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Auctions and Auction Fever:

Explanations from Competitive Arousal and Framing

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Abstract

The present study extends the work of Malhotra and Murnighan (2000) by experimentally examining competitive arousal and framing as explanations of auction fever. Auction fever is viewed as bidding over one's pre-selected limit and is often accompanied by increased arousal. In addition to examining auction fever, this study tested the economic prediction of revenue equivalence in English and Dutch auctions. In Experiment 1, the components of competitive arousal (competition and time pressure) are studied in English and Dutch auctions. Experiment 2 tests competitive arousal and positive and negative frames as competing explanations of auction fever.

Economics has provided a large body of theoretical and experimental literature on the dynamics and structures of auctions (e.g., McAfee & McMillan, 1987; Vickrey, 1961). The importance of this literature has been legitimized by William Vickrey's receipt of the Nobel Prize in economics in 1996. Given the recent explosive growth of online auction sites, auctions are generating even more interest in the academic community. Much of this research still focuses on the structures of auctions with less systematic research on individual bidder behavior. The exception to this rule is the winner's curse (e.g., Thaler, 1992). Here, because of the uncertainty of the value of an item and because bidders have different estimates of the value, the person who wins the bid may have overbid for the item. Recently, Malhotra and Murnighan (2000) looked specifically at bidder behavior, trying to understand why bidders bid past their limits and fell prey to auction fever. The present study draws on and extends the work of Malhotra and Murnighan (2000), analyzing two potential reasons for auction fever.

Economic literature assumes that bidders think rationally and behave calmly. However, this is not always the case. For instance, Murnighan (2000) described an updated version of Shubik's (1971) Dollar Auction, which was used as an exercise in a negotiations class of Executive MBA students. The author auctioned off a $20 bill – the highest bidder paid his or her bid and received the $20 bill, while the second highest bidder did not receive anything but paid his or her bid. In this particular instance, the auction started normally enough with an opening bid of $1 and incremental bids of $1. There were numerous bidders early on, but when the bidding reached $18, only two bidders remained. One person bid $19, and the other bid $20. The first bidder hesitated and then bid $21. All of a sudden, the bidding became more earnest. By the time the two bidders stopped, the final bid was $2,000 – the winner got to take home $20, but had to pay a sizeable $1,980. Since the author/auctioneer had gradually increased the bid

increments from $1 to $50 (when the bidding reached $1,200), the loser was in a slightly better situation, owing only $1,950. All this for $20! Said the winner, "I personally got caught up in the competitive bidding process and needless to say bid well over my self-imposed limits. In fact my ego took over and my competitive juices began to flow." (Murnighan, 2000) The loser of the auction reported similar emotions, "As the dollars ran up and up into the thousands, my internal stress level had reached a point where I was not thinking clearly about the ramifications about my decision to run the bids higher. I was more concerned with 'winning' and 'not giving up.'" (Murnighan, 2000) These hardly sound like rational bidders who are thinking clearly about their actions.

In the summer of 1999, Chicago held a public art exhibit of fiberglass cows. The exhibition was aptly named "Cows on Parade" since these bovine were displayed on the streets of the city. Following the exhibition, the cows were auctioned off for various charities via live and Internet auctions. The auctioneers provided an average estimate of $3,217 for the 75 cows on the Internet auction and an average of $4,081 for the 65 cows at the live auction. The average final price for a cow on the Internet auction was $18,051 (with a high of $65,000) and the average final price for a cow at the live auction was $32,300 (with a staggering high of a $110,000). On average, sale prices were 575 percent and 791 percent of the Internet and live estimates respectively (Malhotra & Murnighan, 2000).

Indeed, such auction fever is consistent with folk wisdom. With the proliferation of online auction sites, such extreme bidding may become more common. Some chat rooms, personal web pages, and online companies selling bidding software now give advice on how to bid wisely and how to deal with others caught up in auction fever. As one online bidder, Kent A. (2000) says, "Experience has shown that there is a large percentage of irrational bidders out there

– those that are overcome by Auction Fever. These are people who will make a bid of any size, even well exceeding the value of the item being auctioned, just so they can WIN." This study views auction fever as bidding over one's pre-selected maximum bid (i.e., one's limit). For those with little experience, it seems that a high level of arousal (e.g., stress, anxiety, and general arousal) accompanies bidding. This intensifies as a person reaches their limit.

As can be seen from these examples, some bidders behave in ways that economic theory does not predict. Instead, economic literature on auctions has focused on predicting and understanding bids and bid formats according to mathematical formula; work that has examined violations of economic theories has not focused on individuals' emotions and thoughts. Research on bidders' actual feelings and their psychological calculus would be particularly beneficial. The aim of the present study, then, is to investigate the emotions, thoughts, and actions of bidders. Specifically, in hopes of more fully describing and understanding auction behavior, and decision-making processes in general, this study will address the possible causes of auction fever. This research will investigate the validity of two theories in explaining auction fever: competitive arousal (Experiment 1) and risk-taking behavior as a result of framing (Experiment 2). While competitive arousal presents an affective explanation of auction fever, framing presents a cognitive argument. This study will also investigate two auction formats, English and Dutch auctions. Since the structures of English and Dutch auctions are inherently different, bidders in the two formats may respond differently to competitive arousal and/or framing.

Auction Formats

The underlying structure of an auction, that is, its format, calls for different behaviors from bidders. As such, depending on the auction format, bidders may be more or less prone to competitive arousal and risk-taking as a result of framing. To fully understand when auction fever occurs, I will first provide a literature review on the four basic auction formats and on the economic predictions of the revenues generated by these auction formats.

In an English auction, bids are placed successively, with each bidder raising the price until one bidder remains. Bids are either announced by the auctioneer or called out by bidders, and the last bidder remaining in the auction wins the item, paying the amount that he or she bid. The English auction is the most familiar auction format and is typically what individuals think of when the word auction is mentioned. Dutch auctions work in a reverse fashion. The auctioneer begins with a high price and then lowers the asking price until one bidder bids, that is, accepts the price. Unlike English auctions where many bidders can place successive bids, Dutch auctions end with the first and only bid. Dutch auctions are used to sell flowers in the Netherlands, fish in Israel, and tobacco in Canada. In first-price sealed bid and second-price sealed bid auctions, bidders submit their bids secretly. In first-price sealed-bid auctions, the highest bidder wins the item for the amount bid. In second-price sealed-bid auctions, the highest bidder again wins but pays an amount equal to the amount bid by the second-highest bidder (McAfee & McMillan, 1987; Vickrey, 1961). First-price sealed bid auctions are often used in auctioning real estate and mineral rights on government-owned land. The Internet auction giant, eBay, uses essentially a second-price sealed bid system for its auctions. Amusingly, McAfee and

McMillan (1987) said of this auction format, "While this auction has useful theoretical properties, it is seldom used in practice" (p. 702).

