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The desire to win: The effects of competitive arousal on motivation and behavior

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ABSTRACT

The paper theoretically elaborates and empirically investigates the “competitive arousal” model of decision making, which argues that elements of the strategic environment (e.g., head-to-head rivalry and time pressure) can fuel competitive motivations and behavior. Study 1 measures real-time motivations of online auction bidders and finds that the “desire to win” (even when winning is costly and will provide no strategic upside) is heightened when rivalry and time pressure coincide. Study 2 is a field experiment which alters the text of email alerts sent to bidders who have been outbid; the text makes competitive (vs. non-competitive) motivations salient. Making the desire to win salient triggers additional bidding, but only when rivalry and time pressure coincide. Study 3, a laboratory study, demonstrates that the desire to win mediates the effect of rivalry and time pressure on over-bidding.

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Introduction

Competitive behavior, defined as the pursuit of assets perceived to be scarce and contested, is ubiquitous (cf., Deutsch, 1949). In domains as varied as business, politics, sports, and nature, individuals and other entities (e.g., firms) compete for limited resources, status, and survival (Hirshleifer, 1978). Competitive behavior is not only seen as a means by which an individual entity can benefit: in the market setting, it is also a primary mechanism for creating value (Smith, 1776). Despite these advantages, the motivation to compete can sometimes have pernicious effects, e.g., the adoption of unethical strategies like sabotage (Hoffman, Festinger, & Lawrence, 1954; Mui, 1995; Münster, 2007).

Paradoxically, competitive motivations may lead to strategies that harm not only one's adversary, but also oneself (Garcia, Tor, & Gonzalez, 2006; Güth, Schmittberger, & Schwarze, 1982; Ku, Malhotra, & Murnighan, 2005). Ku et al. (2005), for example, found that the desire to beat rival bidders can lead auction participants to pay more than an item is worth to them (cf., Cox, Smith, & Walker, 1992). Likewise, Malhotra, Ku, and Murnighan (2008) suggest that

the desire to “win” can lead disputants to pursue costly litigation even when a less antagonistic strategy would lead to better outcomes. This paper investigates when and why potentially self-damaging competitive motivations and behaviors will emerge.

The motivation to compete and the desire to “win”

即使付出相当大的个人成本，也要最大化相对回报

The motivation to compete often promotes survival and success (Axelrod, 1984). Under certain conditions, however, this naturally occurring motivation can transform into a more narrowly focused pursuit of “winning”—i.e., maximizing relative payoffs even at considerable personal cost (Bazerman, Loewenstein, & White, 1992; Messick & McClintock, 1968). For current purposes, I distinguish between “competitive motivation”, defined as the desire to pursue scarce and contested assets (cf., Deutsch, 1949), and the “desire to win”, defined as a preference for maximizing relative payoffs, even at personal cost. The desire to win requires competitive motivation, but competitive motivation does not require a desire to “win”.

Prior research has not always distinguished these motivations. As a result, some studies include a preference for relative gains in their definition of competitive motivation (e.g., Messick & McClintock, 1968); others are consistent with our approach, arguing that these two motivations are meaningfully distinct (see Griffin-Pierson,

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1990). Mead's (1937, p. 17) studies of competitive behavior allow us to elaborate the distinction as follows: "[Competitive motivation] is oriented towards a goal in which the other competitors for the goal are secondary; [Desire to win] is oriented toward another human being, whose worsening is the primary goal." In auctions, for example, competitive motivation would drive auction participants to continue bidding until they reach their valuation for an item. A desire to win, in contrast, could drive bidders to pay more than an item is worth to deprive a competitor, even when doing so provides no strategic benefit (Rubin, Pruitt, & Kim, 1994).

The desire to win is not necessarily irrational. However, decision makers often exhibit a preference for relative gains even in situations where winning comes at a personal loss with no strategic upside (Malhotra & Bazerman, 2007). Messick and Thorngate (1967), for instance, found that people may pursue relative gains more vigorously than personal gains because they do not like receiving less than referent others. To illustrate the potentially dangerous mindset that many competitors adopt, Brandenburger and Nalebuff (1996) quote Gore Vidal as saying: "It is not enough to succeed. Others must fail." This is the essence of the desire to win.

While the literature on competitive motivation is vast, research that focuses on understanding the seemingly visceral desire to "win at any cost" is scant (cf., Loewenstein, 1996; Rubin et al., 1994). A recent "competitive arousal" model of decision making addresses this issue by identifying some of the conditions that can trigger a desire to win (Ku et al., 2005). This paper develops and substantiates the model by: (a) elaborating the mechanisms that underlie competitive arousal and (b) testing its core predictions.

Prior research on competitive motivation

Early work on competitive behavior focused more on the parameters of competitive (vs. cooperative) situations than on the motivation of individuals (Deutsch, 1949; Maller, 1929; May & Doob, 1937; Mead, 1937). This research identified two basic conditions for a competitive interaction: scarcity and contestation. The focus shifted to motivation with the work on social value orientation (e.g., Messick & McClintock, 1968), which, along with more recent extensions (De Dreu & Boles, 1998; Van Lange, Otten, De Bruin, & Joireman, 1997), largely focuses on individual differences in the propensity to adopt strategies that maximize relative payoffs even at personal cost. Extensions of this work have started to consider whether and when individuals will positively or negatively value others' outcomes, finding that contextual factors (e.g., negotiating over gains vs. losses) can affect the strength of individual preferences for relative payoffs (Loewenstein, Thompson, & Bazerman, 1989; Messick & Sentis, 1985).

Despite the variety of definitions, frameworks, and contexts represented in the literature, research on the motivation to maximize relative payoffs focuses on a single underlying mechanism, social comparison (Festinger, 1954; Garcia & Tor, 2009; Messick & Thorngate, 1967): the preference for maximizing relative payoffs stems from the tendency to judge the "goodness" of one's outcome by comparing it to the outcome of referent others (Thibaut & Kelly, 1959). Accordingly, the research presumes that the preference for relative payoffs pre-exists within the individual, but only manifests itself in behavior when social comparison processes are facilitated, as when the other party's outcome is made visible (e.g., Messick & Thorngate, 1967) or the salience of referent individuals is increased (e.g., Garcia & Tor, 2009).

