal of research (e.g. Petty, Cacioppo & Schumann, 1983) has shown that high involvement decisions are different in important ways from low involvement decisions, particularly with respect to the factors that influence decisions. Thus, it is reasonable to expect that peripheral factors which are not directly related to the item's value will have less of an effect on bidding than on ordinary purchase decisions, particularly as the auction progresses and the consumer's involvement increases.

*Decision Dynamics.* Consistent with prior decision research (e.g., Staw, 1976), we expect that the behavior of a consumer at one stage can influence his or her behavior at a later stage. Such time-dependent behavior is likely to play a role in any multi-period decisions, particularly in situations that are emotionally involving (e.g., a competition). A distinctive characteristic of English (ascending) auctions (e.g., eBay) is that the initial entry decision often involves little risk, because the initial bidding price is typically low relative to the value of the item. However, after the initial decision consumers are likely to experience escalation of commitment to the action (e.g., Staw, 1976). Auctions might be particularly susceptible to escalation of commitment because participation in an online auction may often trigger an intense emotional response. To examine the intuitions of online bidders regarding this topic, we posted a request at online bulletin boards of a large auction site, asking for volunteers to come to our web site and answer a few questions. Two hundred online bidders responded within 48 hours.<sup>3</sup> Indeed, 76.8% of the respondents in our survey indicated that they perceived other bidders as "competitors" and referred to outcomes as "winning" or "losing." As in other competitive situations, the emotional component of online auctions is likely to intensify and have an increasingly important influence on bidding decisions as the auction progresses. In addition, to escalation of commitment early bids, by a consumer might be later interpreted, by the same consumer as a signal that they value the particular item (Bem, 1972; Ariely, Loewenstein, & Prelec, 2001; Drolet, Simonson, & Tversky, 2000; Simonson, 1991). For example, an early decision to bid \$10 on a watch might be interpreted a few days later as an indication that the watch was attractive (and not just for \$10), thus providing a justification to submit a higher bid.

A related way of thinking about this process is through the endowment effect (e.g., Kahneman, Knetsch, & Thaler, 1990). In the standard demonstration of the endowment effect, a person's value for item X increases once it is owned. One explanation of this effect is that the ownership causes increased attachment to the item, which, in turn, increases its

<sup>2</sup>An interesting question, is whether consumers make inferences about private value goods, such as commodities, in similar ways to public value items.

<sup>3</sup>Respondents were relatively experienced bidders: A large percent of them visited auction sites at least once a week (98%), sold products at auction sites at least once week (50%), and purchased products at auction sites at least once week (30%).

subjective value (e.g., Carmon & Ariely, 2000). Of course, as long as auctions are in progress, no bidder owns the product. However, during the process of an auction, psychological ownership could take place (e.g., Strahilevitz & Loewenstein, 2001). For instance, a consumer who was the highest bidder for an item on the first day of an auction and does not visit the auction site for the next four days might get more attached to the item during this time as it becomes a part of his or her psychological endowment. When this consumer returns to the auction site on the fifth day of the auction they might be sorely disappointed to see that their item has been "lost." This reaction might increase the consumer's willingness to raise the previous bid, to reclaim the endowment. Furthermore, such a pseudo-endowment effect on bidding decisions is likely to be more pronounced if the consumer "owned" the item (i.e. had the highest bid) for a longer period, especially if this imminent "win" was close to the conclusion of the auction.

Another important outcome of the dynamics of an auction relates to its impact on attribute weights. During an auction, one of the attributes of the product, its price, is continuously changing while the other dimensions (color, size, shipping time, etc.) remain constant. Aside from the effects of price changes on perceived value, the focalized attention on the price dimension it is likely to give this attribute disproportional attention and weight in influencing later bidding decisions.

### Bidding at the End of an Auction

The conclusion of an auction is often a distinct phase that deserves special attention. Much like in a marathon, the end of an auction is where the "winner" and "losers" are determined. This is where each of the participants must decide what kind of resources they are willing to invest to win. Thus, the main differentiating characteristic of the end of an auction is that, unlike earlier phases, decisions at the end are clearly consequential and often irreversible.<sup>4</sup>

With respect to the distinction between value assessment and decision dynamics, by the end of an auction, an active participant is likely to have examined all the value cues and formed an assessment of the item's value, whereas decision dynamics are likely to play a critical role in the final bidding decisions. Accordingly, our focus at this stage is on decision dynamics.

