On eBay, it pays to snipe

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Science Snapshot
Dan Vergano

Thank goodness for science. How else would we know the best way to nab those barely-used weed whackers, dumbbells or duck-shape salt shakers on eBay? In a study that gives the lie to the notion that eggheads don't like to eyeball online auctions like normal folks, a study by South Korean physicists confirms via some elaborate mathematical modeling that "sniping" — waiting for the very last second to submit your bid on that Elvis-shape throw rug — is indeed "a rational and effective strategy to win in an eBay auction."

Founded in 1995, eBay is the king of online auction sites. Sellers put up items for sale and buyers bid up the price. Thanks to the Internet's lack of state sales tax and the public's thirst for other people's garage sale items, the company has grown into a firm that amassed $4.55 billion in revenue last year. The service sets a deadline on bids for items, which has given rise to the practice of "sniping," bidding at the last minute to deny other bidders time to outbid you.

Savvy buyers have taken to the practice in swarms. Some companies even exist to snipe for you. Sellers, however, have grumbled that the practice keeps winning bid prices lower than they would be in a more open-ended auction, in which prices may be driven up by competition between buyers. If nobody bids until the last second, it's inevitably just a (relatively) low-bidding person who puts in the highest-price bid and walks away with the item.

To test whether sniping is a smart way to do things or just truncates normal bidding, the South Korean team at Seoul National University produced a "master equation" for how bidding proceeds (it's nk(t+1) — nk(t) = w(k-1)(t)*n(k-1)(t) — wk(t)*nk(t) + sigma(k,1)*u(t), if you really want to know), and then tested it against a massive number of auction records, some 264,073 items sold in one day on eBay and another 287,018 items sold in one year by eBay's Korean partner.

Plugging all those data into the model and testing the outcome in terms of how the auctions turned out, the team found that the probability of submitting a winning bid on an item indeed drops with each bid. "Our analysis explicitly shows that the winning strategy is to bid at the last moment as the first attempt rather than incremental bidding from the start." The study appears in the current *Physical Review E* journal.

The finding is no surprise to Harvard economist Alvin Roth, who has studied sniping from an economics viewpoint since 2002 with colleague Axel Ockenfels of Germany's University of Cologne. They came to similar conclusions. "I think you might do the most good if you advise bidders to form an opinion of how much they are willing to pay for an item, so that they don't get caught up in a bidding war and pay more than they will be happy with," says Roth, by e-mail. "But, that being said, if they know what proxy bid they want to submit, it won't hurt them to submit it very near the end (but neither will it help them much, or often ...) So, sniping is a good strategy, for those with the time to do it," he adds.

A statement on the eBay site says: Sniping is part of the eBay experience, and all bids placed before a listing ends are valid — even if they're placed one second before the listing ends.

BONUS MATERIAL: Dan Vergano's Q&A with Alvin Roth and Axel Ockenfels

1. Do you view sniping as a problem? Some eBay sellers have complained that sniping works to artificially lower auction prices. What is your view?

Ockenfels: Sniping can help bidders to get better prices on eBay. But sellers too can profit from sniping, because the possibility of sniping may attract more bidders. For instance, sniping can lead to more bidding from experts, because by bidding late, experts can avoid giving information to others through their own early bids. Sniping can also increase the excitement and entertainment value of bidding, which again attracts more bidders.

Roth: Sniping is a feature of the auction that eBay bought into when it chose to have a hard close. They must think it adds enough to the auction, in entertainment value, in allowing experts to protect their information, etc. to make up in increased bidders what it loses in lost bids and bidding wars.

2. If your work and this South Korean paper show that sniping is rational and effective, why doesn't everyone use the strategy?

Ockenfels: On eBay, not the last bid but the highest bid wins. Furthermore, last-minute bids sometimes come in too late, after the close of the auction. So, it can be a perfectly sensible strategy to submit a bid early. In fact, depending on the situation, game theory supports both early and late bidding strategies. However, we are also seeing a lot of non-rational, naive behaviors on markets such as eBay. There is no reason to suppose that everybody always behaves in a rational and effective way. This is especially true for eBay, where many

RELATED PAPERS

Roth, Alvin E. and Axel Ockenfels, "Last-Minute Bidding and the Rules for Ending Second-Price Auctions: Evidence from eBay and Amazon Auctions on the Internet," *American Economic Review*, 92 (4), September 2002, 1093-1103.

