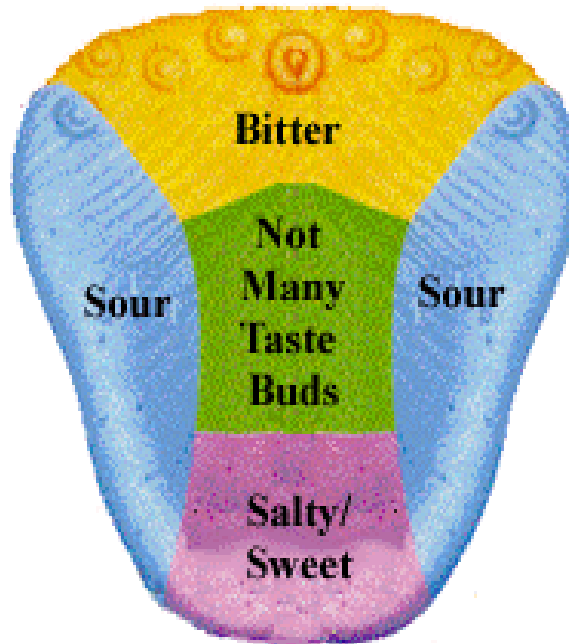


Does Gender Effect How People Taste Sugar?



Hypothesis

This experiment tests the difference of the sensitivity to sugar on the taste buds of boys and girls between the ages of 12-15. According to Natalie Rigal, it is expected that girls would taste sugar more easily than boys because during puberty girls become more sensitive to a sugary taste¹. Therefore, the taste of sugar is stronger in girls' mouths. If girls have more perceptive sweet taste receptors, then they will more accurately indicate the content of sugar at lower concentrations in a set of varying water solutions. The comparison of gender is the independent variable. A set of four solutions with concentrations varying from .1M to .125M will be used to test subjects. To ensure a fair test, 28mL samples of each concentration solution, plus one 28mL sample of distilled water, are randomly set up for each subject. The lowest concentration of the solution that a subject identifies as having sugar is recorded. Each subject must have a cleansing drink of distilled water between each 28mL sample tasted. Each subject is treated the same with a set routine for each person.

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¹ http://www.t-fal.ca/tefal/kids_corner/taste/developing_taste.asp

Does Gender Affect How People Taste Sugar?

Introduction

It is a common belief that youth drink a lot of pop and consume too much sugar. This experiment tested the sensitivity of adolescent, human tongues to sugar. An average can of Pepsi contains 41g of sugar² and is a favourite drink of this age group. This experiment is to show the smallest amount of sugar that a subject can taste, compared by gender.

In this experiment, the sugar taste threshold was measured. Sugar taste threshold is the lowest concentration at which a subject can taste sugar. Five concentrations of sugar were tested on male and female adolescents aged 12-15 to see which gender is more sensitive to lower concentrations. Molarity is the number of mols of solute dissolved in one litre of solution³. The concentrations that were tested were: 18g of sugar in 1L of distilled water (.1 M), 9g of sugar in 1L of distilled water (.5 M), 4.5g of sugar in 1L of distilled water (.25 M), and 2.25g of sugar in 1L of distilled water (.125 M). Distilled water was used as a control.

The tongue has four main taste areas. The tip of the tongue is more sensitive to sweet, the back to bitter, the front-sides to salty, and the back-sides to sour⁴. It has recently been discovered that taste buds are not just clustered in these places but are scattered all over the tongue. However, they are more prominent in the four main taste areas⁵. In general, girls have more taste buds than boys do⁶. Taste research is a booming business with scientists investigating all five basic tastes: sweet, sour, bitter, salty, and umami (the pleasing taste of protein)⁷.

In the real world, this experiment could be used by drink and food producers to increase sales and profit. By lowering the sugar content in foods or drinks, they could possibly attract health conscious customers. More and more people are looking for a low calorie product or a product that "Now contains less sugar than ever before."