More recently, it has been argued that a preference for maximizing relative payoffs may develop endogenously in competition—i.e., the desire to win can emerge, or be heightened, during the course of competitive interaction itself. In a variety of competitive contexts (e.g., auctions, negotiations and disputes), individu-

als start with the goal of making wise decisions and maximizing their own payoff, but as the competition unfolds, their motivation shifts towards "beating the other side" (Cooper & Fang, 2008; Delgado, Schotter, Ozbay, & Phelps, 2008; Malhotra et al., 2008). According to Rubin et al. (1994, p. 71): "In the early stages of many conflicts, Party is simply out to do as well as it can for itself, without regard for how well or how poorly Other is doing. . . As conflict escalates, however, Party's simple interest in doing well is supplanted by a clearly competitive objective. Now doing well means outdoing Other."

Ku et al. (2005) suggest that this shift in motivation may result from the emergence of "competitive arousal," an adrenaline-laden emotional state that can arise during competitive interaction (Ku et al., 2005). Their competitive arousal model places special emphasis on two antecedents of competitive arousal: heightened perceptions of rivalry (Allport, 1924) and increasing time pressure (cf., Kerstholt, 1994; Miller, 1960). The current research elaborates upon and evaluates the core premise of the competitive arousal model—that competitive environments can trigger the desire to win, which in turn drives potentially self-defeating competitive behavior. Evidence for this relationship would have tremendous implications for theory (e.g., regarding the nature of competitive motivation, the emergence of preferences for relative gains, and the basis of self-defeating competitive behavior) and practice (e.g., how best to protect against the potentially damaging effects of competitive arousal).

The competitive arousal model

According to the competitive arousal model, the desire to win emerges in a two-step process. First, characteristics of the competitive situation (e.g., rivalry and time pressure) stimulate physiological arousal. Second, arousal pushes motivation away from goal attainment (i.e., the rational pursuit of a scarce and contested asset) toward beating the competition at potentially high cost (cf., Mead, 1937). Here I elaborate on both elements.

The effect of arousal on the desire to win

The competitive arousal model builds on the work by Zillman and his colleagues (e.g., Zillmann & Bryant, 1974; Zillmann, Bryant, Cantor, & Day, 1975) on the effects of arousal on aggression and retaliation. This research demonstrates that elevated physiological arousal, even when triggered exogenously, can intensify hostility and aggression towards a perceived provoker (Zillmann, Katcher, & Milavsky, 1972). Furthermore, when arousal is pronounced, it can crowd out cognitive appraisals that might dampen aggression, such as the consideration of costly personal consequences (Loewenstein, 1996; Zillmann et al., 1972). Consistent with this expectation, Loewenstein, Nagin, and Paternoster (1997) find that physiological arousal leads to particularly aggressive decision making with limited attention to costs and benefits. The competitive arousal model extends this logic to the domain of competitive interactions, where arousal based on rivalry, time pressure, and audience effects can trigger the desire to win (Ku et al., 2005).

Zillmann, Bryant, Cantor, and Day (1975) proposed three mechanisms that explain why physiological arousal crowds out rational considerations (like long-term self-interest). First, arousal narrows the decision maker's focus to a set of salient environmental cues (e.g., repeat bidding by an auction opponent), diminishing the impact of other important but less salient cues (e.g., one's reservation value). Second, arousal triggers a temporary "lack of concern" for the consequences of one's actions, even when these consequences are known and considered. Third, arousal increases hostility because retaliation against a perceived aggressor is often the most

immediately accessible means of achieving a reduction in aversive drive. In competitive contexts such as negotiations, disputes, and auctions, each of these mechanisms can facilitate the desire to win.

The effect of rivalry and time pressure on arousal

Ku et al. (2005) argue that competitive situations typically include a variety of factors that can trigger arousal (e.g., the stakes, the presence of an audience, etc.). The model gives precedence to two factors—perceived rivalry and time pressure—and in particular, their interaction. Following Allport (1924) and Mead (1937), I define rivalry as heightened consciousness of a competitor's role in obstructing goal achievement. Ku et al. (2005) suggest that rivalry is likely to be higher when there are few (rather than many) competitors, and highest in head-to-head competitions where there is one identifiable adversary. This logic is consistent with Zillmann and Bryant (1974), who suggested that arousal is likely to be higher when the provocation can be clearly attributed to the discretionary behavior of an identifiable opponent. In auctions, for example, a bidder is more likely to perceive another party's bid as a personal attack when only one other bidder remains; when many others are bidding, it is less likely that someone's bid will be perceived as a personal affront. The model's second critical factor, time pressure, is defined as the perceived need or desire to make judgments or decisions quickly (Carnevale & Lawler, 1987; Pruitt, 1981). In studies of competitive interactions, time pressure is often operationalized via the imposition of deadlines (Moore, 2004) because these can increase the perceived need to make decisions quickly, especially as the deadline nears (Roth, Murnighan, & Schoumaker, 1988). Wofford (2001) has shown that time pressure increases physiological arousal, and Shiv and Fedorikhin (2002) have found that time pressure increases the role of affect in decision making while decreasing deliberation of decision consequences.

Because rivalry and time pressure are perceptual factors that can vary endogenously during the course of competitive interaction, they are particularly interesting and important to consider. Although many competitors may be present at the outset, many contests (e.g., auctions, corporate acquisitions, and promotion contests) eventually whittle down to a head-to-head competition between two parties. Time pressure can also increase as the competition unfolds if a deadline has been established, as in auctions and many negotiations. Considerable evidence suggests that individuals typically underestimate the effects of visceral factors (e.g., competitive arousal) on motivations and behavior (Loewenstein, 1996), and as a result, tend not to protect themselves against their impact (Ku, 2008; Read & van Leeuwen, 1998). Because perceptions of rivalry and time pressure may be absent (or less salient) when competitors first decide to compete, the danger of falling prey to their impact is magnified.

The current investigation

Ku et al. (2005) found that auction bidders were more likely to exceed their pre-set bidding limits when they faced one (rather than many) other bidders, i.e., when perceptions of rivalry were likely to peak, and as the auction deadline approached. Rivalry and time pressure interacted: surpassing one's pre-set limit was most likely when time was running out and only one other bidder remained. While Ku et al.'s (2005) analysis reveals a link between rivalry/time pressure and competitive behavior they did not have access to the bidders' motivations. As a result, the central proposition of the competitive arousal model, that characteristics of the competitive environment can trigger the desire to win, and that this motivation fuels potentially self-defeating behavior, has not been tested.

