Internet Auctions and Time –

Does the Race Against Minute Limits Influence the Auction Outcome?

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Abstract

Internet based auctions have become popular and has become a forum for both rational and emotional driven decisions to buy or not to buy. This study focus the analysis on if and to what extent the auction time might influence the final, price winning, bid. The auctions showed a relative value increase as the time frame for the auction decreased. At the same time there was no significant difference between the numbers of bids in short relative to long auctions that could explain the increase in value. The result is discussed in terms of how time might influence, positively or negatively, economic rationality.

Keywords: Internet, Auctions, winning bid, time, emotions.

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1 Introduction

Imagine that you are sitting in front of the screen; a clammy finger is raised in order to place a bid which you hope will be the final one in the auction. However, if somebody stopped to tell you that the price you will pay in the auction is dependent on whether the duration of the auction is long or short – would you still place the bid? Online auctions have received considerable attention as a new context for doing business. While it may have been assumed that consumers would make rational decisions in internet auctions, research shows that this is not the case (Spann and Tellis, 2006). Purchasing in auctions is surrounded by emotion-laden processes likely to elicit non-rational economic behavior (Smith, 1989). A primary objective of consumer studies is to gain knowledge in the ways in which individuals evaluate events in relation to purchasing commodities or services. Therefore this article addresses patterns of price in relation to temporality as well as exploring and contrasting findings against a backdrop of rationality and affective influences.

EBay alone accounts for more than 12.5 million auctions per day in the global marketplace (Peters and Bodkin 2006). The foundations of decision making in an auction context are argued to be somewhat different from contexts of both off and online retailing. Standifird (2001) claimed that the payment and delivery of products rarely occur simultaneously in online auctions as opposed to regular retail settings. Where a product is offered by a retailer the price is usually fixed while the auctioneers "negotiate" a price by placing bids. Another difference is that the auction setting shows time discounting, offering a clearly stated point in time when the bidding ends. In comparison to an offline retailer offering a physical display of the product, online retailers have used comprehensive product information including images and detailed specifications of products in order to reduce perceived risk (Flanagin, 2007, Park, Lennon and Stoel, 2005). However the bidder is left with no other "on stage" signal than the bid as a means for communication to other potential bidders.

The auction setting offers a situation where continuous judgments escalate into a decision. Thus it is hard to determine exactly where a final decision of purchasing is being made. Therefore the concept of decision making will be treated as the process ranging from placing the first bid until the final bid is placed in the auction. Increasing the resolution of the decision making process would possibly unveil specific decision strategies associated to specific stages of the auction process. Furthermore,

due to temporal and geographical dispersion of bidders in online auctions, it is difficult to research emotional influences on decision making through means other than experiments. However, variables deriving from secondary data may be used as proxies for emotional influences in decision making. Imposing a construal framework highlights time as an important factor when bidding. Two different modes can be identified in the auction setting; more specifically decision making when one is far away from a deadline as well as when one is close to one. Therefore it is interesting to study proxies for construal processes as affecting the bidding process.

This paper is organized as follows. First, we briefly address different views of rationality. Second we elaborate on decision making by paying special attention to the intersection of temporal construal theory, affect and online auctions. Third, we account for methods, procedures and results with accompanying limitations. Fourth and finally we discuss and conclude our findings prior to suggestions for new directions of research.

1.1 Views of Rationality

Rationality has many times been dichotomized to emotions. Such a dichotomy, however, is just as hard to accomplish as it is to capture rationality as a single concept. There may different types of rationality. Pham (2007) claimed rational decisions to be either logic, material or ecological. The logical aspect of rationality encloses matters of making transitive judgments, meaning that if A is preferred to B and B is preferred to C, then A should be preferred to C. The material aspect refers to that the individual should be consistent between decisions and actions in relation to objectives and self interests. In other words, it means complying with traditional economic theorizing where courses of actions maximize the individual utility (such as paying the lowest price possible for equivalent products). Finally, ecological rationality refers to behaviors which need not necessarily comply with logical standards or serve material self interest. This type of rationality is when the individual meets higher moral standards which can deviate from serving material self interest (Pham, 2007). When it comes to rationality, logical and material aspects are argued to be most likely to be seen in conjunction with the decision process in this paper.