**Decision Dynamics.** In addition to the decision dynamics factors discussed with respect to the middle phase, at the end of an auction, participants have to decide how much

they want to win. Furthermore, consumers may try to anticipate how they would feel about losing an auction versus winning it, which relates to the notion of "winner's curse" (Thaler, 1992) and what might be called the "loser's curse."

By design, auctions have the feature that the winner is the person who submits the highest bid, which also means that the highest bidder in an auction might overpay for the item they have "won." The winner's curse has been demonstrated in cases where the monetary value of the item is unambiguous (e.g., selling a penny jar), but it is unclear whether it also occurs for items whose value is ambiguous. Furthermore, consumers may not anticipate the winner's curse, in which case it will have little, if any, influence on their bidding decisions. Conversely, there is little doubt that auction participants often can and do anticipate how they will feel about losing the auctioned item, which might be called the "loser's curse." The frequency and magnitude of anticipated post-auction feelings can be a major influence on bidding decisions toward the end of the auction.

The winner's and loser's curses can also have effects on bidding in subsequent auctions. In particular, winning or losing an auction might change the consumer's propensity for bidding in future auctions for either similar or different products. In terms of effects across auctions, the second price systems used by online auctions (i.e., eBay) reduce the probability of winners' curse (because bidders do not pay their price), while maximizing the losers' curse (because the final price posted for an item is lower than the price that would be needed to outbid the highest bidder). To examine the intuitions of online bidders with regards to this topic, we asked the respondents of our survey to indicate how often they regretted having bid too much ( $M = 2.5$  on an 11 point scale), and how often they regretted not having bid sufficiently high ( $M = 4.8$  on an 11 point scale). This initial finding is consistent with our intuition that the loser's curse plays a more significant role in online auctions. Thus, assuming that a higher frequency of the losers' curse makes it more salient during the auction, we expect that factors which cause auction participants to anticipate regret (e.g., Simonson, 1992) will tend to generate more aggressive bids at the end of an auction.

Another important factor that influences decision dynamics at the end of an auction relates to the auction's end rules. In particular, eBay follows a hard stopping rule, such that if an auction is set to end at 12 p.m., it will end at 12 p.m. regardless of any last minute bidding activity. Amazon, on the other hand, uses a softer stopping rule, whereby an auction that is scheduled to end at a certain time ends at that time only if no bids were accepted within the last 10 min of the auction. If new bids are placed during the last 10 min, the auction extends until there is a period of 10 min in which no new bids are submitted. The consequence of Amazon's format is that it prevents bidders from placing a bid in the last 10 min of the auction, to which other bidders cannot react.

The effects of these end rules have been examined in both natural field studies (Ockenfels & Roth, 2001) and in labora-

<sup>4</sup>Endings and their motivational effects have been observed in rats and pigeons who increase their effort as a function of temporal distance from the end of the experience—a pattern known as scalloping—even when the increased behavior does not improve their payoffs (Ferster & Skinner, 1957; for related effects in humans see Ceci & Bronfenbrenner, 1985; Roth, Murnighan, & Schoumaker, 1988).

tory experiments (Ariely, Ockenfels, & Roth, 2001). The results showed that the end rule has large effects on bidding behavior. For example, in their experiments Ariely, Ockenfels and Roth (2001) showed that late bidding (also known as “sniping”) was influenced by the stopping rule—such that sniping was much more frequent in the eBay condition compared with the Amazon condition. Moreover, bidders in the eBay condition learned to snipe more over time while bidders in the Amazon condition learned to snipe less over time (both in terms of frequency and magnitude). Finally, the results also showed that all bidders in eBay, whether they were the highest bidders or not just before the end of the auction, sniped to the same degree. This final result suggests that, in auctions with hard stopping rules, consumers use sniping as a generic bidding strategy.

### PRELIMINARY STUDIES OF VALUE ASSESSMENT IN ONLINE AUCTIONS

The previous discussion presented propositions regarding various influences on bidding behavior, which might be investigated in future research. In this section we describe three studies that were conducted to examine aspects of value assessment in a natural auction environment on a commercial auction web site. The first study was a price comparison study that involved the comparison of prices in an online auction site to prices of regular online retailers. The second study involved auctions for tickets to the Rose Bowl (PAC-10 vs. Big-10) football game and examined the effect of sellers’ reputation and starting prices. The third study was a controlled experiment, examining the effects of starting prices and search costs.

