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Gender and Ability to Distinguish between  
Sugar-Free and Sugar Peppermints

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*Do men and women have the same ability in distinguishing sugar free peppermints from regular, with sugar, peppermints? Many would say that women have a stronger sense of taste and smell, possibly due to motherly instincts. Fourteen male and fourteen female students from the Human Subject Pool at Lindenwood University participated in the study. The students were asked to taste two peppermints and record, which they thought was sugar free. The results revealed no statistically significant sex difference in the student's ability to identify the sugar-free candy. However, there was a significant finding in order effects. Seven out of the eight participants who could not tell differences between the mints, were administered the sugar-less mint first.*

Is there a difference in men and women's ability to distinguish between sugar free candy and regular candy that contains sugar? I have heard people say that women have a stronger sense of taste. Research shows that women are more likely to be super-tasters than males (Hunter, 1998). Super-tasters have more taste buds than medium or non-tasters. Women are more able to taste PROP (6-n-propylthiouracil), which means sweet food tastes sweeter and bitter foods tastes more bitter. Super-tasters are more sensitive to different tastes.

Much of the research about the differences in men and women's taste ability supports that women tend to be better tasters. Women might be more sensitive to taste

and smell due to innate motherly instincts. “More women than men are super-tasters, perhaps because bitter is the skull and crossbones of the natural world, and evolution once favored mothers with superior poison-detecting systems (Gadsby, 2000).”

Tasting ability is said to be genetic. Scientist have had difficulty locating which areas, gene, or protein is responsible for the sensory of sweet taste. Nicholas J.P. Ryba with the National Institute of Dental and Craniofacial Research in Bethesda, Md. and Charles Zucker of the Howard Hughes Medical Institute at the University of California, San Diego both played a part in locating the sweet-receptor gene in 1999. Later research by Y. Gopi Shanker of the Mount Sinai Team and another group headed by Jean Pierre Montmayeur of Harvard Medical School found genes that resembled those revealed of Ryba and Zucker. As a result of their research a gene called T1r3, is a likely basis for the tongue’s sweetness sensor as cited in (Netting 2001).

Based on these findings and thoughts, I hypothesized that more women than men will be able to distinguish the sugar free peppermints from the regular peppermints that contain sugar.

The experiment lasted about five to seven minutes. The students were asked, in this order, to eat a pretzel for one minute, suck on a peppermint for one minute, eat a pretzel for one minute, and lastly suck on another peppermint for one minute. The participants ate a pretzel before each peppermint as a goal to make the conditions for each student similar. The students were given verbal directions throughout the experiment. The order to which each student received the peppermint was counterbalanced. Half of the students received the sugar free mint first and the other half received the sugar mint first. Counterbalancing should minimize the order effects. After

sampling both mints the students were asked to record which mint they thought was sugar free.

## Method

### *Participants*

The target number of participants was 20 or more students. The students were recruited from the human subject pool at Lindenwood University. An equal number of men and women would be beneficial and useful for comparing the gender differences in tasting ability.

### *Materials*

The experimenter needed 30 of the following items: consent forms, feedback letters, student receipts, answer sheets, questions sheets, white napkins, and 1ft. x 6-inch paper towels. The paper towels are for setting the peppermints and pretzels on. The white napkins are for covering the peppermints so the students will not be influenced by the appearance of the peppermints. The experimenter also needed seven pens, six chairs, a stopwatch, and one large table in a quiet area and a notebook.

The experimenter used a bag of Rold Gold pretzels. Before sucking on each peppermint the students were asked to eat a pretzel. Each student received two pretzels total. The kind of pretzel doesn't matter as long as everyone gets the two pretzels of the same brand. In this experiment the participants sampled Rold Gold Larger Pretzel twist. The experimenter also needed one bag of Bob's regular sugar peppermints and 2 bags of Bob's sugar free peppermints. Each student that participates got one sugar free peppermint and one regular peppermint.

*Procedure*

This study is a between groups experiment because the difference between males and females is being tested when tasting peppermints.

The experiment consisted of sessions with no more than six students at a time. Before the students were able to sit down at the table the table was already set up for each student. Each student's setting consisted of these things: one paper towel on the table with (from right to left) a pretzel, then the first peppermint, another pretzel, and then the last peppermint. The first and second peppermints were different because one was sugar and the other was sugar free. The order to which the students received the mints were counterbalanced to minimize the order effects. The mints were arranged a little higher on the paper towel than the pretzels. This arrangement allowed the experimenter to cover the mints with a napkin without covering the pretzels. The mints were covered up with a white napkin to where the pretzels are visible at the bottom of the paper towel.

Then from right to left, the answer sheet was upside down underneath the paper towel. It was sticking out about 3 inches above the paper towel so the participants could clearly see where the paper was but cannot see the words. The answer sheet included three things: A student code at the top, the statement "Circle which one was sugarless?" and a choice of A or B at the bottom. The answer sheet was only wide enough to fit the information needed above.

Then on the left of the answer sheet was a question sheet that was upside down to where the words weren't visible. At the top of the question sheet were directions that asked the students to circle their answer. Also at the top of the question sheet was an option to circle whether they were male or female. The question sheet asked "If you had a

choice in candy which would you choose?" The choices were, regular with sugar, sugar free, or no preference. It also was sticking out about 3 inches so it was clearly visible. The answer and question sheets were about 4 inches apart. Lastly, each participant had a consent form and pen on the right or left of him or her lying flat with plenty of room to read and sign the form without disrupting the set ups.

The experimenter charted and coded the sequence of the mints. For example, at the top of the answer sheet there was a color and number (blue 2). This was the code that was discussed earlier when describing the answer sheet. The experimenter needed a notebook aside from the experiment to write blue 2 and whether the sugar (A) or sugar free (b) was first. So, in the answer key Blue 2 b meant that if the participant circled b then the participant was right in choosing which one was sugar free.