Another important distinction in auctions is whether an auction is classified as an independent private value (IPV) or a common value (CV) auction. In an IPV auction, bidders have privately-known and potentially different values for the items. Items that typically fall into this category have little or unknown resale value; instead the value is determined based on personal preferences or subjective judgments. An example of an IPV auction is the auction of an antique in which bidders are purchasing the item for personal use and do not plan on reselling it. In a CV auction, bidders are uncertain about the value they place on the item until after the auction is over – there is a true value to the item, but this value is essentially determined by the results of the auction. However, bidders have a common sense of the worth of the item, and as the auction progresses, individuals can gain increasingly accurate value estimates of the item from other bids. This is not true for IPV auctions. An example of a CV auction is an auction of mineral or oil rights on a plot of land (McAfee & McMillan, 1987).

Vickrey (1961) demonstrated logically that English auctions and second-price sealed bid auctions are strategically equivalent, that is, not only do they produce the same final bid price (or revenue) for the auctioneer, but also, a bidder should follow the same strategy in both formats. In second-price sealed bid auctions, the dominant strategy for bidders is to bid their valuations; in English auctions, bidders should bid up to this value if they are pushed to do so by other bidders. Similarly, Vickrey (1961) demonstrated that Dutch and first-price auctions are strategically equivalent. In both auctions, the participant must bid without knowing other bidders' decisions. Since the same information is available before either auction begins, bidders in both auction formats should bid strictly less than their valuations. Although each pair (i.e.,

English and second-price sealed bid auctions and separately Dutch and first-price sealed bid auctions) of auctions is strategically equivalent, the four auctions are not strategically equivalent to one another. However, economic theory predicts that under situations where bidders are risk neutral and have independent private values, revenues earned from all four formats will be equivalent (McAfee & McMillan, 1987; Vickrey, 1961). Hence, when bidders are risk neutral towards winning (or losing) an item and when each bidder has privately assigned and known values for the item, economic theory predicts that Dutch, English, first-price sealed bid, and second-price sealed bid auctions will produce equivalent revenues.

Previous research has investigated the equivalence of the four basic auction formats, with most studies using laboratory data and focusing on strategic rather than revenue equivalence. The results from these studies provide only limited support for the economic predictions. Generally, sealed bid auctions tend to produce higher levels of revenue. First-price auctions typically result in higher revenues than Dutch auctions (Coppinger, Smith, & Titus, 1980; Cox, Roberson, & Smith, 1982; Cox, Smith, & Walker, 1983). Similarly, second-price sealed bid auctions have generated greater revenues than English auctions since bidders tend to bid their valuations in English auctions (Kagel, Harstad, & Levin, 1987) while bidding above their valuations in second-price auctions (Kagel et al., 1987; Kagel & Levin, 1993). However, Coppinger et al. (1980) did demonstrate revenue equivalence for English and second-price auctions. Kagel (1995) provides an overview of the experiments that have been carried out on strategic and revenue equivalence. In addition to these laboratory studies, Lucking-Reiley (1999) conducted an interesting field experiment, auctioning off Magic: the Gathering collector trading cards on eBay. He compared the strategic equivalence between Dutch and first-price sealed bid auctions and between English and second-price sealed bid auctions. Contrary to

economic theory and the above mentioned laboratory findings, Dutch auctions produced 30 percent (or approximately $0.30 per trading card) higher revenues than first-price sealed bid auctions. English and second-price sealed bid auctions produced approximately equivalent amounts of revenue.

Economic theory, then, predicts that English and second-price sealed bid auctions and Dutch and first-price sealed bid auctions are strategically equivalent, and that all four auction formats will have equivalent revenues when the IPV and risk neutral assumptions are maintained. However, experiments have found limited support for both strategic and revenue equivalence. In this study, I compare Dutch and English auctions and suggest that the two auction formats are sufficiently different psychologically as to produce higher revenues in Dutch auctions.

Competitive Arousal – Competition and Time Pressure

In the Chicago cow auctions mentioned above, Malhotra and Murnighan (2000) attempted to explain the overbidding by developing and testing three competing models of bidder behavior. The rational choice model predicted that bidders would only bid past a stated limit strategically (e.g., using the behavior of others as a guide to avoid the winner's curse) and would never bid past their true reservation price for an item. The escalation of commitment model predicted that bidders who had invested more time in the auction would be more likely to bid past their set limits if and when these limits were reached. Finally, the competitive arousal model predicted that bidders would be more likely to bid past their limits "in the heat of the

moment" when the end of the auction was near and when rivalry was particularly high among a few remaining bidders.

Data analysis revealed considerable support for the competitive arousal model and some for escalation of commitment. There was little evidence to support a rational choice model. Describing the competitive arousal model, the authors argued that bidding in auctions tends to require decisions that are made in rapid succession, and where time is of the essence and bidders are competing with one another to win the item. Hence, the two components of competitive arousal are competition and time pressure (Malhotra & Murnighan, 2000). Given the emotionally-charged nature of auction fever, the authors argued that escalation models provide an insufficient explanation of the phenomenon since escalation models focus on cognitive rather than emotive factors. Consistent with the competitive arousal model, Malhotra and Murnighan (2000) showed that bidders were more likely to exceed their limits towards the end of the auction, when few rather than many bidders were still bidding (i.e., when rivalry among a few bidders was high). Given these findings by Malhotra and Murnighan (2000), the present study puts aside the escalation of commitment and rational choice models and attempts to test the components of competitive arousal in a controlled laboratory setting to assess the roles that competition and time pressure play in explaining auction fever.