#### Search and Price Comparisons (A Field Study)

This initial study was designed to examine the issue of price comparison and efficiency of auctions as selling mechanisms. We tracked 500 auctions on a large Internet auction site for music CDs, books, and movies (VHS & DVDs). For each of the 500 auctions, we waited until it was over to record the product and the final price (including shipping charges). At that point, we spent up to 10 min searching for the identical item at regular retail sites. We recorded only prices for items that were available for immediate shipment, and included shipping and handling charges in the price (as we did for the auction prices). Our goal was to compare the price of common commodities at the auction site to the prices we found within this limited time frame at regular online retailers.

The results showed that the auction site was the cheapest in 6 (1.2%) of the 500 cases, and more expensive in 494 (98.8%) of the 500 cases. Moreover, within the allocated time (10 min), we were able to find and record two online retailers that were cheaper than the auction web site in 79.9% of the cases; three online retailers that were cheaper than the auction web site in

44.7% of the cases; four online retailers that were cheaper than the auction web site in 30.5% of the cases; and five online retailers that were cheaper than the auction web site in 27.6% of the cases. In terms of price differences, consumers paid on average 15.3% more in auctions compared with the lowest regular online retail prices we found.

It is noteworthy that such price premiums could not be explained based on any improvements to the service (better, faster), or on reduced risk. In fact, transactions in online auctions typically take longer to finalize (the buyers send a check and the seller sends the merchandise only after the check is cleared), the reliability of the average individual selling products in online auctions is probably not higher than that of commercial sites, and it is harder to return merchandise to individual sellers. Taken together, the price premium and the high transaction costs suggest that online auction participants often fail to consider other available options and, consequently, electronic auctions might lead in many cases to more expensive transactions.

Finally, we wanted to find out if participants in online auctions are aware that winning prices are sometimes higher than normal online prices. We therefore asked our survey participants (who have had extensive experience participating in auctions) to indicate what prices they were paying on the auction site in relationship to regular online retailer purchases. The respondents indicated that they very rarely bought things on auction sites that could be purchased for a cheaper price on regular retail sites (1.1 on an 11 point scale). Furthermore, the respondents also claimed that they often compared prices before bidding on an item (6.7 on an 11 point scale). Thus, the results suggest that, despite relatively low search cost, consumers often paid premiums for goods they “won” in online auctions, yet they did not acknowledge outright their willingness to do so.

#### Determinants of Final Prices (A Field Study)

This field study started one month before the 2000 Rose-Bowl game, which took place on January 1, 2000 (Stanford vs. Wisconsin). We tracked all auctions for game tickets and recorded the details of each auction. From December 2, 1999 until December 31, 1999, there were 275 valid auctions for Rose-Bowl tickets on eBay (excluding auctions that sold, in addition to tickets, other services such as parking and accommodations). For each auction we recorded the transaction information, and regressed the starting price per ticket, total number of bids, total number of bidders, date started, auction duration, seller reputation, and the number of tickets offered on the final price of the ticket. The full model proved highly significant  $R = .919$ ,  $F(8, 264) = 179.146$ ,  $p < .0001$ . The coefficients for the different predictors are presented in Table 2.

Examination of the coefficients in Table 2 shows that the final price was positively related to the starting price, total number of bids, and the total number of bidders. The final

TABLE 2  
Regression Results for Rose-Bowl Game Ticket Sale

	<i>Standard Coefficient</i>	<i>t Value</i>	<i>p Value</i>
Starting price	.809	28.265	< .0001
Total number of bids	.404	7.106	< .0001
Date started	-.273	-6.844	< .0001
Auction duration	-.128	-3.772	.0002
Total number of bidders	.176	2.844	.0048
Seller's reputation	-.008	.307	.7590

price was negatively related to the starting date of the auction (auctions that started later had lower final sale prices) and to the duration of the auction. Finally, the only factor that did not have any impact on final prices was sellers' reputation (but see Lucking-Reiley, Bryan, Prasad, & Reeves, 2001 for significant effects of reputation).

Some of these effects can be easily reconciled with straightforward expectations: An increase in the number of bidders indicates that more people were interested in the ticket, which should have increased its price. Auctions that started earlier had a negative effect because bidders who were more interested in going to the game were likely to bid earlier and were willing to pay higher prices to ensure that they would have tickets. Other results are harder to explain from a normative perspective. With respect to auction duration, *a priori*, one would expect that longer auctions would allow more people to view and participate in the auction while also allowing participants to increase their bids. The fact that shorter auctions were associated with higher prices could suggest that shorter auctions increased competition among bidders, which drove up prices.

