

Cover sheet

NATIONAL UNIVERSITY OF SINGAPORE

SP1541/ES1541 EXPLORING SCIENCE COMMUNICATION THROUGH POPULAR SCIENCE

Assignment: Science News Article 2

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Tutorial Group: S04

Major(s): Data Science and Analytics

Selected research article for **Science News 1**:

Category: C Discipline: Mathematics

Selected research article for **Science News 2**:

Category: B Discipline: Food Science and Technology

Investigating the relationship between culture and sweet-sour taste interactions

Are we correct to stereotype taste perceptions and preferences based on different cultures?

By: Harry Chang (31 October 2020)

Imagine that you are drinking a glass of margarita. After that first sip, you find that your drink is too sour. You then lick some of the salt from the rim of the glass before taking a second sip. You find that now, the margarita tastes less sour! This is a perfect example of a taste interaction between different taste qualities.

When two or more taste qualities interact, they affect the perception of one another. The taste qualities involved can either enhance or suppress one another, which is dependent on their concentrations.

Previous studies have shown that cultural differences do affect taste sensitivities and taste interactions amongst different individuals. For instance, a US study discovered that taste sensitivities across all five taste qualities are lower amongst individuals of African-American and Hispanic origin compared to Caucasians. Another study also revealed that Taiwanese students tend to have higher sweetness sensitivity compared to their American counterparts.

Thus, a new study has sought to validate the above-mentioned findings. Conducted by a group of Danish and Chinese researchers earlier this year, this cross-cultural study suggested that culture does affect taste interactions to a certain degree. In particular, Danish consumers experienced a smaller extent of sourness suppression by the sweetness of sucrose as compared to their Chinese counterparts.

To the researchers' surprise, they discovered that the vice versa does not prove to be true. As they could not establish a relationship between culture and the extent of sourness suppressing sweetness, this suggests that the differences in taste perception may need to be further classified at the individual level.

So, in the first place, how does the suppression between sweetness and sourness occur?

Sucrose, widely known as table sugar, undergoes hydrolysis to be further decomposed to glucose and fructose. This process can be quickened by introducing acids such as citric acid, commonly present in fruit juices. As such, hydrolysis reduces the formation of sugar crystals, explaining how sourness can suppress sweetness.

Let us now try to break down this process from another perspective. Citric acid, for instance, has an estimated pH of 2.2, which exemplifies its relatively high acidity to its sourness. On the other hand, sucrose is known to be slightly alkaline – and a bit bitter, given its higher pH value of 8. However, when citric acid is introduced to sucrose, the resultant solution will have a pH range between 4 to 7. Simply put, we can also make use of the same reaction to explain how sweetness suppresses sourness.

To further appreciate the findings of the study, we should also understand how taste sensitivities relate to taste preferences.

In a separate study conducted by Canadian researchers in 2019, there is evidence of a relationship between certain taste sensitivities of consumers and their taste preferences. In particular, sweetness and saltiness were revealed to be less preferred by consumers who recorded higher sensitivities in these two taste qualities.

As such, the study sought to investigate how these taste interactions vary between both cultures. The Danish and Chinese test subjects evaluated six liquid mixtures: namely water, sucrose, tartaric acid, citric acid, a mixture of sucrose with tartaric acid and sucrose mixed with citric acid. Both citric and tartaric acids were used as samples to exhibit the taste of sourness, while sucrose was used to exhibit sweetness.

Participants were tasked to taste one sample at a time, with a 30 second break in between after rinsing their mouth with water. For each sample, the taste sensitivity was evaluated on a 9-point scale, with 1 being 'not at all' and 9 rated as 'extremely' sweet or sour, depending on the sample.

For samples containing a mixture of sweetness and sourness, they were evaluated with an additional 'Just About Right' (JAR) scale to measure the appropriate concentrations of sucrose and acids based on each individual. Together with the taste sensitivities, the JAR ratings for each sample were recorded using a questionnaire. Data collected from this questionnaire was later used for further analysis.

On average, the Danish consumers consistently recorded higher sweetness sensitivities than their Chinese counterparts. This further explains how the researchers concluded that sucrose had managed to suppress tartaric acid to a greater extent in Chinese consumers compared to the Danish consumers.

The researchers added that based on their research on similar studies, a Caucasian population generally tends to have a lower taste sensitivity for sweetness, sourness, saltiness and bitterness than an Asian population. Since an inverse relationship between taste sensitivity and taste preference has been established from the Canadian study, comparing the taste sensitivities of these Chinese and Danish consumers may therefore not be entirely representative of the 'East vs. West' comparison.

In addition, the researchers could not conclude if culture had a role in sweetness suppression by sourness. This is because the results had varied between each individual, regardless of whether they were Chinese or Danish.

Upon obtaining the necessary readings, the test subjects were later divided into three different clusters based on their relative sensitivities to sourness. For instance, consumers with similarly low sourness sensitivity were grouped together under the same category. This may be due to the high suppression of sourness by sweetness.

This same method of classification based on sweetness was also performed on these customers. Likewise, each cluster comprised of both Chinese and Danish consumers. While

there were certain trends that may imply a relationship between culture and taste interactions, the researchers could not affirm this conclusion upon further analysis.

Overall, beverage manufacturers stand to benefit most from the results of the study. In order to boost their sales revenue, they would need to re-evaluate their product segmentation strategies to diversify their target consumer range. Instead of focusing on culture, these companies may wish to explore other variables such as age and gender instead.

With this stereotype debunked, do we now expect people of different cultures to appreciate unique drinks such as sugarcane juice with lemon the same way? Only time and experience will tell.

(991 words)

References: (use APA; provide clickable links; highlight main RA)

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Williams, J. A., Bartoshuk, L. M., Fillingim, R. B., & Dotson, C. D. (2016). Exploring ethnic differences in taste perception. *Chemical senses*, 41(5), 449-456. Also available from <https://academic.oup.com/chemse/article/41/5/449/2366044>

Reflective commentary 2

I used my supplementary source on the Canadian study to expand the evaluation of the main research article. I felt that it was important to first provide evidence that there is a relationship between taste sensitivities of consumers and their taste preferences. This relationship is explored again later in the article when I mentioned that it is not entirely accurate to compare the taste sensitivities of Chinese and Danish consumers to that of the Asian vs Caucasian population on average. This helps to provide further insights of the evaluation of the main research article.

The research article also lacked in the scientific explanation of how sucrose and the weak acids interact to suppress one another. To tackle this, I attempted to explain with the concept of hydrolysis of sucrose. I also avoided the use of the word 'catalyst', instead simplifying by saying that 'the reaction is quickened with the presence of acid'. I felt that 'catalyst' was too technical of a word for non-chemistry readers to understand.

do elaborate more on this

Why was this better?
Analyse how it achieved its intended aim?

There was also a paragraph on comparing the pH values of the different chemicals. I ensured that along with the words 'acidic' and 'alkaline', I complemented them with the words 'sour' and 'bitter' respectively. This would ensure that readers could better relate pH value with the degree of sourness and bitterness.

In addition, I included the usage of pronouns and questions to ensure that the dialogic features were consistent throughout my news article.

(243 words)

heavy attempt
wrote to focus
on some key
language choices

could reflect more
deeply on some choices
wrote

you
handle
above
common
terms?

Many the science news article has some
potentially useful ideas. Further clarification is
needed. - There was a series of studies
mentioned - There's need for clearer
logical flow. To develop & make clear
the logical connection. To develop
significance of key findings. Writing is
generally suited to science news.