Competition

Turning first to competition, Allport (1924) argued that competitive situations are composed of two social factors – rivalry and social facilitation. Rivalry is an emotional response that is accompanied by a desire to win. From introspective reports, rivalry is "a kind of mild anger which modifies the struggle reaction" (Allport, 1924, p. 283). In the sports literature, Gill

(1980) confirmed with three different measures of arousal that competition did, indeed, increase arousal in volleyball players. Similarly, minor and large competitions increased arousal as measured by heart rate and subjective ratings of anxiety in athletes (Bäckman & Molander, 1986).

Social facilitation studies show that the presence of others, either in the form of an audience or as coactors, can affect task performance (Zajonc, 1965). The mere presence of others as an audience enhanced well-learned tasks, while hindering more complex and new tasks (Markus, 1978; Zajonc, 1965; Zajonc & Sales, 1966). Additionally, an audience that showed interest in what a participant was doing (Cottrell, Wack, Sekerak, & Rittle, 1968) or one that was presented as "expert" (Henchy & Glass, 1968) caused evaluation apprehension in participants. This lead to a similar pattern of increased frequency of dominant well-learned responses and decreased frequency of subordinate novel responses from the participants. In a review of the experimental literature on social facilitation, Guerin (1986) confirmed that these two types of audiences (mere presence and evaluative) can both lead to social facilitation. Looking at the reasons underlying the effects of an audience, Zajonc (1965; 1966) argued that the mere presence of an audience or of coactors can increase arousal or "drive". As a result of these drive-producing qualities, individuals exhibit more ingrained than novel responses.

Arousal can have a negative impact on decision-making process and on outcomes. For instance, looking at the effects of arousal and risk-taking behavior, Mano (1992; 1994) demonstrated that higher arousal led to higher risk-taking, which was expressed as higher willingness-to-pay for lotteries but lower willingness-to-pay for insurance. Participants under distress employed simpler decision rules and made more polarized judgments (i.e., evaluations further from the mean) (Mano, 1992). In sports, Bäckman and Molander (1986) argued that

individuals who experienced suboptimal levels of arousal, and subsequently performed poorly, suffered from a variety of impaired cognitive abilities. Stress, anxiety, and arousal have also been found to have negative effects on perception, motor performance, problem-solving, and learning (Staw, Sandelands, & Dutton, 1981). Indeed, under situations of threat, restriction in information processing and constriction of control are apparent at the individual, group, and organizational levels (Staw et al., 1981).

In summary, competitive situations consist of two components, rivalry and social facilitation, both of which result in increased arousal. As a result of the increased arousal, individuals rely more heavily on well-learned responses and make poorer judgments and decisions. Taking this information into the realm of auctions, all the necessary elements of competition that would lead to poor decision-making and judgments are present. Figure 1 demonstrates how these elements of competition combine to cause auction fever. Bidders find themselves in a competitive situation, trying to vie for the top bid, with other participants bidding against them (rivalry) and/or watching (social facilitation). Rivalry and social facilitation combine and result in increased arousal. Individuals for whom bidding is a well-learned behavior will exhibit this well-learned behavior with greater frequency and keep bidding. In contrast, if bidding is a novel experience to individuals, the increased arousal prevents them from carefully processing and thinking through the situation and can also lead to continued bidding. Hence, bidders may get caught up in auction fever.

Hypothesis 1: Relative to participants perceiving the auction as low in competition (both rivalry and social facilitation), participants perceiving the auction as high in competition

will exhibit higher levels of arousal (i.e., stress, distress, anxiety, and general arousal), and will bid over their limits more often and by greater amounts.

Time Pressure

As with competition, time pressure leads to increased arousal (e.g., Cates et al., 1996; Maule, Hockey, & Bdzola, 2000) that can then lead to decreased cognitive abilities. There is considerable evidence of poor performance and outcomes when participants are faced with completing tasks with time constraints. Time constraints lead individuals to rely more heavily on heuristics, and as a result, become more influenced by cognitive biases (Hogarth, 1980). For instance, Kruglanski and Freund (1983) demonstrated that primacy effects, ethnic stereotyping, and anchoring phenomena increased in magnitude under time pressure. In a problem-solving task consisting of deciphering riddles, time constraints prevented participants from utilizing previously acquired information that was relevant to the task (Bowden, 1985). Ordóñez and Benson (1997) asked participants to judge the attractiveness and maximum-buying prices of some risky gambles. They found that under time pressure, participants were less likely to engage in cognitive deliberations, but were more likely to depend on the same strategy used in previous trials.

As with competition, time pressure is a critical characteristic of auctions. In auctions, bidders are required to make snap decisions and quickly place bids and counter-bids. A person who does not make a bid quickly risks losing the item to another bidder. This is particularly true as the auction progresses and only a few bidders are left and each has less time to consider the implications of their decisions. Hence, with time pressure, bidders are more likely to rely on

simpler cognitive modes and heuristics, to make less than optimal decisions, and thereby to exhibit greater auction fever (Figure 1).

> Hypothesis 2: Relative to participants perceiving low time pressure, participants perceiving high time pressure in the auction will exhibit higher levels of arousal, and will bid over their limits more often and by greater amounts.

Competition and Time Pressure

Malhotra and Murnighan (2000) argued that competitive arousal, or competition and time pressure together, best explain auction fever. Figure 1 provides a graphic description of how competition and time pressure combine to produce auction fever. Ultimately, an auction is a competitive situation in which bidders are contending against others to win an item and where bids are often made quickly with little time for in-depth deliberation. Towards the end of English auctions, there are usually only a few bidders left and the remaining bidders might feel that they are under a spotlight as others watch. Given these competitive and time pressure characteristics of auctions, it is not surprising that auction fever often results. Bidders are highly aroused and unable to think clearly, and since decisions need to be made quickly, bidders keep bidding.

> Hypothesis 3: Relative to participants experiencing low levels of competition and time pressure or high levels of either competition or time pressure, participants perceiving high levels of both competition and time pressure in the auction will exhibit higher levels of arousal, and will bid over their limits more often and by greater amounts.

