

A digital detective roots out 'brushing' in online marketplaces

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Online ratings and reviews are a helpful, if imperfect, guide for potential customers.

There are many ways to game these web-based rating systems. Most are relatively low level: A new author recruits friends to write favorable reviews for Amazon. A bed and breakfast offers free amenities in return for a nice blurb on Yelp or TripAdvisor.

A [graduate student](#) at William & Mary is examining digital review-spoofing on a much more ambitious level. In China, online markets have spawned entire underground communities dedicated to the generation of fictitious reviews. It's known as "brushing."

The digital detective is Haitao Xu, a Ph.D. student in William & Mary's Department of Computer Science. He is currently serving an internship in China with the Chinese e-commerce giant Alibaba Group. He is part of a group working to limit—and hopefully eradicate—the practice of "brushing" on Taobao, the eBay-like subsidiary of Alibaba.

"Brushing" is the practice of arranging fake online [transactions](#) in order to artificially inflate the reputation of an online vendor. Brushing has been a serious problem on Chinese online marketplaces, including Taobao and JD.com. Xu said he knows of no brushing problems on sites such as Amazon and eBay, but he cautions that the English-language sites are by no means immune from such manipulation.

"The problem could happen on those two marketplaces too, since they adopt the similar reputation system to help buyers make decisions and the sellers have the same motivations to escalate their reputations as the sellers on Taobao," Xu explained.

Xu is among the world's leaders in computer detection of brushing activity. Along with Daiping Liu and Haining Wang of the University of Delaware and Angelos Stavrouis of George Mason University, Xu is an author of one of the first scholarly papers to identify the brushing phenomenon. "E-commerce Reputation Manipulation: The Emergence of Reputation-Escalation-as-a-Service" was presented at the 24th International World Wide Web Conference. Xu and his collaborators describe the practice in detail as well as the emergence of online "black markets" that are essentially brushing job boards.

"They connect the sellers and the cheap laborers, and operate in the form of crowdsourcing, exactly like Amazon Mechanical Turk," Xu explained. "They allow insincere sellers to post fake-transaction assignments on their platforms."

Brushing is simple to explain: A Taobao vendor uses one of the job boards to recruit people willing to conduct fictitious transactions and then submit a glowing review of the product and seller's service as well as the highest possible rating. All this for a price, of course.

Xu and his colleagues refer to the brushing community as "seller-reputation-escalation" markets, or SREs. In their paper, they reported infiltrating five SRE markets and studying them all day-by-day over a period of two months. They found that brushing is widespread and involves large amounts of money.

"These transactions earned at least \$46,438 in revenue for the five SRE markets, and the total value of merchandise involved exceeded

\$3,452,530," they state in their paper.

The typical brushing transaction includes no product delivery. At most, Xu says, a brushing vendor might ship an empty box to maintain the illusion of legitimacy, but usually a printed shipping label is all that has been required to verify that a transaction has taken place.

Brushing, Xu said, is all about making a vendor stand out from the competition. He said that about half of the SRE fictitious transactions studied were for apparel, especially women's clothes; the remainder was mostly divided among software and phone cards. There seems to be no link between brushing and low-grade merchandise, he added.

"One goal of SRE sellers is to create an illusion of 'bogus boom' and attract potential customers to place orders by leveraging the herd mentality," he said. "Another goal of SRE sellers is to receive a top rank in the search result list."

Xu explained that the SRE vendors are using brushing to try to climb to the top of Taobao's internal ranking system. The methodology of this system is not revealed to buyers or sellers, but Xu says it's widely believed that a key metric is based on monthly transaction volume. Therefore, the SRE group expects that any increased volume will bring their Taobao product more hits.

For a time, a shady website called Empire offered what Xu and his co-authors term a "trustee" service for vendors looking for a short cut to good ratings. The trustee service offered an illicit way for vendors to buy a better reputation. Empire posted a menu of reputation-hike options, along with the cost for each. For \$96, a seller could buy a reputation increase of 251, placing them among single-diamond Taobao sellers. A move of several notches up, into the single-crown grade, requires a seller to pay Empire \$2,080. These reputation hikes require no

transactions—even fictitious ones.

"This service is quite attractive," the paper states, "since a legitimate seller may need several years to achieve the same reputation level, and even an insincere seller must tediously post about 10,000 tasks on SRE markets."

Xu says that it's most likely that the trustee service was set up by either hackers or by someone operating from within Alibaba. In any event, the trustee service didn't last very long and Empire's site was taken down, likely by a law enforcement agency in China, Xu said.

SRE activity is a concern to Alibaba's corporate manager, especially as the online market had its initial IPO last September. The whole brushing concept, Xu said, erodes trust, the most valuable component of an online marketplace. Once trust is gone, he added, the customer follows.

"The reputation system establishing the trust between sellers and buyers is ruined," he said. "Consumers have no ideas about the quality of online products based on the ratings and customer reviews of the sellers, when it's possible that the ratings and reviews are given by the hired human laborers."

To maintain that trust, Alibaba has established a slate of punitive measures that ranges from removal of any reviews/rating points generated by SRE activity up to completely shutting down the online stores of serious offenders.

Xu's paper laid the groundwork for identifying SER markets and now Xu is part of a not-so-small Alibaba army of coders and other computing professionals dedicated to network detection of brushing behavior and SRE markets.

"Nearly 1,000 technical experts have developed advanced algorithm models to detect fake transactions, bad buyers and bad sellers," he said. "Those models are quite effective and it is said that nearly 99 percent of fake transactions could be identified."

Xu is working on a new paper on brushing, focusing on Taobao's efforts to crack down on fake transactions. He will continue to work at his Alibaba internship until returning to William & Mary in November.

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