This investigation tests three key predictions of the model: (a) characteristics of the competitive environment (i.e., rivalry and time pressure) can heighten the desire to win; (b) the desire to win drives competitive behavior when rivalry and time pressure are high; and (c) the desire to win mediates the relationship between rivalry/time pressure and competitive behavior. Study 1 is a field study that tests whether time pressure and perceptions of rivalry heighten the desire to win. Study 2 is a field experiment which assesses whether triggering the desire to win is more likely to lead to competitive behaviors when time pressure and perceptions of rivalry are high. Study 3 is a laboratory experiment that tests whether the desire to win (rather than an alternative mechanism) mediates the effect of rivalry and time pressure on competitive behavior.

Study 1

The context of Study 1 was a field investigation involving bidder behavior in online charity auctions. People may bid in charity auctions for at least three reasons: (a) to acquire the item at a price below its perceived value, (b) to contribute to charity, and (c) to beat the competition (i.e., "win"). The unique feature of charity auctions is that all of these motivations result in the same behavior (i.e., continued bidding), which in turn results in the same outcomes (i.e., an increased likelihood of submitting the winning bid and raising more money for charity). Study 1 was designed to assess whether and when the third motivation—the desire to win—is salient to bidders in a charity auction. The competitive arousal model predicts that the motivation to win will increase when perceived rivalry is high (i.e., only one other bidder is present) and time pressure is increasing (i.e., the auction is nearing its end).

Method

In coordination with a US firm that hosts dozens of online auctions each month, I altered the auction platform so that bidders would be asked a survey question as soon as they had submitted their bid: "Item value aside, how important is 'winning' (beating other bidders) to you?" Responses on a seven-point Likert-type scale (1 = "Not at All Important"; 7 = "Extremely Important") served as the dependent measure. This question was presented to all bidders when it was either: (a) the first bid by that bidder on that item or (b) it was the last day of the auction.¹ The data was collected over a 3 month period, during which time 6177 bidders across 683 different auctions responded.

Independent measures

Rivalry, measured dichotomously, was considered high (rivalry = 1) when there was only one other bidder who bid on the item on the day the survey question was answered; rivalry was considered low (=0) when there was more than one other bidder on the item that day. Time pressure, also measured dichotomously, was considered high (time pressure = 1) when the survey question was answered on the last day of the auction and low (=0) when the survey question was answered on any other day.²

Control variables

The analysis controlled for a host of factors that might influence bidding and perceptions in this setting: (a) the auction length (in days), (b) the total number of items in the auction, (c) the total number of bids placed on the focal item, (d) the current bid amount

¹ Less than 1% of bidders answered the question in multiple auctions; excluding this data does not affect results.

² To check for robustness, I tested an alternative characterization in which time pressure was "high" when it was the last day of the auction, and "low" when it was the first day of the auction. The results were almost identical.

submitted by the bidder, (e) the opening bid on the focal item, (f) the cost estimate of the item, as provided by the auctioneer (but hidden from the bidders), and (g) the total number of bidders on the item. To eliminate the possibility of psychological influence based on potentially arbitrary values (Ku, Galinsky, & Murnighan, 2008; Tversky & Kahneman, 1974), the analysis excluded items with a reserve price (i.e., a minimal acceptable bid $> \$0$).³

Results and discussion

Bidders provided a range of responses to the survey question that asked about their desire to win. The mean response on the 1–7 scale was 3.17; the median response was 3.00. 40.6% of bidders responded with a 1 or 2, essentially reporting that “winning” was not very important to them. 10.5% of bidders responded with a 6 or 7, admitting to a high desire to win.

The analysis regressed the desire to win (as measured by the survey question) on Rivalry and Time Pressure, and on the interaction between these two variables, while controlling for the variables described above. As predicted, there was a statistically significant interaction between Rivalry and Time Pressure ($F(1, 4187) = 5.95$; $p < .015$). Bidders reported a greater desire to win on the last day of the auction, but only when rivalry was high (i.e., there was only one other bidder competing). There was also a marginally significant main effect of time pressure—i.e., a heightened desire to win reported on the last day ($p < .06$)—but no main effect of Rivalry.

These results represent the first assessment, to our knowledge, of the psychological motivation of competitive bidders in a natural field setting. The results are consistent with the predictions of Ku et al.'s (2005) competitive arousal model and extend their findings by providing evidence for the psychological underpinnings of the behaviors they documented. The current results also control for a host of additional factors that might otherwise affect behavior and perceptions in this setting.

One limitation of this study is that the dependent variable involves a self-report measure. I see no reason for bidders to misrepresent their attitudes in this survey, nor do I have an explanation for why their responses, if misrepresented, would be biased towards a confirmation of the Rivalry \times Time Pressure interaction. Nevertheless, Study 2 was designed to address this potential shortcoming and to test whether inducing competitive behavior through an exogenous trigger would be more effective when rivalry and time pressure were high.

Study 2

The context of Study 2 was again online charity auctions. Specifically, I conducted a field experiment to test whether, when, and how the desire to win will drive bidder behavior. The results of Study 1 provide evidence for the heightening of a desire to win when time pressure and perceptions of rivalry are high. However, there is no evidence to date that: (a) the desire to win influences actual bidder behavior or that (b) the effect of a desire to win on behavior is heightened when rivalry and time pressure coincide.

Method

Study 2 exogenously triggered competitive (vs. other) motivations among auction participants and assessed whether and when these triggers influenced bidding. In coordination with the same firm as in Study 1, we reprogrammed the auction platform in order to alter the text of the electronic messages (e-mails) that were sent

to bidders when their current bid had been exceeded by a rival bidder. Bidders received either a competitive or a charitable message. The competitive message included language designed to make the desire to win salient: “*The competition is heating up! If you hope to win, you will have to bid again. Are you up for the challenge?*” The charitable message included language designed to make charitable motivations salient: “*We hope you will continue to support this charity by keeping the bidding alive. Every extra dollar you bid in the auction helps us accomplish our very important mission.*” Both messages informed bidders that they had been outbid and could return to the auction website to continue bidding. The message sent to bidders alternated each day for a period of 8 weeks.