Competition versus Time Pressure

Differentiating between the importance of competition and time pressure in generating auction fever, Malhotra and Murnighan (2000) argued that competition (rivalry and social facilitation) by itself will only have a moderately negative impact on decision-making. As the end of the auction approaches, there is greater rivalry and a corresponding increase in competition and its negative effects on bidding behavior. In comparison, time pressure is likely to have a larger negative effect, especially towards the end of the auction (Malhotra & Murnighan, 2000). From the negotiations literature, deadlines engender greater action in the forms of messages, proposals, concessions, and time mentions (Lim & Murnighan, 1994; Roth, Murnighan, & Shoumaker, 1988). Towards the end of auctions, even higher levels of arousal and even lower levels of clarity in thought, then, are likely to accompany the bids. Figure 2 shows the relationship of competition and time pressure on decision-making proposed by Malhotra and Murnighan (2000). Individuals possess a baseline level of cognitive biases. With competition, the level of biases is greater and increases somewhat as the end of an auction approaches. However, time pressure leads to departures from optimal decision-making that rise exponentially as the end of the auction approaches.

Hypothesis 4: Relative to high competition, high time pressure will cause participants to exhibit higher levels of arousal, and will cause them to bid over their limits more often and by greater amounts.

Competitive Arousal and Auction Formats

Recall that previous studies have shown little support for the strategic equivalence of English and second-price sealed bid auctions and of Dutch and first-price sealed bid auctions. Indeed, although economic theory predicts that revenues will be equivalent in English and Dutch auctions (assuming risk-neutrality and IPV auctions), economic research has not focused on the revenue equivalence of English and Dutch auctions. Competitive arousal predicts that, due to increased feelings of competition and time pressure, Dutch auctions will produce higher revenues than English auctions. In Dutch auctions, the bids are decreased rather than increased. In fact, in some Dutch auctions (e.g., flower and fish auctions), the decreases in price are extremely rapid with prices dropping significantly by the second. This leads to high levels of time pressure – bidders only have one chance to bid (and win) and must make a decision between bidding too early (and too high) or bidding too late and being outbid by someone else. Since bidders have their "fingers on the trigger," competition (rivalry and social facilitation) can be very high. In contrast, with English auctions, the relative level of competitive arousal may be lower. Bidders are (literally) faced with less time pressure since the prices do not necessarily change by the second. Competition is also lower in English auctions since an individual has more than one chance to bid – if a competitor makes a bid, an English auction bidder still has the opportunity to place a counter-bid. The "do or die" element of competition is diminished in English auctions. Hence, contrary to economic theory, competitive arousal predicts that Dutch auctions will lead to higher revenues than English auctions.

Hypothesis 5a: Relative to participants in English auctions, participants in Dutch auctions will exhibit higher levels of arousal, and will bid over their limits more often and by greater amounts.

Hypothesis 5b: Revenue will be higher in Dutch auctions than in English auctions.

Extending the logic of interactions between competitive arousal and auction formats, the greatest amount of auction fever should occur with high competition and high time pressure in a Dutch auction.

Hypothesis 6: Relative to all other participants, participants perceiving high levels of competition and time pressure in Dutch auctions will exhibit the highest levels of arousal, and will bid over their limits the most often and by the greatest amounts.

Experiment 1 – Competitive Arousal and Auction Format

Experiment 1 addresses Hypotheses 1-6, looking at competition, time pressure, and auction format.

Design

The study uses a 2 (high competition versus low competition) x 2 (high time pressure versus low time pressure) x 2 (English auction versus Dutch auction) factorial design.

Participants

Participants will be male and female undergraduates from Northwestern University, and will be recruited and tested in groups of four. Each cell of the factorial design will have approximately 20 participants, resulting in a total sample of 160.

Materials

To maintain the IPV assumption necessary to attain revenue equivalence, the bid item will need to have a value that only the bidder can determine. The item that participants will bid on is a lottery ticket. The winner of the lottery ticket will be eligible for a drawing of a grand prize of dinner for two at a local restaurant. The value of this lottery ticket will be pilot tested. Below, participants are provided with a $10 endowment, which is assumed to be 150% of the pilot-tested value of the lottery ticket. The endowment is set at 150% of the pilot-tested value of the lottery ticket to ensure that participants in the English auctions do not exceed their endowments.

To determine participants' cognitive states prior to the auction, half of the participants will fill out a pretest questionnaire. The pretest questionnaire will include questions about bidders' valuations of the lottery ticket and the grand prize and bidders' preset bid limits. In addition, participants will be presented with 7-point scales and asked to rate how they view the auctions (e.g., a way of making money by participating in an experiment, an opportunity to win the lottery ticket, etc.) and how they feel (e.g., confident, hurried, anxious, etc.). Appendix A contains the pretest questionnaire. In addition, half the participants will also fill out Mano's (1991; 1992; 1994) octant scales, which consists of 24 emotion-describing adjectives designed to measure how intensely participants are aroused, elated, pleased, calm, quiet, bored, unpleasant, and distressed. Focusing on arousal, calmness, boredom, unpleasantness, and distress, this scale

will look at arousal levels in participants. All participants will fill out a similar but more comprehensive posttest questionnaire and Mano's octant scales. In addition to the questions in the pretest questionnaire, the posttest questionnaire will also include questions on participants' highest bids, whether the bidder won the ticket, and whether they had sufficient time to think about their bids. Appendix B contains details on the posttest questionnaire.

Procedure

Each auction will consist of four individuals bidding against one another and will be videotaped. Participants will be randomly assigned to one of eight groups. Upon arriving, the experimenter will inform participants that they will be taking part in two tasks, an auction and a subsequent group task. In actuality, there will not be a second task, but this slight ruse is used as part of the competition manipulation (see below for details). To facilitate the bidding, the experimenter will give participants an endowment of $10 to spend on the auction. The experimenter will then inform participants that they will be bidding for a lottery ticket that will entitle them to a grand prize draw of dinner for two at a local restaurant. The experimenter will explain that the winner of the ticket will have his or her name entered into the drawing after having paid his or her bid. The losers will walk away with just the $10 (i.e., payment for their participation in the experiment). To prevent all participants from spending all $10 of their endowments, the experimenter will also announce, "there will be quite a few other names in the drawing." To increase involvement, the experimenter will say, "Past participants have found this to be a fun exercise, especially since there is the possibility of winning a free meal."