The amount of liquid mixture given to each subject was taken into consideration to ensure that no subject was ingesting more sugar than another subject. Guidelines regarding the use of human subjects in Science Fair projects as set out by the YSF have been taken into consideration during this experiment⁸.

² <http://www.saveharry.com/liquidcandy.html> 14/02/2005

³ <http://dl.clackamas.cc.or.us/ch105-04/molarity.htm> 21/02/2005

⁴ http://www.aromadictionary.com/articles/tonguemap_article.html 14/02/2005

⁵ Discover Magazine Volume 26, Number 3 17/02/2005

⁶ <http://library.thinkquest.org/3750/taste/taste.html> 17/02/2005

⁷ Discover Magazine Volume 26, Number 3 17/02/2005

⁸ www.ysf.ca 15/02/2005

Materials

- Sugar
- Distilled water
- Five 1 L bottles or ten ½ L bottles
- Blank, white stickers
- Five different colours of markers
- A digital scale
- Funnel
- 30 ml plastic cup with 28 ml fill line.

Method

Making the Solutions:

- 1) Measure exactly 1L of distilled water into five water bottles.
- 2) Add 18g of sugar to the water of the first water bottle. Shake until dissolved.
- 3) Add 9g of sugar to the water of the second water bottle. Shake until dissolved.
- 4) Add 4.5g of sugar to the water of the third water bottle. Shake until dissolved.
- 5) Add 2.25g of sugar to the water of the fourth water bottle. Shake until dissolved.
- 6) Fill the last water bottle with just distilled water.

Doing the Experiment

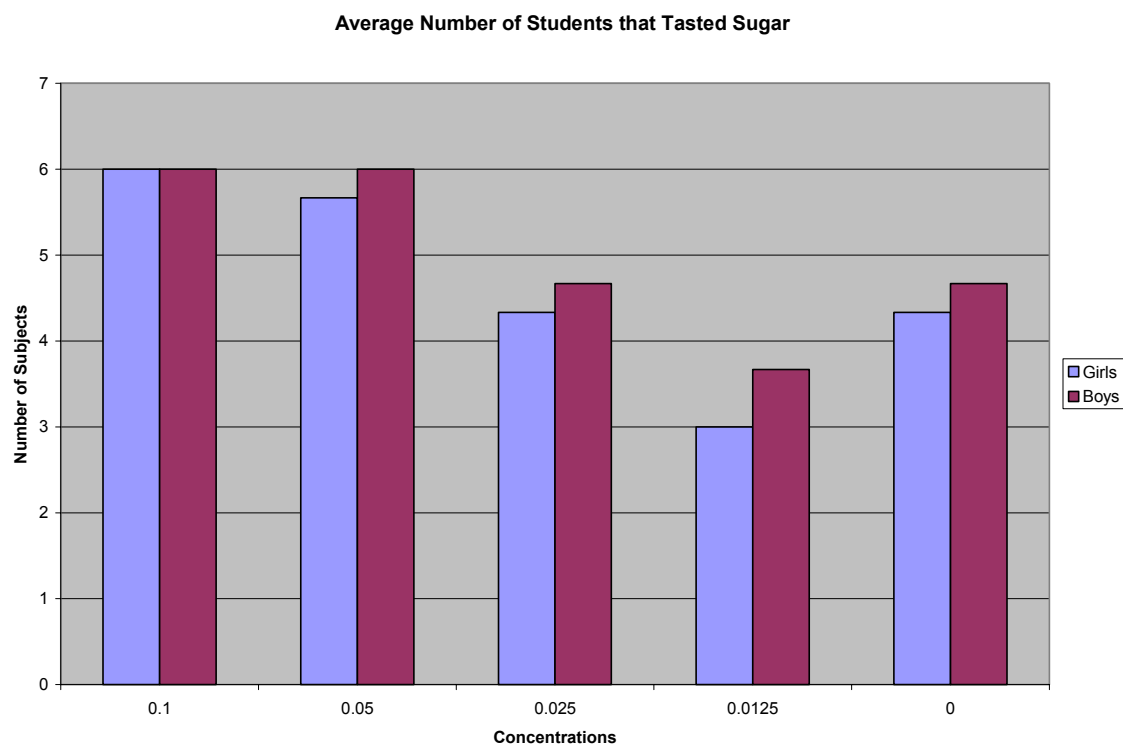
- 7) Fill five 30mL glasses with one of each of the five concentrations.
- 8) Mark the concentration on a piece of masking tape and place it on the corresponding glass.
- 9) Randomly set up glasses so concentrations are not predictable. Ask the subject to drink from each cup with a cleansing drink of water between each drink. The subject is to indicate whether or not each solution contains sugar. Record the lowest concentration in which the subject indicated the presence of sugar. If the subject tells you there is sugar in the glass that only contains distilled water, then you know there is either something in the water or the subject is not telling the truth. This could give an inaccurate measurement that would mess up the overall average at the end of the experiment.
- 10) Repeat steps 7-9 on the next two consecutive days for a total of three days data.