The competitive arousal model predicts that making competitive motivations salient will induce additional bidding, but only (or especially) when rivalry and time pressure are high. This amounts to a predicted three-way interaction between message type (competitive vs. charitable), time pressure (i.e., time remaining in the auction), and rivalry (i.e., number of bidders).

Independent measures

As in Study 1, rivalry was considered high (rivalry = 1) when there was only one other bidder for the item on the day the focal bidder was outbid; rivalry was low (=0) when there was more than one other bidder present. Time pressure was high (time pressure = 1) when the outbid event took place on the last day and low (=0) on any other day.

Control variables

The logistic regression analysis controlled for: (a) the day of the week, (b) the current bid amount on the item, and (c) the days remaining in the auction. Because different messages were sent on different days, one concern is that the same bidder could receive different messages on different days (if they were outbid multiple times over the course of the auction). To avoid the effect of “multiple messages”, I restricted analysis to the behavior of bidders who were being outbid for the first time. Additionally, to minimize confounds and mitigate noise, analysis was restricted to: (i) items without a reserve price and (ii) items for which the auctioneer had not published an “estimated value” which might influence bidding. The final sample consisted of 14,415 outbid events.

Results and discussion

The analysis regressed the decision to re-bid on Message Type (competitive vs. charitable), Rivalry, and Time Pressure, and on the interaction between these three variables, while controlling for the other factors noted above. As predicted, there was a statistically significant three-way interaction between rivalry, time pressure, and message type (logistic regression, $B = .154$, $SE = .070$, Wald = 4.79, $p < .029$).

The size of the effect is surprisingly large (see Fig. 1a): on the last day of the auction (when time pressure is high), if only one rival bidder is present, bidders are 35.7% more likely to re-bid if they receive a competitive rather than a charity message. When multiple other bidders are present on the last day, however, the charity message is 49.6% more likely to induce bidding than a competitive message. Thus, the competitive message is more effective than the charity message when time pressure and rivalry are both high. This pattern disappears (as predicted) when time pressure is low, i.e., on earlier days of the auction (see Fig. 1b). Taken together, Fig. 1a (high time pressure) and b (low time pressure) provide a compelling visual representation of the three-way interaction.

Consistent with prior research on competitive arousal and the results of Study 1, bidders were more susceptible to the competitive trigger when rivalry and time pressure coincided. Study 2 represents the first attempt, to my knowledge, to test competitive

³ Follow-up analysis revealed that including data points with a reserve price $> \$0$ did not change the results.

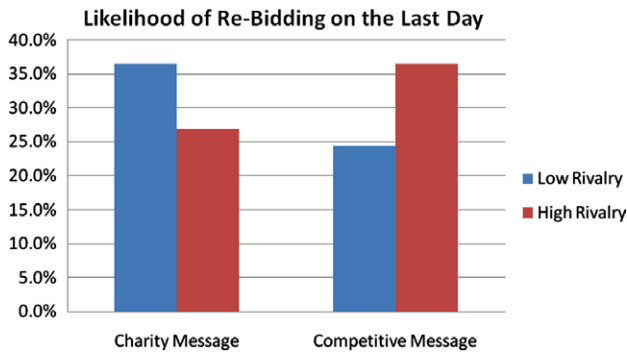


Fig. 1a. Likelihood of Re-Bidding on Last Day of Auction: Rivalry \times Message Type Interaction (Study 2).

arousal predictions using an experimental approach on incentive compatible behaviors. The effect is particularly compelling when considered in context: the experimental manipulation in this field experiment was restricted to a short, emailed statement.

One result that I did not predict pertains to the increased effectiveness of the charity message when time pressure is high and rivalry is low (i.e., many others are bidding). While not central to this investigation, the result is worth additional comment because it seems at odds with a wealth of prior research on the “bystander effect”, which suggests that people are *less* likely to be helpful or charitable when group size increases (Darley & Latane, 1968; Wiesenenthal, Austrom, & Silverman, 1983). On the other hand, it appears consistent with research on conformity and social influence (Asch, 1956; Cialdini, 1993) which predicts that individuals will respond positively to a request when others appear to be doing so as well. Reconciling my findings with these two streams of research may suggest a closer look at the role of time pressure and arousal. It is possible that time pressure and/or arousal diminishes the bystander effect and/or enhances conformity. Another issue to consider is that charitably motivated individuals may not have to obtain the item in order to achieve their objective; stimulating higher final prices provides more money to charity even if someone else obtains the item. Clearly, more work is needed to evaluate these possibilities.

Together, Studies 1 and 2 suggest that the desire to win is heightened when rivalry and time pressure are high (Study 1), and that the desire to win is most likely to influence competitive behaviors when rivalry and time pressure are high (Study 2). Study 3 tests whether the effect of rivalry and time pressure on competitive behavior is mediated by the desire to win, rather than by some alternative mechanism (e.g., the perceived likelihood of winning).

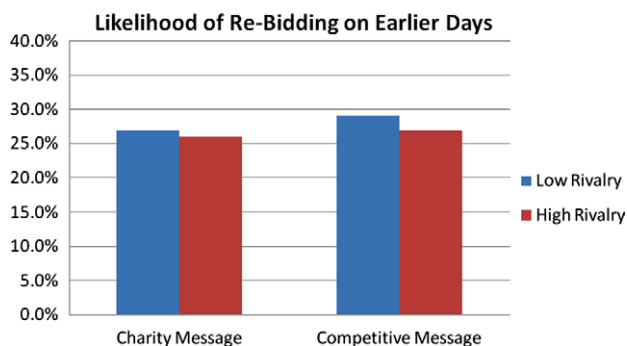


Fig. 1b. Likelihood of Re-Bidding on Earlier Days of Auction: Rivalry \times Message Type Interaction (Study 2).