The experimenter will explain the rules of the auction (see below for Dutch and English auction manipulations) and answer any questions that participants may have. Participants will

then have a practice auction to ensure that they are comfortable with the format and rules. Once this is accomplished, participants in half of the groups will fill out the pretest questionnaire, after which, the experimenter will introduce the competition manipulation (see below for details) and the auction will begin. Upon completion of the auction, the winner will be announced and all participants will complete the posttest questionnaire. The experimenter will then thoroughly debrief the participants. Since participants were videotaped without their knowledge, the experimenter will gain their signed consent to view the videotapes. When this is completed, the experimenter will dismiss the participants.

Auction format manipulation. Participants will bid in an English or Dutch auction. In the English auction, the experimenter or auctioneer will call out each bid, and participants will accept each bid by raising their hands (to the level of their shoulders). The experimenter will ask participants not to call out or speak out their bids. This is to ensure that bid acceptance is equally salient across conditions. The starting bid and bid increment will each be $0.25. Participants will not be allowed to jump bids. To simulate an auctioneer's announcement of "going, going, gone!", a large digital clock will display a 5-second window after each bid is placed. The clock will be visible to all participants. If no bid is placed within that window, the auction will end. Participants can make a new higher bid at any time during the 5 seconds. As an example of how the English auction will work, the experimenter will begin by announcing, "Anyone for $0.25?" Participant A raises his or her hand and the experimenter immediately starts the clock and announces, "$0.50?" Participant B accepts the bid and the experimenter immediately restarts the clock and announces, "$0.75?" Assuming 5 seconds pass and no other bids are made, the lottery ticket is sold for $0.75.

In the Dutch auction, the bids will drop from $10.00. Decrements of $0.25 will be made every 5 seconds. Again, the 5-second intervals will be displayed on a large digital clock that is visible to all bidders. Hence, prices will proceed "$10.00, $9.75, $9.50, etc." A bidder who makes a bid will pay a price that is a multiple of $0.25 (that is, bid prices will not read down to the level of dimes, nickels, or pennies). As an example of how the Dutch auction will proceed, the experimenter will begin the auction by announcing, "Anyone for $10.00?" and will start the clock for 5 seconds. Assuming no one accepts the bid, after 5 seconds, the experimenter will announce, "$9.75?". If participant A accepts the bid, the auction will end with a final sale price of $9.75. As in the English auction, bidders will accept a bid by raising their hands and will be asked not to call out their bids.

Competition manipulation. Since competition can be seen as both rivalry and social facilitation, both aspects will be operationalized. From the social facilitation literature, competition will be operationalized as the presence of other bidders (coactors). In the high competition condition, participants will sit in a semi-circle facing the experimenter/auctioneer. Participants will hence be able to see one another and the experimenter clearly. In the low competition manipulation, cubicle walls will separate participants, preventing any interaction among bidders.

In addition, rivalry will be operationalized through a cover story. In the high competition condition, the bidding exercise will be continually referred to as "competitive bidding" whereas the word "competitive" will be omitted in the low competition condition. Additionally, as mentioned above, the experimenter will inform participants when they arrive that they will participate in two tasks. The experimenter will inform participants in the competition condition that the second task is a group task where the four individuals will be placed into four separate

groups to work with others. The experimenter will go on to explain that since the second task examines performance across the groups, the four participants will be competing against one another. Participants in the low competition condition will also be told that they will participate in a subsequent group task, but the experimenter will not mention any competition or cooperation in the tasks. These operationalizations will be pilot tested to ensure that they are successful.

Time pressure manipulation. To create a sense of time pressure, the digital clocks will count down 5-second intervals and will count down the 5 seconds to varying degrees of accuracy – a second or 1/100th of a second. In the high time pressure condition, the clock will display time out to 1/100th of a second. Hence, time will literally fly by before the participants' eyes. In the low time pressure condition, the clock will display time out to only one second. Although the same amount of time passes in each condition, the perception of time pressure is expected to be greater when participants can see each 1/100th of a second rushing by. This operationalization of time pressure and the duration of 5 seconds will also be pilot tested.

Analysis of Videotapes

Two raters who are unaware of the hypotheses will independently rate the videotape for each auction. They will view two segments of the bidding – the first 15 seconds and the last 15 seconds of the auctions. The length of these segments may be altered depending the overall duration of auctions. On 7-point scales, raters will rate bidders on their levels of arousal, (focusing on anxiety, stress, distress, and excitement) and how actively they are bidding. Interrater reliability will be checked. From Figure 2, since competition and time pressure

naturally increase as auctions proceed, these ratings will allow for comparisons across conditions to ensure that the actual competition and time pressure manipulations were effective.

Experiment 2 – Framing and Competitive Arousal

Framing and Risk-Taking

An alternate explanation to potential findings from Experiment 1 is risk-taking as a result of framing. Hence, Experiment 2 examines framing from prospect theory as an alternative explanation of auction fever. Kahneman and Tversky (1979) proposed a value function that represented values as gains or losses (rather than final assets), that is concave for gains and convex for losses, and where the slope is steeper for losses than for gains. According to prospect theory, when we evaluate choices, "losses loom larger than gains" (Kahneman & Tversky, 1979, p. 279). Prospect theory suggests that objectively identical outcomes will be seen as positive or negative in relation to a fixed, neutral reference point. Positive variations from the neutral point can be seen as gains and negative variations from the neutral point can be seen as losses (Kahneman & Tversky, 1979; Tversky & Kahneman, 1982).

For instance, suppose a person has lost $140 at the racetrack and is considering betting $10 on a 15:1 long shot in the last race. This decision can be framed in two ways. If the status quo is the reference point, then the outcomes of the bet can be framed as a gain of $140 or a loss of $10. In contrast, if the reference point is the current loss of $140, then the bet can be framed as either a return to the neutral point or a loss of $150. When outcomes are framed in the latter fashion, risk-seeking behavior will be more common. This results because the shape of the value function is steeper for losses, that is, avoiding losses is more valuable than achieving comparable

gains (Tversky & Kahneman, 1982). Hence when an outcome is framed positively as a gain, individuals tend to be risk averse. In contrast, when outcomes are framed negatively as a loss, individuals tend to be risk seeking. Framing and its effects on risk-seeking and risk-aversive behavior have been replicated in many different settings (e.g., Bazerman, Magliozzi, & Neale, 1985; Kahneman & Tversky, 1979; Slovic, Fischhoff, & Lichtenstein, 1982; Tversky & Kahneman, 1982).