Regarding the total number of bids, it is important to note that this measure is not the effect of the total number of bidders (people), but rather, the total number of bids submitted including multiple bids by the same person (such that a person who had submitted a bid and had increased it twice afterward would count as 3 bids for this measure). We speculate that multiple bids are linked to decision dynamics, that they reflect the level of commitment and competitiveness of the participants, and to bidding frenzy, and as such contribute to price increases.

With respect to the influence of starting prices set by the seller, it is reasonable to assume that such prices served as value indicators or reference prices. One could suggest that the starting price acted as a reference price for the particular ticket because ticket quality was hard to express and communicate. We examine this question more directly in a study described in the next section (the online experiment).

Another interesting result is the non-significant effect of sellers' reputation (*i.e.*, insignificant negative effect), even though online bidders tend to believe that seller reputation does have a significant impact on their decisions. In our survey of 200 online auction participants mentioned earlier, we

asked respondents about perceptions of the degree to which different factors influenced their bidding decisions. The results indicated that, next to product quality, reputation of the seller ( $M = 9.1$  on an 11 point scale) was perceived as the most important factor. It is noteworthy that, relative to many other categories, reputation should be a rather important factor in the category of tickets for sporting events, considering that product quality is often ambiguous, verification of quality before the event is difficult, and the product has no value after the event (and thus cannot be traded or returned).

### Search and Starting Price (A Field Experiment)

The goal of the field experiment was twofold: to test in a relatively controlled environment the extent to which people search for price comparisons (related to the search and price comparisons study) and to test the influence of the starting price on the magnitude of bids (related to the determinants of final prices study). The experiment was carried out at a large commercial online auction site, involving selling products that we had purchased from online retailers. The products we auctioned off were movie DVDs, VHS tapes, web cameras, computer keyboards, and trackballs. Note that all the products we sold were commodities and were readily available from both online and brick-and-mortar retailers. In all cases, the products were auctioned for a period of a week (from Friday to Friday), and every product and were offered by a different "person" (an identity we created). Having a new identity was important because the experiment lasted over time and after each auction the selling identity became more credible by the virtue of its experience and the reputation input it received. In total we conducted 48 auctions: eight for the DVD of *The Matrix*, eight for the VHS tape of *The Mummy*, 16 for *The QuickCam* web cameras, eight for Kensington keyboards, and eight for Kensington trackballs.

There were two factors in the experiment, initial price and comparability. The initial price is the price, which the seller specifies as the minimum starting bid and this factor had two levels, low (\$1 for all the products) and high (set at about half the retail price—\$5 for the movies and \$30 for the computer peripherals). Comparability also had two levels. At the "low" comparability level, a product was offered individually dur-

TABLE 3  
Illustration of the Different Auctions Conducted During a Week, Representing the Different Conditions in the Experiment

Product	Starting price	Comparability	# Of products offered
The Matrix	Low (\$1)	Low	1
The Mummy	Low (\$1)	High	2
The Mummy	High (\$5)	High	2
QuickCam	High (\$30)	Low	1
Trackball	High (\$30)	High	2
Trackball	Low (\$1)	High	2

ing a period of a week either at its low starting price or its high starting price. At the “high” comparability level two products were offered during a period of a week, one at its low starting price and one at its high starting price. The two identical products in the high comparability condition were offered by different “sellers,” but the starting times and end times were similar such that the two products were displayed as adjacent. For an illustration of the manipulation, see Table 3. This table depicts a sample of one week of auctions, during which we sold the four different product types under the four different conditions. The two products that were auctioned in the low comparability conditions (*The Matrix* and *The QuickCam*) were the only products of their type offered by us on that week and they were each offered at the appropriate starting price. In the case of the high comparability conditions (*The Mummy* and *The Trackball*), we offered during that week two items from each product type. These two items were auctioned by different “sellers,” one at the low starting price and one at the high starting price.

Note that this is a relatively subtle manipulation because there were (concurrently or in the past) many more items of the same type at the same online auction site that bidders could have searched (in fact our selection criteria for the items was that they had been popular items at that particular online auction site in the past). In addition, information about these products was readily available at many sites just a mouse click away (for other large effects of small search costs, see Lynch & Ariely, 2000).