Study 3

Study 3 was conducted online, using an auction scenario in which participants made a decision regarding whether to continue bidding past a pre-set limit. The scenario was adapted from Ku et al. (2005) and jointly manipulated rivalry (i.e., the number of other bidders present when the pre-set limit was reached), as well as perceptions of time pressure. Two conditions were created: (a) high rivalry plus high time pressure and (b) low rivalry plus low time pressure. The following are the key portions of the scenario (see Appendix A for the full text):

“Imagine that you are attending a live auction and the item up for bid is something that you really, really want. . . Before bidding began, you had decided that the most you would be willing to pay for this item is approximately \$150. . . As the auction progressed, many bidders dropped out, and now it is down to you and one other bidder [*approximately five other bidders*]. Your last bid was \$145. The other bidder [*One of the other bidders*] then bid \$150. You now have to decide whether you want to continue bidding. Your next bid would be \$155. Imagine that speed is critical. You have only 3 seconds to figure out what to do [*Imagine that there is no rush. You have as much time as you want to think about what to do.*]”

Participants then answered a series of questions regarding how they would behave, how they feel, and what they expect. In particular, participants reported the likelihood (from 0% to 100%) that they would submit another bid. This served as the dependent measure. Based on the results of Studies 1 and 2, I predicted that participants would be more likely to bid again when rivalry and time pressure were high rather than low. I also asked participants to report on their desire to win, their perceived likelihood of winning the item, and their valuation of the item. I predicted that the effect of rivalry + time pressure on bidding would be mediated by the desire to win, rather than by the perceived likelihood of winning or the perceived value of the item.

Participants

Four hundred and twelve participants between the ages of 18 and 60 were recruited for the study using online advertising, and were paid \$10 for their time. 30.3% ($N = 125$) were males. The mean age was 35.5 years (Median Age = 34). Gender and Age were included in the analysis as covariates.

Analysis

In addition to asking them their likelihood of continuing to bid past their pre-set limit, the questionnaire asked participants to respond to the following questions.

- (1) “How competitive do you feel as you make this decision?”
- (2) “How much do you think the item is worth?”
- (3) “How likely are you to win the item in this auction? (0–100%)”.
- (4) “Have you ever participated in a live auction?” (and if yes, “How many times?”).
- (5) “Have you ever participated in an Internet auction?” (and if yes, “How many times?”).

The first question, measuring the desire to win, was answered on a seven-point (1 = *Not at All*, 7 = *Very Much*) Likert-type scale (cf., Garcia & Tor, 2009). The second and third questions were important control variables because the number of other bidders

may affect both the perceived value of the item (Question 2 above), and the likelihood of winning (Question 3 above). I also controlled for participants' experience in live and Internet auctions: 34.5% reported prior experience with live auctions; 80.1% reported experience with Internet auctions.

Results and discussion

As expected, participants reported a greater likelihood of submitting another bid when there was one other bidder and time pressure was high (81.3%), than when there were five other bidders and time pressure was low (74.1%). Regression analysis, controlling for age, gender, perceived value of the item, perceived likelihood of winning, and auction experience confirmed the robustness of the rivalry + time pressure effect on bidding past an initially set limit ($B = 4.832$, $SE = 2.258$, $t = 2.140$, $p < .033$) (Table 1 provides regression results for the mediation analysis).

To test whether the desire to win mediates the effect of rivalry + time pressure on likelihood of continued bidding, I conducted two follow-up regression analyses (Baron & Kenny, 1986). First, I regressed the desire to win (the mediator variable) on rivalry + time pressure (the independent variable), while including all other control variables. As predicted, desire to win was significantly higher in the rivalry + time pressure condition ($B = 0.339$, $SE = 0.140$, $t = 2.428$, $p < .016$). Next, I regressed likelihood of submitting another bid (the dependent variable) simultaneously on desire to win (the mediator) and rivalry + time pressure (the independent variable), while including all control variables. Desire to win was a significant predictor of continued bidding ($B = 3.56$, $SE = 0.788$, $t = 4.515$, $p < .001$), but rivalry + time pressure was no longer a significant predictor ($B = 3.626$, $SE = 2.222$, $t = 1.632$, $p < .11$), suggesting mediation. As a further test of the mediation effect, I used the procedure outlined in Sobel (1982). The Sobel test computes a z -value that assesses whether the indirect effect of the independent variable on the dependent variable through the mediator is significantly different from zero. The Sobel test confirmed the significance of the mediating effect ($z = 2.13$; $p < .033$).

Consistent with the competitive arousal model and with the results of Studies 1 and 2, the effect of rivalry + time pressure on the likelihood of continued bidding was mediated by a heightened desire to win. Moreover, the effect of rivalry (+ time pressure) on bidding was not explained by a change in the perceived value of the item or the perceived likelihood of winning due to a reduction in the number of other bidders remaining. Notably, the perceived likelihood of winning had a separate, significant main effect on

the likelihood of continued bidding ($B = 0.553$, $SE = 0.051$, $t = 10.775$, $p < .001$); perceived value of the item was not a significant predictor ($p < .47$), controlling for all other factors.

General discussion

The current investigation finds that elements of the competitive environment can heighten the desire to win, and that this motivation has an impact on competitive behaviors. Study 1 demonstrates that when rivalry and time pressure coincide, "winning" becomes a more powerful motivator. Study 2 demonstrates that triggering a desire to win can have powerful effects on behavior, especially when rivalry and time pressure coincide. Study 3 considers alternative explanations for the effect of rivalry and time pressure on competitive behavior and finds that the effect is mediated by the desire to win. The context of Studies 1 and 2 (actual auctions) and the large effect-size in Study 2 are both noteworthy.

The current research extends the literature on competitive motivation and behavior in a number of ways. First, by distinguishing between "competitive motivation" and the "desire to win", I clarify the relationship between competitive behaviors, competitive motivation, and the relatively less common but potentially costly preference for maximizing relative payoffs. Second, while it has long been understood that competitor and disputant motivations can transform in the heat of battle—away from a desire to obtain scarce and contested assets, and towards beating the perceived rival (Rubin et al., 1994)—and while this possibility has been discussed in negotiation and dispute resolution courses for years (cf., Murnighan, 2002), the current investigation provides a precise theoretical and empirical account for this transition. In doing so, the paper builds on Ku et al.'s (2005) model empirically as well as theoretically, by elaborating and testing the mechanisms underlying competitive arousal. Finally, while previous research (Fehr & Schmidt, 1999; Loewenstein et al., 1989; Messick & Sentis, 1985) has demonstrated that competitive motivations are influenced by relational and structural factors, the current results suggest that such motivations can also be heightened endogenously, as the competition itself unfolds (e.g., as time starts to run out, or the number of adversaries whittles down to one). The fact that the "natural" progression of a competition or a conflict influences the degree to which parties exhibit a desire to win is of theoretical and practical significance.