Framing and Auction Fever

Framing may also affect bidders' behavior in auctions. As a result, any potential findings from Experiment 1 can be interpreted in an alternate manner. For instance, if the auction is seen as a loss, risk-seeking behavior will be prevalent and bidders will continue bidding in an attempt not to lose. In contrast, if the auction is seen as a gain or win, then risk-aversive behavior will be prevalent and bidders will be less likely to continue bidding. Hence, if bidders think to themselves, "I'm going to lose this if I don't bid on it!" they will bid more aggressively. With this is in mind, one cause of auction fever is the framing of an auction, which can occur at the level of the individual or at the level of the auction. In the former case, a single individual (or several individuals) might frame the auction as a loss (as in the above example). Also, if auctioneers are trying to push the final price of items up, they might frame auctions as losses in an attempt to increase risk-seeking behavior in all the bidders. For instance, an auctioneer may make statements like, "If you don't want to lose the cow, you will have to raise your bids to $5,000!" This study does not differentiate between these two forms of framing and will utilize a frame applied by the auctioneer to test the relationship between framing and auction fever.

Hypothesis 7: When the auction is framed negatively rather than positively, participants will exhibit higher levels of arousal, and will bid over their limits more often and by greater amounts.

Risk-Taking and Competitive Arousal

A pertinent theoretical question is whether competitive arousal will be better able to explain auction fever than will framing and risk-taking. Auction fever, by its very name, is not a completely cognitive phenomenon. Individuals who are caught up in auction fever do not think strategically and methodically; instead, they are emotionally stimulated. In contrast, just as the escalation of model was considered by Malhotra and Murnighan (2000)to have a more cognitive tone, framing is also primarily a cognitive phenomenon. Hence, given the intrinsic nature of auction fever, competitive arousal should provide a better explanation of auction fever than framing and risk-taking.

Hypothesis 8: Relative to positive or negative framing, participants perceiving high competitive arousal will exhibit higher levels of arousal, and will bid over their limits more often and by greater amounts.

It is also relevant to question the interaction of positive and negative frames with competitive arousal. If prospect theory and competitive arousal can exist side by side and have an 'additive' effect, then auction fever will most likely occur when an auction is high in competitive arousal and is negatively framed.

Hypothesis 9a: Participants perceiving high levels of competitive arousal and a negative frame will exhibit the highest levels of arousal, and will bid over their limits the most often and by the greatest amounts.

In contrast, because auction fever is primarily an affective phenomenon while framing is primarily a cognitive phenomenon, prospect theory and competitive arousal may not be 'additive.' Dunegan (1993) looked at the cognitive modes that framing elicits and concluded that negative framing was associated with more controlled processing while positive framing was associated with more automatic cognitive modes. Hence, contrary to Hypothesis 9a, it is possible that auction fever will be greatest when competition, time pressure, and a positive frame are employed.

Hypothesis 9b: Participants perceiving high levels of competitive arousal and a positive frame will exhibit the highest levels of arousal, and will bid over their limits the most often and by the greatest amounts.

To test these hypotheses, framing and risk-taking behavior are compared with competitive arousal in Experiment 2. Only English auctions will be employed since they are more commonly used than Dutch auctions.

Design

A 2 (high competitive arousal versus low competitive arousal) x 3 (negative framing versus positive framing versus neutral framing) factorial design will be used. Competitive

arousal will be collapsed into one manipulation where high competitive arousal will consist of high competition (i.e., bidding in an open room, referring to the task as "competitive bidding," and the subsequent competitive group task cover story) and high time pressure (i.e., clock reading time down to 1/100th of a second).

Participants

As before, participants will be male and female undergraduates from Northwestern University. Approximately 20 participants will be recruited for each cell, leading to a total of 120.

Materials and Procedure

The same materials and procedure as in Experiment 1 will be used. Additionally, a framing manipulation will be introduced after half of the participants fill out the pretest questionnaire.

Framing manipulation. The experimenter will introduce the framing manipulation by making statements referring to the auction in win or lose or neutral terms. After the pretest questionnaire, in the gain frame condition, the experimenter will casually mention, "Just so that you know, other participants have found it helpful to keep in mind that you need to bid enough to win." However, in the lose condition, the experimenter will say, "Just so that you know, other participants have found it helpful to keep in mind that you need to bid enough not to lose." In the neutral condition, the experimenter will make the same statement without reference to winning or losing. Additionally, during the auction, the experimenter will incorporate short statements of winning or losing into the bid announcement. For instance, the experimenter

would say, "Anyone for $5.00? Keep in mind that you need to bid enough to win (not to lose)." The experimenter will make similar statements in the neutral condition, but will refrain from making any references to winning or losing.

Discussion

Hence, Experiment 1 will look at the roles of competition and time pressure in understanding auction fever. Additionally, the revenue equivalence of Dutch and English auctions will be examined. Experiment 2 will analyze framing and risk-taking as an alternative explanation of auction fever. Findings from these two experiments will shed light on how bidders react to different situations – competition, time pressure, and framing. A greater understanding of how bidders behave will benefit both auctioneers and bidders. As an increasing number of online organizations are setting up auction sites (e.g., in conjunction with eBay, entertainment-giant Disney just established an auction site in Fall 2000), it is important for these auction sites to understand not only the economic but also psychological ramifications of particular auction formats and mechanisms. For instance, an auctioneer trying to design an auction to generate the highest revenues might be tempted to increase competition and time pressure or to frame the auction in terms of loss. A bidder who does not want to fall prey to auction fever may have to learn to stay clear of fast-paced auctions where competition is high. Another possibility is for the bidders to learn how to stay focused and think clearly. Since bidding is fundamentally a decision-making process, the findings will also provide valuable insights into how situations high in competition and time pressure affect decision-making processes in general.

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Appendix A. Pretest Questionnaire for Experiments 1 and 2

1) How much do you think the lottery ticket is worth? _____

2) How much do you think the grand prize is worth? _____

3) Have you set a limit for yourself on how much you are going to bid?