1.2 The Distinction of Cognition and Emotion in Decision Making.

Traditional decision research has mainly viewed decision making as a cognition-expectation-based calculus, emphasizing little on affect (Loewenstein et al. 2001). Making decisions under influence of affect has been considered not to have the same unified output mode as rational decision making does. However the last decade has differentiated the debate rendering a difference between affective-based and cognitive-based processes, labeling them as “hot” and “cold” processes (Metcalfe and Mischel, 1999, Loewenstein et al. 2001, Peters et al. 2006).

Online auctions are assumed to be multistage decision processes, enclosing examples of escalation, endowment and self perception, in turn raising potential emotional reactions and increased competitive behavior (Ariely and Simonson, 2003). Theories of judgment and decision making are indicative of dual decision making modes, emphasizing different mind frames at certain stages of a decision. Therefore different attributes of decision making are argued to be weighted more at times and less at other times. For instance, Metcalfe and Mischel (1999) proposed a dual system framework, where a cold cognitive “know” and a hot emotional “go” system deals differently with situations involving willpower. The “cold” system is the seat of “cognitive, emotionally neutral, contemplative, flexible, integrated, coherent, spatiotemporal, slow, episodic, and strategic” processing while the “hot” system is “emotionality, fears as well as passions–impulsive and reflexive, initially controlled by innate releasing stimuli (and, thus, literally under "stimulus control"); it is fundamental for emotional (classical) conditioning and undermines efforts at self-control” (Metcalfe and Mischel, 1999.p. 3). Additionally, Kahneman’s (2003) work could be seen as a backbone for describing cognitive processing but also describing a situation where affect influences decision making. A reason based system leans towards cognitive characteristics which are slow, serial, effortful, rule-governed, flexible and neutral. When it comes to content of the information, the system relies on conceptual representations as a main source. The other system is an intuitive system, which encompass processes that are characterized by fast, parallel, automatic, effortless, associative, slow-learning and emotional processing. The intuitive system relies on both conceptual representations as well as more stimulus bound resources, which further indicates that system two involves deeper processing of information.

Although the distinction between emotion and cognition is likely to be oversimplified it earns acknowledgement and has been widely acknowledged in a range of research programs. To mention a few; associative system versus rule-based system (Sloman, 1996), non-verbal processes versus verbal processes (Paivio, 1986), reflexive system versus reflective system (Lieberman, Gaunt, Gilbert, and Trope, 2002), experiential system versus rational system (Epstein, 1994), and the approach/avoidance versus true/false distinction (Zajonc 1998, p. 591). The duality, on the one side cognition and the other side emotion, leads to consequences when matched with rationality/irrationality. Using broad brush-strokes, cognition based systems (represented as cognitive calculus, forward looking, self-controlled and value maximizing) seem to conform to Pham's (2007) definitions of logical and material rationality. Somewhat contrary to this, the myopic, transitory, lack of self-control, hot and cold differential seems to comply with matters of irrationality. Another vein of research has shown transitivity (and thus logical rationality) to be a part of the emotional system (Lee, Amir, Ariely, 2006). According to evolutionary psychologists emotions activate, mobilize and coordinate mental processes, goals, perceptual mechanisms, memory, attention, emotional expressions as well as physiology to solve the problem (Cosmides and Tooby, 2000). Consequently, the emotional system may be suitably adjusted to consistently and accurately uphold preference consistency (transitivity). Indeed, experiments where manipulation of the visual form of a choice stimuli, the state of the decision maker and goal of the task was manipulated showed more transitivity when presented in an affective condition (pictures in comparison to names) when decision where made under higher versus lower cognitive load as well as when they based their decisions under hedonic preferences compared to price or popularity (Lee, Amir, Ariely, 2006). Therefore, this vein of research suggests that, certain aspects of rationality may be fulfilled even under affective influence.

In addition to the distinction between the cognition/emotion dual theories of judgment and decision making are also implicitly related to temporality. Furthermore none of the suggested models deals explicitly with temporality for future decisions, which is an essential characteristic for online auctions. Such a discussion is developed below.