One implication is that a better understanding of competitive behavior may require that we focus less on distinguishing among individuals who are competitive vs. cooperative "types" (De Dreu

Table 1
The mediating role of competitive motivations (Study 3).

Dependent variable	Model 1 Likely to re-bid		Model 2 Competitive motivations		Model 3 Likely to re-bid	
	B	SE	B	SE	B	SE
Competitive motivation					3.560***	.788
Rivalry and time pressure	4.832*	2.258	.339*	.140	3.626	2.222
Gender (0 = M; 1 = F)	6.118*	2.442	.158	.151	5.556*	2.388
Age	.296**	.108	.011	.007	.259*	.106
How likely to win	.666***	.046	.032***	.003	.553***	.051
How much item is worth	.018	.015	.002*	.001	.010	.015
Participated in live auctions	2.695	2.670	.068	.165	2.452	2.609
How many live auctions	-.603***	.171	.006	.011	-.623***	.167
Participated in internet auctions	-8.311**	2.913	-.554**	.180	-6.339*	2.879
How many internet auctions	.014	.012	.000	.001	.014	.012
Constant	20.008*	8.518	2.929***	.526	9.580	8.634

N = 412.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

& Boles, 1998; Messick & McClintock, 1968), and more so on investigating the conditions under which different motivations are likely to emerge, or become salient. Prior work has been largely limited to studying exogenous triggers of the desire to win, as when decision frames (e.g., De Dreu & McCusker, 1997) or implicit primes (e.g., Kay & Ross, 2003; Kay, Wheeler, Bargh, & Ross, 2004) are experimentally manipulated, or when individuals are asked to imagine a positive or negative prior relationship with the other party (e.g., Loewenstein et al., 1989). Greater emphasis on endogenous triggers of competitive motivations and behaviors seems warranted. Hybrid approaches may be even more fruitful: certain types of individuals and relationships may be more susceptible to competitive arousal (cf., Creyer & Kozup, 2003; Garcia & Tor, 2009).

More generally, the current results speak to the growing literature on the role of affect in decision making (Peters, Vastfjall, Garling, & Solvic, 2006). For example, prior research documents inconsistencies between decisions that are predicted *ex ante* and those that are actually made in competitive contexts (Ku, 2008; O'Connor et al., 2002). One explanation for the inconsistency between predicted and actual decisions is that visceral reactions to environmental stimuli at the moment of decision are powerful motivators of behavior, but are difficult to anticipate in advance (Loewenstein, 1996; Read & van Leeuwen, 1998; Wilson & Gilbert, 2005). The current results point to a more fundamental problem with emotional decision making, at least in the context of competitive interaction: the factors that trigger emotional and visceral reactions may not emerge (i.e., be “visible”) until after the competition unfolds. This creates an additional problem for decision makers to tackle: predict the emergence of factors that may trigger visceral reactions and predict affective response to such factors.

Surprisingly, while there is some research on the role of visceral, “heat of the moment” reactions (Ariely & Loewenstein, 2006) in consumer choice and other individual decision-making contexts, extremely little attention has been focused on the antecedents and consequences of visceral reactions in competitive contexts (Delgado et al., 2008; Ku et al., 2005). Given the fact that social and economic interactions are rife with competitive motivations and behavior, and considering the size of the effects documented in this investigation, this seems to be a conspicuous omission in the literature on affective decision making.

The current investigation also extends research on auction behavior. The winner’s curse and the escalation of commitment, both of which predict over-bidding in auctions, have been studied for over three decades (Capen, Clapp, & Campbell, 1971; Staw, 1976). In contrast, research on competitive arousal is still in its early stages (Ku et al., 2005; van den Bos et al., 2008). The different mechanisms underlying these alternative models are worth noting. The mechanism underlying the winner’s curse is incomplete information and a tendency to ignore the perspectives and decisions of other parties (Bazerman & Samuelson, 1983; Crawford & Iriberri, 2007; Thaler, 1988). The mechanism underlying the escalation of commitment involves cognitive and motivational biases, in particular, the inability to ignore sunk costs and the motivation to self-justify prior decisions (Heath, 1995; Staw & Ross, 1978). In contrast, the mechanism underlying competitive arousal is emotional/visceral and motivational (Ku et al., 2005; Loewenstein, 1996). It is hoped that the elaboration of the competitive arousal model in this paper will serve as in impetus for more research on the visceral component of bidder behavior.

On a more practical level, the current results suggest the need for greater vigilance among individuals who are engaged in competition. If perceived rivalry and increasing time pressure are “risk factors” associated with a heightened desire to win “at any cost” it may be wise for individuals to anticipate and mitigate these risks. For example, individuals may set aside more time for

important negotiations, especially in dispute contexts, to make competitive arousal less likely. Likewise, the effects of rivalry may be dealt with by limiting the decision authority of (or by sidelining) those who feel the rivalry most intensely (Malhotra et al., 2008).

Further research on these issues is necessary and would be fruitful. Research on competitive arousal and on the emergence of motivations and behaviors aimed at “winning” is in its early stages, but given how prevalent rivalry and time pressure are in business and social contexts, the implications of this work may be considerable.

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Appendix A. Full text of scenario used in Study 3

“Imagine that you are attending a live auction and the item up for bid is something that you really, really want. It is the only item of its kind at this auction, and you don’t think that you will find this item anywhere else. In fact, because you were waiting to see the item for sale one day, you made it a point to come to this auction.

Before bidding began, you had decided that the most you would be willing to pay for this item is approximately \$150. Of course, you’d like to pay as little as possible. When the bidding began, many bidders seemed interested, and the price went up quickly. As the auction progressed, many bidders dropped out, and now it is down to you and one other bidder [approximately five other bidders].

Your last bid was \$145. The other bidder [One of the other bidders] then bid \$150. You now have to decide whether you want to continue bidding. Your next bid would be \$155.

Imagine that speed is critical. You have only 3 s to figure out what to do. [Imagine that there is no rush. You have as much time as you want to think about what to do.]”