Observations:

A Comparison of the Average Number of Subjects (age 12-13) that Accurately Tasted Sugar in Dilute Solutions

| Number of Subjects that Accurately Tasted Sugar When Given a Random Taste Test of Sugar Solutions of Varying Concentrations | | | | | | | | | | |
|---|-------|------|-------|------|-------|------|----------|----------|----------|----------|
| Concentration (in M) | Day 1 | | Day 2 | | Day 3 | | Averages | | | |
| | Girls | Boys | Girls | Boys | Girls | Boys | Girls | STD | Boys | STD |
| 0.1 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 0 | 6 | 0 |
| 0.05 | 5 | 6 | 6 | 6 | 6 | 6 | 5.6667 | 0.57735 | 6 | 0 |
| 0.025 | 3 | 5 | 4 | 3 | 6 | 6 | 4.333333 | 1.527525 | 4.666667 | 1.527525 |
| 0.0125 | 3 | 5 | 4 | 4 | 1 | 3 | 3 | 1.732051 | 3.666667 | 0.57735 |
| 0.0 | 4 | 3 | 5 | 5 | 4 | 6 | 4.333333 | 0.57735 | 4.666667 | 1.527525 |

A Comparison of the Average Number of Subjects (age 12-13) that Accurately Tasted Sugar in Dilute Solutions



Conclusion

It can be concluded that the hypothesis of this experiment was incorrect. Girls were expected to taste lower concentrations of sugar than boys because girls have more taste buds⁹ and because during puberty girls become more sensitive to sugary tastes¹⁰. However, it was found that girls and boys taste sugar equally well at low concentrations. Results showed the following: on day 1, boys tasted lower concentrations of sugar more accurately, on day 2, girls tasted lower concentrations of sugar more accurately, on day 3, girls and boys were comparatively equal. The variance (STD) in the average results indicates that the difference in ability to taste sugar at low concentration is likely insignificant.

An error that could have caused inconsistencies in the result is the focus and calmness of the subject while consuming the sugar/water mixture. This could affect how long the solution was kept in the mouth, as well as how much sugar went down the throat, and how quickly. Since the taste buds sensitive to sugar are at the tip of the tongue, if the sugar was consumed too fast, the sugar would not have had as long a time to make an impact. Therefore, a higher concentration of sugar would have been required before the subject would be able to identify the sugar content. The equipment used to make solutions for this experiment was accurate and precise to 1.0g of sugar.

⁹ <http://library.thinkquest.org/3750/taste/taste.html>

¹⁰ http://www.t-fal.ca/tefal/kids_corner/taste/developing_taste.asp

If this experiment was to be done again, the following changes should be made: subjects should be placed in an environment where there are no distractions, the equipment used should be accurate and precise to .25g so the measurements are not estimates.

If one was to further investigate gender differences in taste thresholds, they could investigate the effects of saltiness, bitterness, sourness and umami.

This experiment is very useful to scientists studying the effects of taste on gender. Based on the results of this experiment, **it would appear gender based taste differences are not present in adolescents.**

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