1.3 Perceived Time, a Distance Dimension and Determinant of outcome Online Auctions

Auctions involve making judgments about the future. Should I place a bet now or should I wait until later? Auctions have an impending deadline-being at initial stages of the auction means having a larger window of time for making decisions in comparison to entering an auction at a later stage. Trope and Liberman (2003) claim that distance dimensions affect how we mentally represent events. Several different types of distance dimensions could be argued to affect construal of events. For instance, spatial distance may be controlled by moving closer or further away from an object. Social relations may be controlled similarly whereas temporal distance is uncontrollable due to the impossibility of affecting time. In relation to online auctions spatial construals are difficult to facilitate considering that the purchasing is represented electronically via a computer. Social distance construals could be affected if the buyer and seller establish contact through emails. However, temporal construals are also likely to affect the process considering they are always present and hard to affect. Trope and Liberman (2003) claim individuals to construe mental representations of events differently depending on their temporal horizon. Events that are considered to take place closer in time share characteristics that differ in comparison to events in a more distant future. The differentiation is according to high and low-level construal. High-level construals refer to temporally distant events of the future while low-level construals refer to events closer in time in the future.

> "*…High-level construals are relative simple, decontextualized representations that extract the very gist from the available information. These construals consist of general, superordinate, and essential features of events. A defining characteristic of high-level construal features is that changes in these features produce major changes in the meaning of the event. Low-level construals tend to be more concrete and include subordinate, contextual, and incidental features of events. Changes in these features produce relatively minor changes in the meaning of the event. Low-level construals are thus richer and more detailed but less structured and parsimonious than high-level construals…*"Trope and Lieberman, 2003. p. 405.

Trope and Lieberman (2003) state temporal construal as a generalized heuristic. Details about low-level information (such as concrete and subordinate features of events) in a distant future are typically not reliable or may even be unavailable. In this case, being at an initial stage in an auction would reveal less detail. As one is temporally closing in on an event, the resolution will increase, revealing more detailed and contextualized information (for instance bids,proxies of value, indicating the general interest from buyers). Judgments in auctions are also somewhat related to goal directed behavior. Thus distinctions between desirability (the value of the end state of an action, implicitly implying a focus on a why aspect) and feasibility (implicitly implying means of getting there, in other words a how aspect) are aspects needed to be taken in consideration. Temporal construal theory propose that desirability concerns would increase when there is a vast temporal horizon whereas feasibility concerns increase as one is projecting the near future (Liberman and Trope, 1998).

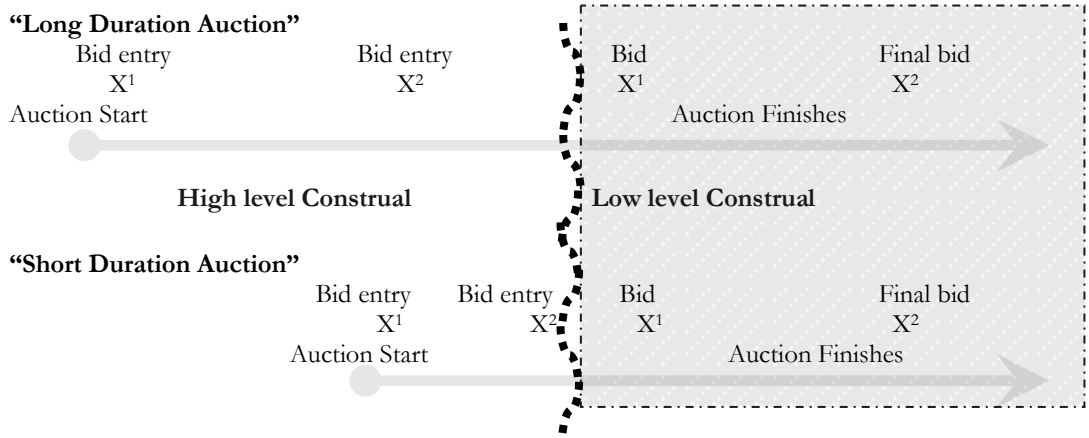
If a near future is characterized as more complex, concrete, unstructured, contextual, surface, subordinate and goal irrelevant information it will put higher cognitive demands on the individual as one is getting closer to a deadline (cf. compare weighing information from bidding patterns). In other words, feasibility concerns are weighted more as one is getting close to a deadline. When complexity increases the need for heuristics become more prominent and affective influence on decisions are argued to be present in situations of heuristic processing and substantive processing, when individuals use selective, constructive processing to integrate available information with preexisting and affectively primed knowledge structures (Forgas, 1995; 2004).