References

- Allport, F. H. (1924). *Social psychology*. New York, NY: Houghton.
- Ariely, D., & Loewenstein, G. (2006). The heat of the moment: The effect of sexual arousal on sexual decision making. *Journal of Behavioral Decision Making*, 19(2), 87–98.
- Asch, S. E. (1956). Studies of independence and submission to group pressure: I. A minority of one against a unanimous majority. *Psychological Monographs*, 70, 1–71.
- Axelrod, R. M. (1984). *The evolution of cooperation*. New York, NY: Basic Books.
- Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic and statistical considerations. *Journal of Personality and Social Psychology*, 51, 1173–1182.
- Bazerman, M. H., Loewenstein, G. F., & White, S. B. (1992). Reversals of preference in allocation decisions: Judging an alternative versus choosing among alternatives. *Administrative Science Quarterly*, 37, 220–240.
- Bazerman, M. H., & Samuelson, W. F. (1983). I won the auction but don’t want the prize. *Journal of Conflict Resolution*, 27(4), 618–634.
- Brandenburger, A. M., & Nalebuff, B. J. (1996). *Co-opetition*. New York, NY: Doubleday.
- Capen, E., Clapp, R., & Campbell, W. (1971). Competitive bidding in high risk situations. *Journal of Petroleum Technology*, 23, 641–653.
- Carnevale, P. J. D., & Lawler, E. J. (1987). Time pressure and the developments of integrative agreements in bilateral negotiations. *Journal of Conflict Resolution*, 30(4), 636–659.
- Cialdini, R. B. (1993). *Influence: The psychology of persuasion* (2nd ed.). New York: Morrow.
- Cooper, D. J., & Fang, H. (2008). Understanding overbidding in second price auctions: An experimental study. *Economic Journal*, 118(532), 1572–1595.
- Cox, J. C., Smith, V. L., & Walker, J. M. (1992). Theory and misbehavior of first-price auctions: Comment. *American Economic Review*, 82(5), 1392–1412.
- Crawford, V. P., & Iriberri, N. (2007). Level-k auctions: Can a nonequilibrium model of strategic thinking explain the winner’s curse and overbidding in private-value auctions? *Econometrica*, 75(6), 1721–1770.