Ariely, Dan, Axel Ockenfels, and Alvin E. Roth, "An Experimental Analysis of Ending Rules in Internet Auctions," *Rand Journal of Economics*, 36, 4, Winter 2005, 891-908.

Ockenfels, Axel and Alvin E. Roth, "Late and Multiple Bidding in Second-Price Internet Auctions: Theory and Evidence Concerning Different Rules for Ending an Auction," *Games and Economic Behavior*, 55, 2006, 297-320

Axel Ockenfels and Alvin E. Roth, "The Timing of Bids in Internet Auctions: Market Design, Bidder Behavior, and Artificial Agents," *AI Magazine*, Fall 2002, 79-88.

experienced and sophisticated traders interact with many unexperienced, naive bidders.

Roth: EBay isn't an English auction, it is a second price auction with proxy bids. If you're a busy guy, you might find it better to put in an early proxy bid, high enough to have a chance of winning. The winning bidder isn't the last bidder, it's the bidder with the highest proxy bid (and the earlier bidder in case of ties). So sniped bids only get lower prices when other bidders would have been willing to raise their proxy bids, but don't have the chance. That happens often enough so that sniping is a good strategy for those with the time ....

3. How does this new study's approach strike you compared to the one you published in 2002? My understanding was that it rested on game theory, so I'm just trying to see how you see things.

Ockenfels: We closely intertwine game theoretical, laboratory and field analyses. Taken together, our studies help in understanding how the market microstructure qualitatively influence participants' strategies and overall market performance. The new study looks at bidding phenomena from a very different perspective and thus takes a very different approach. It quantitatively analyzes statistical properties of dynamic bidding patterns on eBay — without addressing institutional complexities or equilibrium aspects of behavior.

Roth: We take a lot of approaches, empirical, theoretical, experimental. And so we are able to look into the multiple causes of sniping, and how they are influenced by the auction rules (and why, therefore, there's so much less late bidding on other kinds of auctions, for example.) But the big divide between physics and economics is that physicists tend to study processes that don't have any human volition in them. Molecules do what they do without forming opinions about what other molecules do. Sometimes this physics approach can also yield some insights into large markets, where each player is small enough to be inconsequential. And eBay must have looked that way to the authors of this article, since they report that in one day they have data from 264,073 auctions involving 384,058 distinct bidders. On the other hand, when I look at those numbers, what strikes me is that there were fewer than 2 bidders per auction in their data. To put it another way, a lot of auctions in their dataset had only a single bidder. Obviously conclusions about sniping are going to be different in such auctions (and in our analyses we normally exclude them).

4. Do you see a better auction strategy for online auction?

Ockenfels: What is a good bidding or selling strategy in online auctions depends on the context, such as the degree of competition and the available information about the value of the object. However, there is a fast-growing applied literature in economics on auction/market design and bidding strategies. (See Roth: http://kuznets.fas.harvard.edu/~aroth/papers/engineer.pdf.)

Roth: I think you might do the most good if you advise bidders to form an opinion of how much they are willing to pay for an item, so that they don't get caught up in a bidding war and pay more than they will be happy with. But, that being said, if they know what proxy bid they want to submit, it won't hurt them to submit it very near the end (but neither will it help them much, or often…) So, sniping is a good strategy, for those with the time to do it. (You can also pay a fee to third party sniping software on the web, like esnipe.com or others ....)

5. What do you see as the key point(s) to make to readers about a study like this one? How do the results apply to other auctions?

One of the general lessons that comes out of our research in "economic engineering" is: details matter! For instance, our studies demonstrate that replacing eBay's hard close by a soft close, which allows bidders to always respond to late bids, would remove the strategic incentives to snipe and thus substantially affect bidding behavior. Bidders respond to incentives, and incentives can be strongly affected by the details of the auction rules and algorithms. This is true for all auctions, including, for instance, spectrum, electricity and procurement auctions.

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