Consumers make decisions based on how and why products are recommended online

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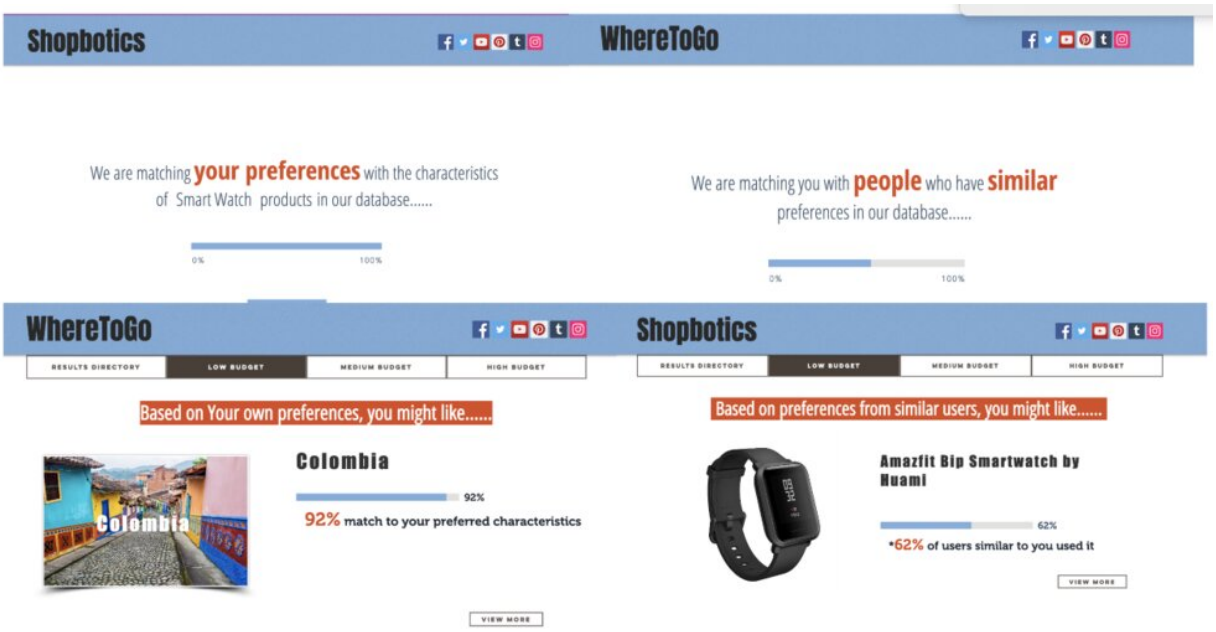

As more people go online for shopping, Penn State researchers suggest that consumers may not be responding to just what product or experience are offered through ecommerce recommendation systems, but also how and why they are recommended. Credit: Pennsylvania State University

As more people go online for shopping, understanding how they rely on e-commerce recommendation systems to make purchases is increasingly important. Penn State researchers now suggest that it's not just what is recommended, but how and why it's recommended, that helps to shape

consumers' opinions.

In a study, the researchers investigated how people reacted to two product recommendation systems. The first system generated recommendations based on the user's earlier purchases—often referred to as content-based recommendation systems. The second provided recommendations based on what other people bought—called collaborative recommendation systems.

The researchers, who report their findings in the *Journal of Advertising*, found that people who like to think and solve problems for themselves—a personality type the researchers describe as "high need for cognition"—find content-based recommendations more persuasive. However, those who are low in their need for cognition are more persuaded by collaborative recommendation systems, which may serve as a signal that other buyers have already vetted the product for them.

The nature of the recommendation system and its degree of confidence in suggesting the right products can be very important in guiding people when making online purchases, said S. Shyam Sundar, James P. Jimirro Professor of Media Effects in the Donald P. Bellisario College of Communications and co-director of the Media Effects Research Laboratory.

"In the pre-Internet era, before artificial intelligence, we would ask another person at a cocktail party, 'I heard you went to Italy, can you give me some recommendations, I'm going there next month,' as a way of gathering information for making our decisions," said Sundar, who is also an affiliate of Penn State's Institute for Computational and Data Sciences. "Now, we go online and can access information from just about everybody who has gone to Italy last month, not just the friend you ran into at the cocktail party. You are now able to get that information about the collective experience of others, as well as how it squares with

your own background and prior travels."

According to Mengqi Liao, a doctoral student in mass communication and first author of the paper, a subtle "bandwagon effect" may be persuading people.

"From a layperson's perspective, we might not know that these are actually two different recommendation systems," said Liao. "One system might just tell the customer that the recommendation is based on what they bought before. But the collaborative recommendation system conveys that a lot of other people bought this product, which adds another layer of persuasive appeal."

The researchers also found that the effectiveness of the recommendation systems was tied to the type of product that the system recommended. When making decisions about experiences, such as movies, travel destination and dining, consumers with a high need for cognition were more likely to respond to information about the extent to which the recommended product reflects their personal preferences—expressed in terms of percentage match of products recommended by content-based filtering systems.

However, consumers with low need for cognition preferred collaborative filtering because they were more persuaded by the percentage of other people who purchased the recommended item, which also promoted their intentions to buy the item.

Such differences were not found for recommendations of "search products," information about which can be obtained by searching online. Both personality types preferred collaborative recommendation systems.

"You can think of it as a sort of cognitive outsourcing," said Sundar. "A customer might see the ad for a smart watch, for example, and see the

features, but think, 'I'm not going to do the hard work of examining all the details and coming to a conclusion of which is better, I'll just outsource this to others.' If they say it's a good smart watch, then they'll buy it."

According to Liao, most research into recommendation systems focuses on optimizing the suggestions of these systems. These findings suggest that developers may need to consider other factors, such as personality types and product types, for improving the user experience of their systems, rather than on focusing solely on the accuracy of their algorithm's suggestions.

"A lot may depend on how users receive the information on the recommendations provided by the systems," said Liao. "It matters why these systems are providing the recommendations for products and experiences."

The researchers recruited 469 people on an online crowdsourced microtask site for the study and randomly assigned them to an experimental website that either used a collaborative or content filtering algorithm.

For collaborative systems, the researchers used a percentage range to indicate how many similar people used the recommended product—or percentage match—and serve as a cue for the bandwagon effect. For content-based systems, the same percentage numbers were used to suggest the extent to which the recommended product matched the consumer's personal characteristics based on their user profile. There were three levels of percentage match indicators—low, medium and high.

In testing the two different types of products—search and experience—the researchers used a smart watch recommendation as an

example of a search product and a tourism destination recommendation to explore participants' reactions to experience products.

Before they browsed the e-commerce site, all participants responded to a series of questions to determine whether they were high need for cognition, or low need for cognition, personality types.

Because the researchers only tested two products and two common recommendation systems, future research could look at the psychological effects of other systems and investigate other types of products. The researchers said this could help verify the validity of their findings.

More information: Mengqi Liao et al, When E-Commerce Personalization Systems Show and Tell: Investigating the Relative Persuasive Appeal of Content-Based versus Collaborative Filtering, *Journal of Advertising* (2021). DOI: 10.1080/00913367.2021.1887013

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