   Yes No (please circle one) If yes, what is the limit? _____

4) With regards to the auction you are soon to participate in, (please mark a number on each of the scales):

   a. How confident are you?

   1 2 3 4 5 6 7

   Not at all Extremely

   b. How hurried are you?

   1 2 3 4 5 6 7

   Not at all Extremely

   c. How aware are you of the other bidders?

   1 2 3 4 5 6 7

   Not at all Extremely

   d. How anxious are you?

   1 2 3 4 5 6 7

   Not at all Extremely

5) Are you thinking of the auction as (please mark a number on each of the scales):

   a. An opportunity to make some money by participating in an experiment

   1 2 3 4 5 6 7

   Not at all Very much so

b. An opportunity where you could win the lottery ticket

1	2	3	4	5	6	7
Not at all						Very much so

c. An opportunity where you could lose the lottery ticket

1	2	3	4	5	6	7
Not at all						Very much so

d. An everyday decision

1	2	3	4	5	6	7
Not at all						Very much so

e. A competition among you and the other bidders

1	2	3	4	5	6	7
Not at all						Very much so

f. A contribution to social science

1	2	3	4	5	6	7
Not at all						Very much so

6) How much do you think the others will affect your bidding?

1	2	3	4	5	6	7
Not at all						A lot

a. If so, how so? _____

7) Do you have any prior experience with auctions?

1	2	3	4	5	6	7
Not at all						A lot

a. If so, what kinds of auctions? _____

Appendix B. Posttest Questionnaire for Experiments 1 and 2

1) How much do you think the lottery ticket is worth? _____

2) How much do you think the grand prize is worth? _____

3) Did you set a limit for yourself ahead of time on how much you were going to bid?

Yes No (please circle one) If yes, what was the limit? _____

4) In the end, what was your highest bid? _____

5) Did you win the lottery ticket? _____

6) Did you bid more than your original limit in the auction? Can you explain why or why not?

_____

_____

If you bid more than your limit, approximately when did this happen? _____

7) Toward the end of the auction, (please mark a number on each of the scales):

a. How confident were you?

1 2 3 4 5 6 7

Not at all Extremely

b. How hurried were you?

1 2 3 4 5 6 7

Not at all Extremely

c. How patient were you?

1 2 3 4 5 6 7

Not at all Extremely

d. How aware were you of the other bidders?

1 2 3 4 5 6 7

Not at all Extremely

e. How anxious were you?

1 2 3 4 5 6 7

Not at all Extremely

8) Did you think of the auction as (please mark a number on each of the scales):

a. An opportunity to make some money by participating in an experiment

1 2 3 4 5 6 7

Not at all Very much so

b. An opportunity where you could win the lottery ticket

1 2 3 4 5 6 7

Not at all Very much so

c. An opportunity where you could lose the lottery ticket

1 2 3 4 5 6 7

Not at all Very much so

d. An everyday decision

1 2 3 4 5 6 7

Not at all Very much so

e. A competition among you and the other bidders

1 2 3 4 5 6 7

Not at all Very much so

f. A contribution to social science

1 2 3 4 5 6 7

Not at all Very much so

9) After the auction was over, did you feel (please mark a number on each of the scales):

a. Relieved?

1 2 3 4 5 6 7

Not at all Very much so

b. Happy?

1 2 3 4 5 6 7

Not at all Very much so

c. Satisfied?

1 2 3 4 5 6 7

Not at all Very much so

d. Frustrated?

1 2 3 4 5 6 7

Not at all Very much so

e. Better than before the bidding?

1 2 3 4 5 6 7

Not at all Very much so

10) Did you have sufficient time to think about your bidding?

1 2 3 4 5 6 7

Not at all Plenty of time

11) Do you have any regrets about the auction?

1	2	3	4	5	6	7
Not at all						Many regrets

12) If you could change something about your actions (i.e., your strategy in some way), what, if anything, would you change?

_____

_____

13) How much did the others affect your bidding?

If so, how so? _____

14) Age _____

15) Sex _____

16) Do you have any prior experience with auctions?

If so, what kinds of auctions? _____

Figure Captions

Figure 1. Auction Fever as a Result of Competitive Arousal (Competition and Time Pressure)

Figure 2. A Model of the Effects of Competition and Time Pressure on Decision-Making (Malhotra & Murnighan, 2000)

Figure 1. In bidding situations, rivalry, social facilitation, and time pressure produce increased arousal in the bidder. This increased arousal leads to reliance on dominant learned responses and impaired cognition. As a result, the individual keeps bidding.