After all six spots are set up the students may enter and sit at any spot he/she chose. As the students entered they were given verbal warning not to disturb the set ups and not to lift up the napkins. When they found a spot they were asked to read and sign the consent form. After they read the consent form the experimenter briefly went over it again so the students clearly understand the information presented in the consent form. Then the students were asked if they had any questions as the consent forms were being collected. The experiment began when the students were done asking questions or if the participants didn't have any questions.

To start the experiment, the students were given a verbal overview of how the experiment would run. The students were told, starting from their right, they will be asked to eat a pretzel, then suck on a mint, then eat another pretzel, and then suck on the last mint. They will have a minute to do each task. Also, remind them not to lift up the

napkin and look at the mints. The over view should took less than a minute. Before starting, the students were asked if they had any questions and remind them that they will receive more instructions as they move to each task. Also remind the students of their actual task which to figure out which one is sugar free.

If and when the students were ready they were given the go ahead to eat the first pretzel while being timed for one minute. Every student had to eat the whole pretzel in one minute. When 30 seconds had elapsed they were told they still had 30 seconds as the experimenter gave them further instruction on how to pick up the first mint. They were to slightly raise the napkin and slide their hand under to find the first mint on the right. They were instructed that on the go ahead to suck on the mint, they are to closed their eyes, tilted their head up, and then put the mint in their mouth. They were reminded as they put the mint in their mouths not to chew or bite the mints. They were to only suck on the mints. The students had one minute to suck on the mint.

After 30 seconds had elapsed, they were told they still had 30 seconds, and started to receive instructions on how to take the mint out of their mouth. They were told to have a grasp of the napkin with one hand and the mint with the other hand. Then they took the mint out of their mouth and placed it under the napkin with their eyes closed. It was still important that they do not look at the mint. When the participants placed the mint back under the napkin then the participants repeated the same procedure for the second pretzel and mint.

After the student finished with the last mint, they were asked to turn over the first paper, sticking out from the paper towel on the right. That was the answer sheet. The experimenter let them know that A was the first mint on the right and B was the second

mint on the left. They were asked to read the question and answer it. They were instructed that as soon as they answered to turn over the paper. After everyone had turned over their paper, they were instructed to pick up the paper sticking out on the left and answer that question. That was the question sheet. They were reminded to answer whether they were male or female and to answer the question. After they were finished they were to flip that paper over too. When everyone was done then the experimenter administered a feedback letter. They were verbally told the experimenter's name and contact information was on the feedback letter if they would like to know more about the study. They were told the hypothesis, which is more women than men will be able to distinguish the sugar free mint from the peppermint that contains sugar. Any questions were answered. Lastly they were given student receipts showing they participated in the study and were thanked for coming.

### Results

In order to test the hypothesis that more women than men would be able to distinguish the sugar free peppermints from the regular, with sugar mints, a chi-squared test was conducted. The participant's answers were the dependent variable and gender (male or female) was the independent variable. The results revealed no statistically significant effect of gender on the ability to distinguish sugar free peppermints from regular peppermints,  $\chi^2(1)=.000$ ,  $p=1.000$ . See Appendix 1.

Other findings include, a chi-squared test conducted with sequence of the candy and whether the participants recorded the correct answer. The results revealed a statically significant effect of the sequence of the candy on the ability to distinguish the sugar free peppermints from the regular peppermints,  $\chi^2(1)=5.184$ ,  $p=.023$ . See Appendix 1.



A  $t$ -test was initially used when analyzing the results but it was found to be not significant when comparing gender with those who answered correctly or not,  $t(27), p=2.052$ .

The students were also asked whether they would prefer sugar free candy, candy with sugar or no preference. Twenty-one students circled candy with sugar and 7 circled no preference.

### Discussion

The findings did not suggest the hypothesis that more women would be able to distinguish between the sugar free peppermint and the sugar mint. Exactly four men and four women could not distinguish between the mints.

However there was a statistical finding in the order of effects. Seven out of the eight people who chose the wrong mint were administered the sugar free mint first. The independent variable (the two mints) was counterbalanced by presenting the order of the mints differently to each person. In this experiment counterbalancing demonstrated that the order of which the participant received the mints affected their ability to distinguish between the two mints. An alternative way to view this contradiction in counterbalancing might include the fact that 19 out the 28 participants chose the second mint they tasted. Perhaps, there was a recency effect and the participant's taste buds were more sensitive at the end of the experiments. To solve the problem a longer period between the two mints might help or counterbalancing of the order of pretzels along with the mints.

Many of the participants stated that they found it hard to distinguish among the mints. However, only 8 participants were unable to distinguish the sugar free peppermint.

If this experiment were replicated the experimenter would need to have the participants record their gender on everything. In this experiment the experimenter made a mistake of not having the students record their gender on the question sheets. The findings might have been beneficial in supporting the hypothesis or the results. However, this might suggest that the participants in the study prefer strong tasting foods.

There should be different people that administer the experiment to minimize order effects and any possible biases. In this experiment one person administered the mints to all the students.

Other research that might add to this study would include studies about sweeteners and sugar preferences. The sugar free mints had Nutrasweet and the regular mints had sugar. Perhaps Nutrasweet dulls the taste buds, hence making it harder for the participants who received the sugar free first to distinguish among the mints. No studies about sweeteners were found that could contribute to this experiment.

The participants were unable to distinguish among the mints, which means more people in society could eat sugar free foods as a change in diet without noticing. People who diet would benefit from knowing that there isn't a significant difference in the taste of sweeteners and sugar.

#### References

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