We examined the results by first running an overall ANOVA test on the 2 (starting price) by 2 (comparability) on the entire set of bids that were submitted. The results showed a main effect for starting price,  $F(1, 340) = 17.79, p < 0.001$ , a main effect for comparability,  $F(1, 340) = 6.01, p = 0.015$ , and most important, a significant two way interaction between starting price and comparability,  $F(1, 340) = 9.0, p = 0.003$ . As can be seen in Figure 1, higher starting prices caused participants to bid higher for the goods, but only when there were no immediate comparisons. When participants could compare the prices of two items, there was no effect for the starting price ( $p = 0.35$ ). It is also interesting to note that in our survey of online auction users, respondents indicated that starting price did not have a large influence on their bidding decisions (second lowest after number of other bidders).

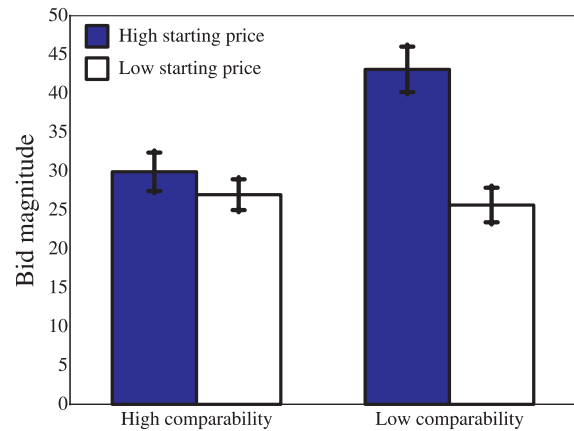


FIGURE 1 Average magnitude of bids across the four conditions. Error bars are based on standard errors.

Next, we analyzed the profits and losses we incurred during the experiment. On average, we lost \$4.01 per item we auctioned (including shipping charges). However, our losses varied among the different products we auctioned,  $F(4, 28) = 69.64, p < 0.001$ . We lost the most on the trackballs ( $M = \$18.87$ ), less on the web cams ( $M = \$4.62$ ), and lost just a little on the keyboards ( $M = \$1.33$ ). Financially, the experiment was not all “bad news.” We made a small gain on the VHS tape ( $M = \$0.40$ ) and a more substantial gain on the DVD ( $M = \$4.95$ ).<sup>5</sup>

When starting this experiment we had two opposing hypotheses about the effect of starting price (see also Häubl & Popkowski Leszczyc, 2001). On one hand, we expected that if prices started low, more participants would be drawn to the auction and if their bidding pattern would escalate, they would end up paying higher prices in the low starting price condition. On the other hand, we also hypothesized that the initial price could work as an anchor reducing the positive effect of the initial price. The results showed that there were more bidders in auctions that started at a low price ( $M = 8.2$ ), compared with high starting price,  $M = 5.3; t(46) = 4.61, p < 0.001$ . Moreover, low starting prices also increased the average number of bids per bidder from 8.3 to

<sup>5</sup>Recall, that in the price comparison study, we used CDs, DVDs, and books, which gave us the highest profit in the experiment



15.25;  $t(46) = 4.62$ ,  $p < 0.001$ . However, when regressing the number of bidders in an auction on the bids placed in the auctions, the effect of the number of bidders was marginally significant and negative (coeff =  $-0.8$ ,  $t = 1.66$ ,  $p = 0.098$ ). Next we regressed together the number of bidders and the number of bids on the magnitude of bids placed in the auction. In this analysis the number of bidders came, as having a highly significant and negative effect (coeff =  $-3.35$ ,  $t = 5.38$ ,  $p < 0.001$ ), while the number of bids was significant and positive (coeff =  $1.5$ ,  $t = 6.05$ ,  $p < 0.001$ ). Although preliminary, these results suggest that while lower starting prices draw more bidders, these bidders bid relatively low (presumably because of the anchoring effect of the starting bid) and hence this strategy is not always successful. On the other hand, to the extent that there are bidding wars (as reflected by the multiple bids of individuals), the magnitude of bids increase. In our experiment the two effects were such that even when we had more bidders at the low starting price, this was not sufficient to create price wars. It is important to note that these are preliminary results; we had only a few bidders in our auctions ( $M = 6.75$ ) and only a modest number of bids per auction ( $M = 11.79$ ). Moreover, the items we auctioned were, for the most part, standard commodities.

