MONELL CENTER
ADVANCING DISCOVERY IN TASTE AND SMELL

Media contact: Leslie Stein, 267.519.4707 or stein@monell.org

Big Data Says Food Is Too Sweet
Text-mining analysis of Amazon customer reviews suggests foods are over-sweetened

PHILADELPHIA (June 24, 2019) – New research from the Monell Center analyzed nearly 400,000 food reviews posted by Amazon customers to gain real-world insight into the food choices that people make. The findings reveal that many people find the foods in today's marketplace to be too sweet.

"This is the first study of this scale to study food choice beyond the artificial constraints of the laboratory," said study lead author Danielle Reed, PhD, a behavioral geneticist at Monell. "Sweet was the most frequently mentioned taste quality and the reviewers definitively told us that human food is over-sweetened."

The study used data posted on an open-source data science site to examine 393,568 unique food reviews of 67,553 products posted by 256,043 Amazon customers over a 10-year period. Using a sophisticated statistical modeling program to identify words related to taste, texture, odor, spiciness, cost, health, and customer service, the scientists computed the number of reviews that mentioned each of these categories.

"Reading and synthesizing almost 400,000 reviews would essentially be impossible for a human team, but recent developments in machine learning gave us the ability to understand both which words are present and also their underlying semantic meaning," said study coauthor Joel Mainland, PhD, an olfactory neurobiologist at Monell.

The focus on product over-sweetness was striking, as almost one percent of product reviews, regardless of food type, used the phrase "too sweet." When looking at reviews that referred to sweet taste, the researchers found that over-sweetness was mentioned 25 times more than under-sweetness.

The findings, published online in advance of print in Physiology & Behavior, indicated that over 30 percent of the Amazon food product reviews mentioned "taste," making it the most frequently-used word.

Drilling down, the scientists found that sweet taste was mentioned in 11 percent of product reviews, almost three times more often than bitter. Saltiness was rarely mentioned, a somewhat surprising finding in light of public health concerns about excess salt consumption.

Seeking to better understand individual differences in how people respond to a given food, the scientists also looked at responses to the 10 products that received the widest range of ratings, as defined by the variability in the number of stars the product received. They identified two factors that tended to account for polarizing reviews related to a product: product reformulation and differing perspectives on the product's taste. With regard to taste, people often rated the sweetness of a product differently. Response to a product's smell also contributed to differences in opinion about a particular product.

"Genetic differences in taste or olfactory receptor sensitivity may help account for the extreme reactions that some products get," said Reed. "Looking at the responses to polarizing foods could be a way to increase understanding of the biology of personal differences in food choice."

Together, the findings illustrate the potential uses of big-data approaches and consumer reviews to advance sensory nutrition, an emerging field that integrates knowledge from sensory science with nutrition and dietetics to improve health. Moving forward, similar methods may inform approaches to personalized nutrition that can match a person's sensory responses to inform healthier food choices.

Also contributing to the research, which was funded by institutional funds from the Monell Center, was Charles Arayata of Monell.

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The Monell Chemical Senses Center is an independent nonprofit basic research institute based in Philadelphia, Pennsylvania. Founded in 1968, Monell science improves human health and well-being through the understanding of taste, smell, and the related senses. Using an interdisciplinary approach, scientists collaborate in the programmatic areas of sensation and perception; neuroscience and molecular biology; environmental and occupational health; nutrition and appetite; health and well-being; development, aging and regeneration; and chemical ecology and communication. For more information about Monell, visit www.monell.org.