- Creyer, E. H., & Kozup, J. C. (2003). An examination of the relationships between coping styles, task-related affect, and the desire for decision assistance. *Organizational Behavior and Human Decision Processes*, 90(1), 37–49.
- Darley, J. M., & Latane, B. (1968). Bystander intervention in emergencies: Diffusion of responsibility. *Journal of Personality and Social Psychology*, 8, 377–383.
- De Dreu, C. K. W., & Boles, T. L. (1998). Share and share alike or winner take all? The influence of social value orientation upon choice and recall of negotiation heuristics. *Organizational Behavior and Human Decision Processes*, 76(3), 253–276.
- De Dreu, C. K. W., & McCusker, C. (1997). Effects of gain-loss frames on cooperation in two-person social dilemmas: A transformational analysis. *Journal of Personality and Social Psychology*, 72(5), 1093–1106.
- Delgado, M. R., Schotter, A., Ozbay, E. Y., & Phelps, E. A. (2008). Understanding overbidding: Using the neural circuitry of reward to design economic auctions. *Science*, 321, 1849–1852.
- Deutsch, M. (1949). A theory of co-operation and competition. *Human Relations*, 2, 129–152.
- Fehr, E., & Schmidt, K. M. (1999). A theory of fairness, competition, and cooperation. *Quarterly Journal of Economics*, 114(3), 817–868.
- Festinger, L. (1954). A theory of social comparison. *Human Relations*, 7, 117–140.
- Garcia, S. M., & Tor, A. (2009). The n-effect: More competitors, less competition. *Psychological Science*, 20(7), 871–877.
- Garcia, S. M., Tor, A., & Gonzalez, R. (2006). Ranks and rivals: A theory of competition. *Personality and Social Psychology Bulletin*, 32(7), 970–982.
- Griffin-Pierson, S. (1990). The competitiveness questionnaire: A measure of two components of competitiveness. *Measurement & Evaluation in Counseling & Development*, 23(3), 108–115.
- Güth, W., Schmittberger, R., & Schwarze, B. (1982). An experimental analysis of ultimatum bargaining. *Journal of Economic Behavior and Organization*, 3(4), 367–388.
- Heath, C. (1995). Escalation and de-escalation of commitment in response to sunk costs: The role of budgeting in mental accounting. *Organizational Behavior and Human Decision Processes*, 62(1), 38–54.
- Hirshleifer, J. (1978). Competition, cooperation, and conflict in economics and biology. *American Economic Review*, 68(2), 238–243.
- Hoffman, P. J., Festinger, L., & Lawrence, D. H. (1954). Tendencies toward group comparability in competitive bargaining. *Human Relations*, 7(2), 141–159.
- Kay, A. C., & Ross, L. (2003). The perceptual push: The interplay of implicit cues and explicit situational construals on behavioral intentions in the prisoner's dilemma. *Journal of Experimental Social Psychology*, 39(6), 634–643.
- Kay, A. C., Wheeler, S. C., Bargh, J. A., & Ross, L. (2004). Material priming: The influence of mundane physical objects on situational construal and competitive behavioral choice. *Organizational Behavior and Human Decision Processes*, 95(1), 83–96.
- Kerstholt, J. H. (1994). The effect of time pressure on decision-making behavior in a dynamic task environment. *Acta Psychologica*, 86(1), 89–104.
- Ku, G. (2008). Before escalation: Behavioral and affective forecasting in escalation of commitment. *Personality and Social Psychology Bulletin*, 34(11), 1477–1491.
- Ku, G., Galinsky, A. D., & Murnighan, J. K. (2008). Starting low but ending high: A reversal of the anchoring effect in auctions. *Journal of Personality and Social Psychology*, 90(6), 975–986.
- Ku, G., Malhotra, D., & Murnighan, J. K. (2005). Towards a competitive arousal model of decision-making: A study of auction fever in live and internet auctions. *Organizational Behavior and Human Decision Processes*, 96(2), 89–103.
- Loewenstein, G. F. (1996). Out of control: Visceral influences on behavior. *Organizational Behavior and Human Decision Processes*, 65(3), 272–292.
- Loewenstein, G. F., Nagin, D., & Paternoster, R. (1997). The effect of sexual arousal on expectations of sexual forcefulness. *Journal of Research in Crime and Delinquency*, 34(4), 443–473.
- Loewenstein, G. F., Thompson, L., & Bazerman, M. H. (1989). Social utility and decision making in interpersonal contexts. *Journal of Personality and Social Psychology*, 57(3), 426–441.
- Malhotra, D., & Bazerman, M. H. (2007). *Negotiation genius: How to overcome obstacles and achieve brilliant results at the bargaining table and beyond*. New York, NY: Bantam Books.
- Malhotra, D., Ku, G., & Murnighan, J. K. (2008). When winning is everything. *Harvard Business Review*, 86(5).
- Maller, J. B. (1929). Co-operation and competition: An experimental study in motivation. *Teachers College Contributions to Education*, 384.
- May, M. A., & Doob, L. W. (1937). Co-operation and competition. *Social Science Research Council Bulletin*, 125.
- Mead, M. (1937). *Co-operation and competition among primitive peoples*. McGraw-Hill.
- Messick, D. M., & McClintock, C. G. (1968). Motivational basis of choice in experimental games. *Journal Experimental Social Psychology*, 4, 1–25.
- Messick, D. M., & Sentis, K. P. (1985). Estimating social and non-social utility functions from ordinal data. *European Journal of Social Psychology*, 15, 389–399.
- Messick, D. M., & Thorngate, W. B. (1967). Relative gain maximization in experimental games. *Journal of Experimental Social Psychology*, 3, 85–101.
- Miller, J. G. (1960). Information input overload and psychopathology. *American Journal of Psychiatry*, 116, 95–104.
- Moore, D. A. (2004). Myopic prediction: Self-destructive secrecy, and the unexpected benefits of revealing final deadlines in negotiation. *Organizational Behavior and Human Decision Processes*, 94, 125–139.
- Mui, V. (1995). The economics of envy. *Journal of Economic Behavior and Organization*, 26(3), 311–336.
- Münster, J. (2007). Selection tournaments, sabotage, and participation. *Journal of Economics and Management Strategy*, 16(4), 943–970.
- Murnighan, J. K. (2002). A very extreme case of the dollar auction. *Journal of Management Education*, 26(1), 56–69.
- O'Connor, K. M., deDreu, C. K. W., Schroth, H., Barry, B., Lituchy, T. R., & Bazerman, M. H. (2002). What we want to do versus what we think we should do. *Journal of Behavioral Decision Making*, 15(5), 403–418.
- Peters, E., Vastfjall, D., Garling, T., & Solvic, P. (2006). Affect and decision making: A “hot” topic. *Journal of Behavioral Decision Making*, 19(2), 79–85.
- Pruitt, D. G. (1981). *Negotiation behavior*. New York, NY: Academic.
- Read, D., & van Leeuwen, B. (1998). Predicting hunger: The effects of appetite and delay on choice. *Organizational Behavior and Human Decision Processes*, 76(2), 189–205.
- Roth, A. E., Murnighan, J. K., & Schoumaker, F. (1988). The deadline effect in bargaining: Some experimental evidence. *American Economic Review*, 78(4), 806–823.
- Rubin, J. Z., Pruitt, D. G., & Kim, S. H. (1994). *Social conflict: Escalation, stalemate, and settlement* (2nd ed.). New York, NY: McGraw-Hill.
- Shiv, B., & Fedorikhin, A. (2002). Spontaneous versus controlled influences of stimulus-based affect on choice behavior. *Organizational Behavior and Human Decision Processes*, 87(2), 342–370.
- Smith, Adam. (1776). *Wealth of nations*. London: Methuen & Co., Ltd.
- Sobel, M. E. (1982). Asymptotic confidence intervals for indirect effects in structural equation models. *Sociological Methodology*, 13, 290–312.
- Staw, B. M. (1976). Knee-deep in the big muddy: A study of escalating commitment to a chosen course of action. *Organizational Behavior and Human Performance*, 16(1), 27–44.
- Staw, B. M., & Ross, J. (1978). Commitment to a policy decision: A multi-theoretical perspective. *Administrative Science Quarterly*, 23(1), 40–64.
- Thaler, R. H. (1988). Anomalies: The winner's curse. *Journal of Economic Perspectives*, 2(1), 191–202.
- Thibaut, J. W., & Kelly, H. H. (1959). *The social psychology of groups*. New York, NY: Wiley.
- Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases. *Science*, 27(185), 1124–1131.
- van den Bos, W., Li, J., Lau, T., Maskin, E., Choen, J. D., Montague, P. R., et al. (2008). The value of victory: Social origins of the winner's curse in common value auctions. *Judgment and Decision Making*, 3(7), 483–492.
- Van Lange, P. A. M., Otten, W., De Bruin, E. M. N., & Joireman, J. A. (1997). Development of prosocial, individualistic, and competitive orientations: Theory and preliminary evidence. *Journal of Personality and Social Psychology*, 73(4), 733–746.
- Wiesenthal, D. L., Austrom, D., & Silverman, I. (1983). Diffusion of responsibility in charitable donations. *Basic and Applied Social Psychology*, 4(1), 17–27.
- Wilson, T. D., & Gilbert, D. T. (2005). Affective forecasting: Knowing what to want. *Current Directions in Psychological Science*, 14(3), 131–134.
- Wofford, J. C. (2001). Cognitive-affective stress response: Effects of individual stress propensity on physiological and psychological indicators of strain. *Psychological Reports*, 88(3), 768–784.
- Zillmann, D., & Bryant, J. (1974). Effect of residual excitation on the emotional response to provocation and delayed aggressive behavior. *Journal of Personality and Social Psychology*, 30(6), 782–791.
- Zillmann, D., Bryant, J., Cantor, J. R., & Day, K. D. (1975). Irrelevance of mitigating circumstances in retaliatory behavior at high levels of excitation. *Journal of Research in Personality*, 9, 282–293.
- Zillmann, D., Katcher, A. H., & Milavsky, B. (1972). Excitation transfer from physical exercise to subsequent aggressive behavior. *Journal of Experimental Social Psychology*, 8, 247–259.