In conjunction to emotional judgments, affective outcomes have demonstrated steeper time discounting than cognitive outcomes (Loewenstein et al. 2001, Loewenstein, 1996). Somewhat contrary to Trope and Liberman (2003) this means, the larger the temporal distance to an event the more reliance on cognitive outcomes in question of determining value of an option. In contrast, the closer one is to a deadline the more reliance on affective outcomes. Similar findings have been shown when processing resources have been limited, favoring an affective choice on the behalf of a cognitive one (Shiv and Fedorikhin, 1999). Furthermore Loewenstein et al. (2001) implies that affective outcomes appear

more frequent as time is discounting which would increase reliance on affect close to a deadline in online auctions.

Figure 1 provides an overview of the online auction setting. Comparing auctions in terms of duration will provide differences of high/low level construals associated with the auctions. Auctions with a large window of time would provide a situation holding both high and low level construals while auctions with relative short duration will hold a relatively larger proportion of low level construal. Thus, the probability of auctioneers being under affective influence is greater in shorter auctions (the shaded area).

Figure 1. An overview of the online auction setting.



In summation, one may also argue that if the duration of the auction is long, bidders would have the possibility of placing more bids in comparison to auctions with short duration- making the price to escalate accordingly. Therefore it is important to investigate whether there is a difference between bids and bidders related to the duration of the auction. Since every new bid has to be higher than the former a significant result would indicate the bidding frequency to be related to the value. We test the following two hypotheses: That the number of bids in auctions are equal for long as well as for short auctions and the number of bidders in auctions are equal for long as well as for short auctions.

Furthermore, when buying an abstract product/service which involve constructive processing (such as a trip, gift voucher or concert ticket) a tension view arises. In an auction with a wide time window (high level construal) it is easier to comply with logical and material rationality due to the fact

that cognitive organization, when weighing alternatives, is superordinate and structured. The cognitive workload would therefore be less.

Contrastingly, in auctions with a more narrow time window; information is considered as more complex (Trope and Liberman, 2003), feasibility concerns increase, (Trope and Liberman, 1998) making individuals likely to use heuristic processing which in turn emphasize reliance on affective material (Forgas, 1995; 2004). In addition, affective outcomes are not only argued to be more frequent as time is discounting, but also reliance on affect close to a deadline is more evident (Loewenstein et al. 2001, Loewenstein, 1996). In all situations, when the time window is narrow it gets harder to weigh alternatives against each other due to a reliance on affective material, possibly violating Pham's (2007) definition of logical and material rationality. However, Lee, Amir and Ariely (2006) experimentally showed that when using emotional processing, logical rationality (transitivity) was maintained, thus providing a tension view of the influence of affective material in relation to time.

Although not directly tested, bidders are assessed through proxies of value (the requested price divided by the final bid) in order to see if material rationality is violated (it would not make sense to pay relatively more for similar products dependent on whether the auction duration is long or short). The proxy would be mirrored in a relatively higher price (value) for a short duration as opposed to long duration auction. The final hypothesis is thus that the final bid is independent on the predetermined time frame of the auction.

2 Method

2.1 Procedure

Ebay/ Tradera is an English type of auction, the highest bid wins. Electronic auctions seem to offer ways of obtaining secondary data. The information displayed on the website is the same for everyone- providing a homogenous baseline. Data come from logging online auctions[1]. Two different types of purchases were monitored- gift-vouchers and concert tickets.

The overarching reason for choosing gift vouchers and concert tickets were that a final price could be compared against a benchmark price, a requested price, signaling the value of the object. In

[1] The auctions observed were www.tradera.com in Sweden and www.ebay.com in Scotland.

terms of gift vouchers, only auctions showing a requested price in the headline or description field were included for analysis. Similarly, only concert tickets with a stated price in the headline or in the description field were included for analysis. Furthermore, for inclusion, auctions need to reveal an individual seller, not being a company or an organization.