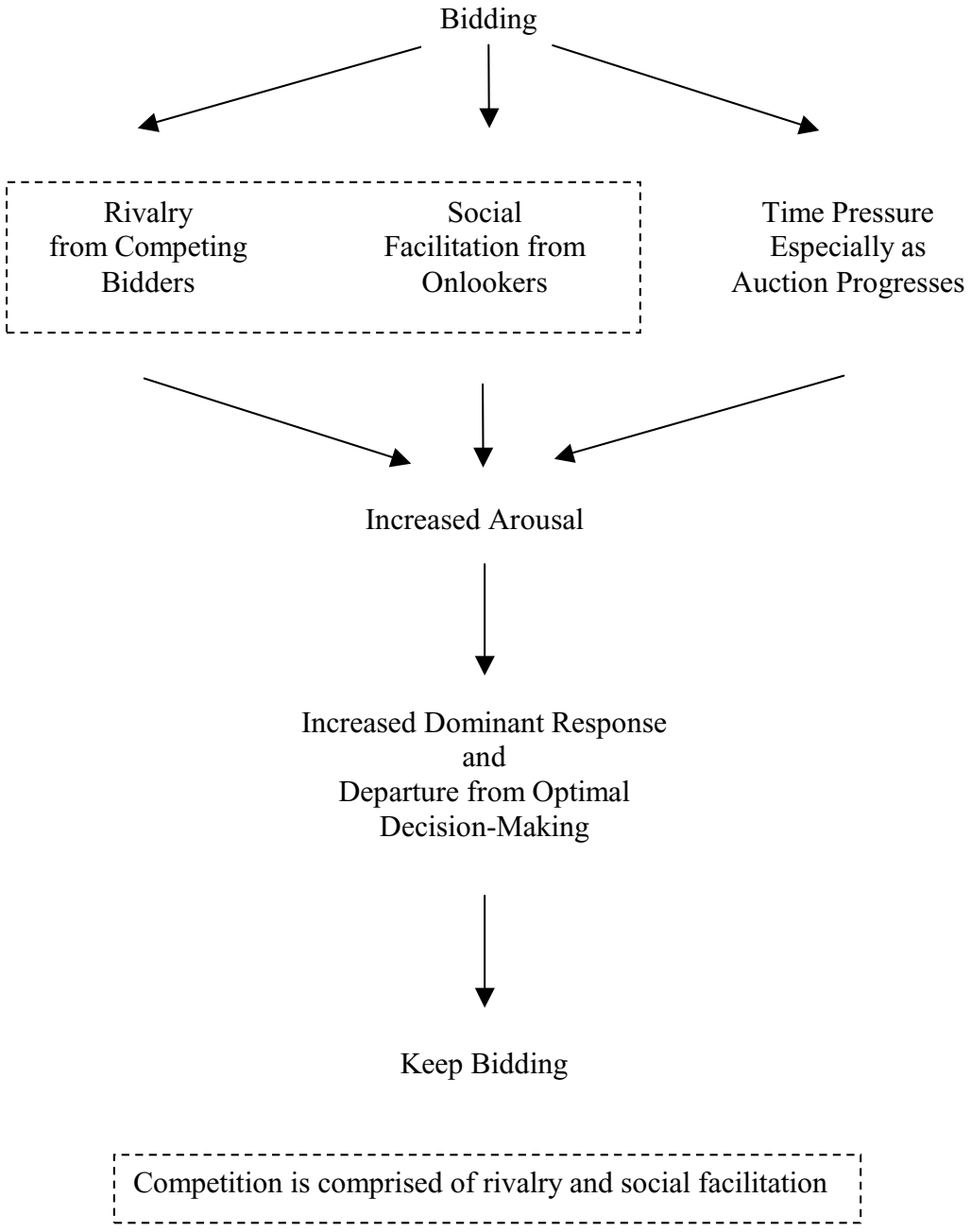
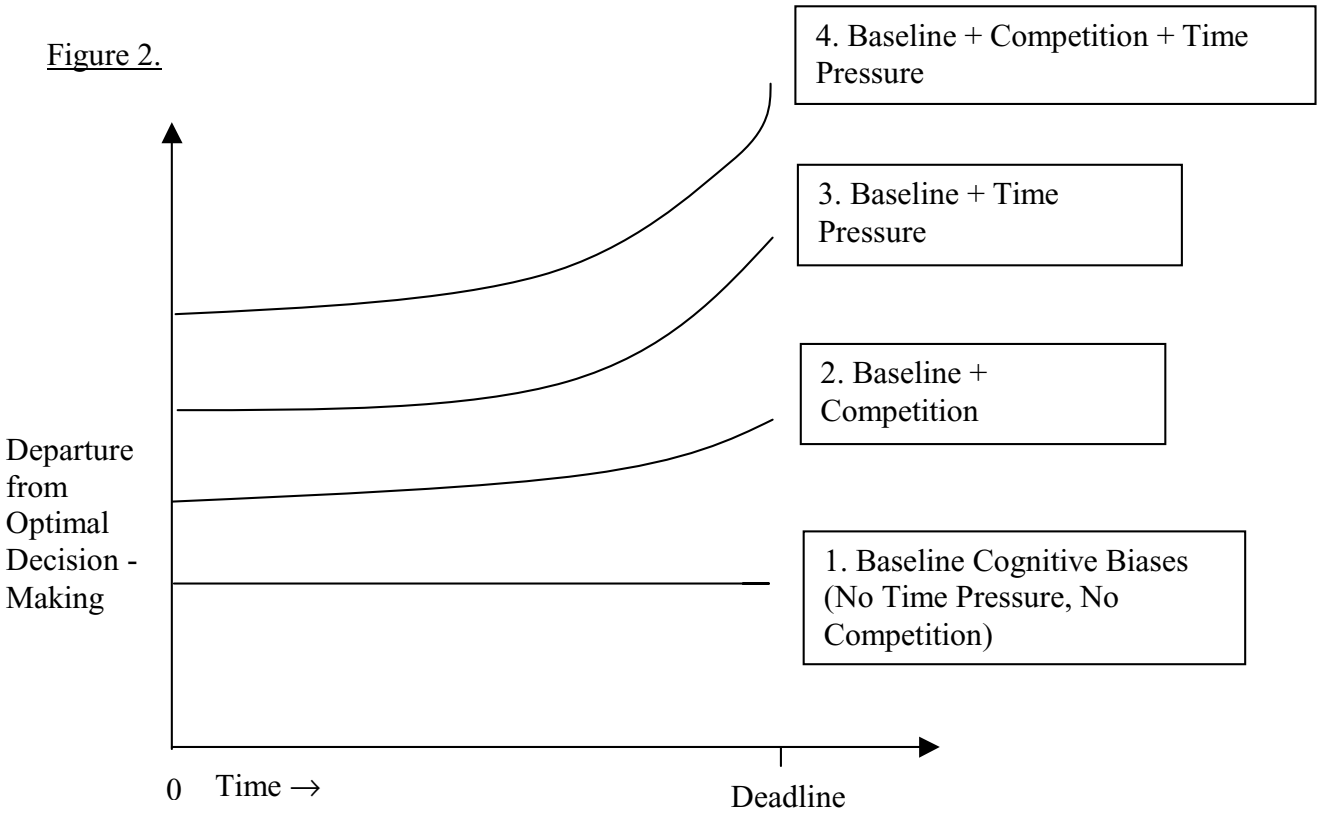


Figure 2.



1. Baseline Level of Cognitive Biases. Baseline level of undetected cognitive biases. No change in departures from optimal decision-making as deadline approaches.
2. Baseline plus Effects of Competition. Departures from optimal decision-making generally higher than baseline. Slight effect of deadline.
3. Baseline plus Effects of Time Pressure. Departures from optimal decision-making rise exponentially as deadline approaches.
4. Baseline plus Competition plus Time Pressure. Effects of time pressure and competition combine for greatest departure from optimal decision-making. Extreme departure as deadline approaches.