## DISCUSSION

Online auctions raise important conceptual questions, and given their remarkable popularity and success, they are also significant from a practical perspective. Conceptually, product acquisition through online auctions is different in fundamental ways from regular fixed price purchases, involving a drastically different process and sources of information. At the same time, participants in online auctions are the same people whose behavior has been studied for many years in the context of regular purchase decisions. Accordingly, the main characteristics of consumers and their preferences are likely to apply to online auctions as they do to other purchases. In particular, one of the main findings regarding consumer preferences is that they are highly sensitive to the decision context and task characteristics (e.g., Bettman et al., 1998). Because the task and context characteristics of online auctions are quite different, studying bidding behavior in online auctions requires us to examine the consequences of the online auction environment characteristics on purchase (bidding) behavior.

In this research we have presented a general framework for studying bidding behavior in online auctions, which centers around the differentiating characteristics of the auction purchase environment (see Table 1). Perhaps the most important factor is that, unlike fixed price purchases, an auction is typically a multi-stage process that involves multiple periods or phases. A consumer first decides whether to choose or enter a particular auction, which is often fol-

lowed by a sequence of bids, with a distinctive final phase, which is often the “moment of truth.”

The second dimension that we considered was value assessment, which is conceptually similar to consumers’ use of various value cues in ordinary purchases. However, the online auction environment offers a different range of value indicators. Furthermore, the impact of particular cues, such as the starting price, the seller’s reputation, and other participants’ bids, are likely to play different roles at different phases of the auction.

The third dimension of our framework, decision dynamics, relates to the impact of making multiple decisions in the context of the same “purchase.” Consistent with prior research, we examined various ways in which early decisions could dynamically impact subsequent decisions, such as escalation, endowment, and self perception. Such influences might often trigger emotional reactions, competitive behavior, and a desire to “win” that could influence consumers’ final bids (for an illustration of this idea see Figure 2). Thus, even though auctions might appear as an efficient mechanism to match product with values (prices), the dynamics of online auctions may often lead consumers to make purchases that are determined by factors that have little to do with their a-priori perceived value.

Although our main focus in this research has been on a framework for studying bidding behavior in online auctions, we also conducted three empirical investigations to examine specific aspects of value assessment by auction participants. We found that auction “winners” often fail to compare auction prices with easily accessible prices on the web for the same items, unless an identical item was placed just next to the focal auction. Interestingly, the results of the Rose Bowl study also suggest that, at least under certain conditions, seller’s reputation does not appear to have a significant effect on bidding decisions. Finally, the results showed that bidders were influenced by the initial price information set by sellers. Specifically, the pattern of results suggests that the low initial price was successful in drawing more bidders to the auction, but unless the larger number of bidders triggered a bidding war (with multiple bids per person), the anchoring effect of the low starting price overcame the “herding” effect. These results illustrate that the psychological aspects of online bidding are essential for understanding the conditions under which Internet auctions offer an efficient way to match buyers and sellers.

Of the three studies that we conducted, one involved a manipulation (of starting prices), a second study combined data from (unmanipulated) auctions with additional analysis of online retail prices for similar items, and the third was based solely on an analysis of (unmanipulated) auction data. Future work involving online auctions (either field or lab studies) might augment this type of data and go a step further by including in the analysis personal and individual characteristics. One individual difference that is expected to influence bidding behavior is the consumer’s expertise on



FIGURE 2 NEED CAPTION

two dimensions: the product domain and the process (and strategies) of online auctions. Product domain expertise is likely to influence the evaluation of the auctioned items, whereas online auction expertise might impact which auction features a consumer is considering and how these features are interpreted and translated into strategic bidding behavior. Furthermore, one might expect domain expertise to diminish the weight of online “value indicators,” because experts may be less dependent on extrinsic cues. Auction expertise, on the other hand, may diminish the impact of auction dynamics, because of the superior ability of such experts to avoid common weaknesses of novice bidders. Other individual differences are also likely to moderate the role of various value indicators and decision dynamics. For example, heightened competitiveness and the need to win are likely to magnify the impact of certain decision dynamics and might thus magnify the susceptibility to errors associated with purchase through online auctions.

Finally, as online auctions become more popular and expand into domains that have not been traditionally associated with auctions, an interesting question naturally arises: What characteristics of a product or service category and marketplace are conducive to the development of online auctions? As can be seen on eBay and other online auction sites, the number of auctioned items and the number of bidders per auction vary greatly across categories. Accordingly, going beyond the impact of the microelements in the online auction environment, future research might investigate the macro-determinants of consumer demand for this up-and-coming form of purchase.

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