Competition strength influences individual preferences in an auction game

Ulf Toelch [a,*], Esperanza Jubera-Garcia [a], Zeb Kurth-Nelson [b,c], Raymond J. Dolan [b]

[a] Berlin School of Mind and Brain, Humboldt University, Luisenstrasse 56, 10117 Berlin, Germany
[b] Wellcome Trust Centre for Neuroimaging, University College London, London WC1N 3BG, UK
[c] Max Planck-UCL Centre for Computational Psychiatry and Ageing, Lentzeallee 94, 14195 Berlin, Germany

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ABSTRACT

Competitive interactions between individuals are ubiquitous in human societies. Auctions represent an institutionalized context for these interactions, a context where individuals frequently make non-optimal decisions. In particular, competition in auctions can lead to overbidding, resulting in the so-called winner's curse, often explained by invoking emotional arousal. In this study, we investigated an alternative possibility, namely that competitors' bids are construed as a source of information about the good's common value thereby influencing an individuals' private value estimate. We tested this hypothesis by asking participants to bid in a repeated all-pay auction game for five different real items. Crucially, participants had to rank the auction items for their preference before and after the experiment. We observed a clear relation between auction dynamics and preference change. We found that low competition reduced preference while high competition increased preference. Our findings support a view that competitors' bids in auction games are perceived as valid social signal for the common value of an item. We suggest that this influence of social information constitutes a major cause for the frequently observed deviations from optimality in auctions.

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1. Introduction

Competition is integral to human social life (Festinger, 1954; Kilduff, Elfenbein, & Staw, 2010). It is surprising that decisions in competition contexts often deviate from rational choice even with extensive experience (Bazerman & Samuelson, 1983; Kagel & Richard, 2001; Lind & Plott, 1991). A well-studied example of such suboptimal behavior is the so-called winner's curse in auctions where the winner often overbids the common (realizable) value of an object (Thaler, 1988). This effect has consistently been demonstrated in laboratory (Bazerman & Samuelson, 1983) and field settings (Carpenter, Holmes, & Matthews, 2008). A proposed cause for the deviation

from rational choice is that individuals derive utility not only from the object itself but also from winning against competitors (for a review on further possible causes of overbidding see (Sheremeta, 2013)). This view accords with the observation that social interactions during competition elicit emotional arousal (Ku, Malhotra, & Murnighan, 2005) that individuals experience as a joy of winning respectively fear of losing (Delgado, Schotter, Ozbay, & Phelps, 2008; van den Bos et al., 2008).

However, apparent overbidding could also be due to an increase in the bidder's actual preference for the good. When the true (private) value of a good is uncertain (e.g. in art auctions), competitors' bids can be taken as information about the true value, which may drive updates to one's own estimated value of the good. The value of a novel object is estimated by pooling previous experience with

related objects (Barron, Dolan, & Behrens, 2013) but is also associated with uncertainty. By integrating over personal and social information sources, uncertainty can be reduced (Morgan, Rendell, Ehn, Hoppitt, & Laland, 2011; Rendell et al., 2011; Toelch et al., 2009). The behavior of competitors could thus serve as a proxy for the common value (Beggs & Graddy, 2009; Campbell-Meiklejohn, Bach, Roepstorff, Dolan, & Frith, 2010; Hayes, Shogren, Shin, & Kliebenstein, 1995; Nicolle et al., 2012; Suzuki et al., 2012), particularly when uncertainty is high, social sources and social dynamics are used to update private values (Berns, Capra, Moore, & Noussair, 2010; Rendell et al., 2011; Toelch, Bruce, Meeus, & Reader, 2010; Toelch et al., 2009).

Despite the recognition of competition as a social process, the interplay between competition and changes to private value estimates has received little attention. One reason is that many competition experiments are common value auctions where signals about the common value are induced (Rutström, 1998) and symmetrical (Kagel & Levin, 2008). In common value auctions, social cues (competitor bids) carry no information, a case rarely occurring under non-laboratory conditions with auctions mainly being private value auctions.

Here, we investigate an important interaction between differences in (*ex ante*) private values and the effect of subsequent competition on individuals' (*ex post*) private value estimate. We specifically test how private values for real items are influenced by the bidding behavior in a two player multiple item repeated all-pay auction game. Crucially, we manipulated auctions such that participants encountered real competitors with lower, approximately equal, or higher private value estimates. As participants bid repeatedly and possibly opted out of the auction by bidding nothing, bids during these auctions potentially deviated from private value estimates. To account for this, we used preference[1] statements as a proxy for participants' private value estimates (Warren, McGraw, & Van Boven, 2011). We specifically investigated how preference ranks of the auction items changed because of both the overall level of competition and the dynamics of the auctions across the session. For this, participants ranked items by preference before and after the game. We then linked behavioral parameters from the bid progression within auctions to participants' propensity to change their preference for a particular item.

2. Materials and methods

2.1. Participants

Participants were recruited from a local participant pool via email invitation. In total 42 (17 male) participants played the game in pairs of two with a maximum of four players per session (10 same gender pairs and 11 mixed gender pairs; sample size calculations can be found in the SI). After the experiment, participants answered a questionnaire where we collected background information

like age and gender. Additionally we asked participants to give verbatim description of their strategies during the game. All procedures comply with APA guidelines and were approved by the Ethics board at Charité University hospital (EA1/212/11).

2.2. Auction game

Players played a first-bid all pay auction game for five different real items in pairs. Prior to playing the actual game participants received a training of 20 rounds to familiarise them with the controls and the mechanics of the game. During this training, the five auction items were replaced by abstract figures. After training, players could inspect the available auction items. All items (candle, pens, box of chocolate, one-way camera, herbal tea) were purchased at approximately the same price (4.5–5.0 Euro). The price of the items was not revealed to the participants. After inspection, players ranked the items according to their preference with 1 denoting the lowest and 5 the highest preference.

Participants played 200 auctions (40 for each item) randomly interspersed. In each round, players could distribute 100 points either to the auction item or to a monetary lottery with a price of seven Euro, which was higher than the actual cost of each item. The player with the highest amount of points allotted to the auction would win the round. The points allocated to the lottery (divided by 100) represented the chance to win seven Euro in this round. For example, take two players who bid for an item. Player 1 bids 25 points and player 2 bids 40 points. In this round player 2 wins the item and has an additional chance of 60% to win seven Euro. Player 1 does not win the auction but has a 75% chance to win the lottery. We deliberately chose a lottery as second investment options for players to minimize decision biases due to risk sensitivity. That is, allocating points in either auction or lottery entailed the risk of losing points. Overbidding in our case occurred when the sum of both players' bids exceeded 71 (approximate value of each item: five Euro equaling 71 points). These calculations were not revealed to the participants.

At the end of the game participants had to rank the items again for preference. One round was randomly selected for each player and the outcome was paid to each participant. In other words, participants could actually win one of the items and an additional seven Euro. Participants who did not win either received three Euro alone. All participants received an additional show-up fee of five Euro. To assess participants' private value for each item participants did not receive feedback on the outcome of the auction in the first five rounds of the experiment where all five items were presented. In all other rounds participants received feedback on whether they won the auction but not the lottery and how much the other player bid for the item.

2.3. Manipulation of preferences

Since we were interested in exploring the interaction between private value, social influences, and competitiveness of the environment, we performed a manipulation on the items players saw in each round by matching pref-

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[1] Tendency to consider something desirable or undesirable.