A total of 178 auctions were gathered (70 gift vouchers and 108 concert tickets). The complete dataset was then pre-analyzed, revealing a number of auctions with few bidders. Auctions containing few bidders are suspected to reveal modest interest by buyers, in other words a lack of affective bidding. Auctions within each object category were labeled as either long or short according to their distribution of a median split. In order to put focus on the bidding process the duration of the auctions were calculated as the difference between the first bid and the final bid. Therefore auctions with fewer than 5 bidders were excluded. In total, 119 auctions remained for analysis (51 gift vouchers and 68 concert tickets). Four different variables were used from the auctions; the *number of bids* (since bidders usually place more than one bid) the *number of unique bidders, duration* of the bidding frequency (the difference between the first and the final bid) as well as the *value* of the purchases (the requested price divided by the final bid) were calculated.

3 Results

Descriptive statistics of the used variables are shown in Table 1.

Table 1. Number of auctions, mean of number of bids, mean of unique bidders, mean duration and value in respective object category.

	Number of auctions	Average number of bids per auction	Average number of unique bidders per auction	Average duration of auctions in minutes	Price/Face value
Gift vouchers	51	16.00	8.16	9396.29	0.76
Concert tickets	68	16.42	6.84	7352.95	3.08
Total	119	16.24	7.40	8228.67	1.76

Bearing the two initial hypotheses in mind, the number of bids and unique bidders as eventually being dependent on whether auctions have long or short duration, we tested using 95% confidence

intervals, the eventual presence of a difference between means for long auctions (58 auctions) and short auctions (61 auctions).

The first hypothesis concerned the number of bids per auction where the null hypothesis assumed no difference in the number of bids per auction between the long auctions and the short auctions. The alternative hypothesis is that the average number of bids would presumably be higher for the long auctions due to the extended time frame. The first row in Table 2 reveals that a 95% confidence interval for the difference in means that we cannot exclude that zero might be the true value of the difference. We cannot reject the hypothesis that the number of bids in long and short auctions is equal.

Table 2. Test of mean difference

	Long (58)	**Short (61)**			**95% confidence limits**	
	Mean	**Mean**	**Mean difference**	**Standard error of difference**	**Lower**	**Upper**
Bids per auction	16.683	15.797	0.8867	1.2843	-1.66	3.43
Unique bidders per auction	7.017	7.797	-0.7799	0.4461	-1.66	0.10

The next hypothesis concerned the number of unique bidders per auction and the null hypothesis assumed no difference in the average number of unique bidders per auction. The alternative hypothesis is here that the number of unique bidders will increase with the time frame due to the longer availability of the auction. However, as the second row of Table 2 reveals, we cannot reject the hypothesis that the number of unique bidders in long and short auctions is equal.

Consequently, the material does not imply that the time frame of the auction has any implication for the number of bids per auction or the number of unique bidders per auction. The question at this point is then whether the outcome of each auction, the final value, depends on the time frame of the auction which brings us to the third hypothesis.

The last hypothesis assumes that the winning bid is independent of the time frame of the auction, with the alternative hypothesis assuming that the winning bid will increase as the time frame decreases. This hypothesis is tested with ordinary least square method. The model being used is:

$$B = AT^{\alpha}V^{\beta}D^{\gamma} \quad (1)$$

in which B is the winning bid, T is the auction time in minutes, V is the face value of object and D is a dummy variable separating the objects, tickets and gift vouchers and A is a constant. The parameters α, β and γ are to be estimated. We are using a non-linear constant elasticity model since we then can interpret primarily the parameter α in relative terms, i.e. the term α will describe how many percent the bid will change as a response to a one percent change in the auction time. Following the hypothesis that a shorter auction time increases the winning bid leads to an assumption that α will be a negative number.

The two other variables are included as control variables. The data covers two different objects, concert tickets and gift vouchers which will be handled by the dummy variable D. A positive value of γ will mean that concert tickets are on average valued more than gift vouchers given the same face value.

The other control variable, face value (V), is included to handle the different face values that tickets and gift vouchers have originally. Since a higher face value most certainly will render a higher winning bid we have to control for this. The result of this is that α describes the percentage change in winning bid for each percentage change in auction time given a certain face value.

We take the logarithms of all variables in equation (1) in order to make the equation linear:

$$\ln(B) = \ln(A) + \alpha \ln(T) + \beta \ln(V) + \gamma \ln(D) \quad (2)$$

The parameters of equation (2) can be estimated using observed values of B, T, V and D using linear regression technique. In our estimation we have used 119 observations, 51 regarding gift vouchers and 68 regarding concert tickets. We have observed the face value of all the objects, the respective winning bid and the time frame in minutes of the auction. The regression result from equation (2) is summarized in Table 3.

Table 3. Regression result

Variable	Estimated coefficient	t-ratio
Constant (A)	1.7	3.1
Time (α)	-0.12	-1.9
Value (β)	0.88	21.9
Dummy (γ)	1.23	5.85

The correlation coefficient was 0.94 and the coefficient of determination turned out to be 0.88, i.e. we can with the help of the variation in time, face value and object type explain 88% of the variation in the winning bids. Only 12% of the variation in the winning bids remain thus unexplained.

The result summarized in Table 3 is as expected and leads to a rejection of the null hypothesis in favor of the alternative hypothesis; the final value of the auction increases as the auction time gets shorter.

Firstly the value sensitivity is close to unity (0.88) which means that if the face value increases by one percent, the winning bid increase on average by 0.88 percent. The coefficient for the dummy variable is also positive indicating (or actually confirming) that the gift vouchers had a higher on average face value.

The most interesting result is that given any face value and object, the winning bid will decrease by 0.12 percent for every single percent the auction time increases. This means of course also that if the auction time is reduced by 1 percent the average winning bid will increase by 0.12 percent. Given the fact that the estimated parameters are significant on at least 5.5 percent level we reject the hypothesis that the auction time is independent of the level of the the winning bid.

4 Conclusion

In relation to the first two hypotheses no significant difference between either number of bids or the number of unique bidders between long and short auctions were found. Since every new bid contributes to an increasing value, more numerous bids would be expected to be related to an increase in value. For instance, more numerous bids in short auctions would therefore contribute to a difference in value between short and long auctions. Nevertheless, since no significant difference was found we

cannot rule out that the number of bids as being unrelated to the increasing value in the short auctions. Instead, and aligned with the last hypothesis, the winning bid in the auctions surveyed revealed a higher final value as the auction time decreased. Or in other words, the auction time has an adverse effect on the fulfillment of value. Thus it seems as if consumers face difficulties when attaining material rationality (Pham, 2007) since they are prone to pay more for similar products when the time in the auction is short. The results of our research paper have a direct impact on how auctions ought to be conducted.

A seller and organizations administrating auctions within the two product categories identified clearly benefit economically by setting shorter deadlines for auctions. Conversely, a consumer would benefit if the auction is prolonged since a lower price paid is associated with a lengthy auction. Additional implications get visible in terms of regulations to e-auctions and could include a cooling off period for auction winners to be able to withdraw their bid thus accounting for “hot hands” behavior. The face value of the tickets could be made more visible on the website to help cool down bidding behavior.

Further research into the impact of automatic bids on bidding patterns and the final prizes achieved could help assert the ethical nature of such practices as well as identify their role in encouraging affective bidding.

Understanding the intersection of emotion and cognition when doing business is critical to helping firms choose effective marketing strategies and consumers make appropriate consumption decisions. Therefore further research could be conducted in terms of assessing the impact of specific emotions within temporal frames. Since emotions are likely to affect process pattern different emotions would be likely to affect interpretation of information differently dependent on the timeframe. Research could also be conducted in order to identify optimum time periods for auctions of specific product categories.

Further statistical analyses could also reveal thresholds of bidding. Research into the pattern of bid would reveal the nature of the progression of bidding levels. It can be assumed at this point that the increase in bids seen in the research above is a linear function. A theoretical improvement would be to put effort into finding out more specifically where the line between high and low level construal goes.

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