

Does chewing different flavored gum help memory?

Miranda Reinhart

Hanover College

Abstract

This study was conducted to examine the effect of chewing gum and gum flavor on recall. Subjects (N=15) were given a list of ten words to study for 3 minutes. They were then distracted with an SAT level quiz to complete. They were then asked to recall as many words as possible from the list in one minute. All subjects did this procedure twice, once with with gum and once without. They were randomly assigned one of two flavors of gum, either mint or pineapple. Previous research indicates that mint flavoring increases attention and cognitive performance, where as other research favors a more distinctive flavor, e.g. pineapple, to increase memory. I expected the mint flavor to increase recall more than the distinct flavor because of this previous research. I did not find a main effect of chewing, $p=.18$ and no main effect of flavor, $p=.51$. There was also no interaction between gum and flavor, $p=.27$. These results will be discussed in light of state-dependent learning and the anomaly of flavor in relation to recall. Further research could look into if these findings generalize to all flavors or specific flavors.

Chewing Gum: How it affects your memory performance

College students are always looking for new study and testing techniques to get them ahead in the classroom in the easiest way possible. They try mnemonic devices, relating items to their every day lives, etc. to try and commit the information to memory. On a popular internet application, Twitter, it was stated that chewing the same flavor gum while studying and then again while testing would help memory (LifeHacks, 2013). This relates to theories of state dependent learning that say it will improve memory recall because of the similar states the body is in while studying then again while testing. There has been recent research and development in the act of chewing gum to improve different types of cognitive function, specifically immediate and delayed word recall, that includes discussion on flavor and its effect on context dependent and state dependent learning.

State-dependent learning is when both the original state is the same as when trying to recall that situation. One study was conducted in 1969 where students studied and then were tested the next day in either the same state or a different one. Results showed that fewer mistakes were made when the states were similar as opposed to differing (Bremer, Hoine, & Stern, 1969). When this logic is applied to the act of chewing gum and flavor of gum, the results are similar. One study in particular done by Wilkinson, Scholey, and Wesnes (2002) found a significant increase in both immediate and delayed word recall in the group chewing gum compared to the group not chewing gum. When considering flavor Baker, Bezance, Zellaby, and Aggleton (2004) did an experiment where they compared chewing to just sucking on a flavored candy and found that flavor alone was able to account for part of the state dependent effects of chewing gum. Stephens and Tunney (2004) also did a similar experiment and discussed that the flavor of mint has been noted in cognitive function in the past as an herbal remedy and to aid in focus and attention.

They suggest this particular flavor has an effect on the performance of cognitive tasks asked of participants. Putting all these findings and research together, I hypothesized that when participants chewed gum their memory recall would be stronger than when they did not chew gum at all. I also hypothesized that those chewing a mint flavor would have even better recall than those chewing a fruit flavor.

For my study, participants were asked to study a list of words for five minutes without chewing gum. They were then given a short sentence completion quiz as a distraction and then were asked to recall as many words from the original list as possible in no longer than one minute. They were then either given a mint flavor of gum or a fruit flavor of gum and asked to do different variations of the same tasks as the first round. How many words they recalled correctly was measured in all conditions and was the basis of all analysis.

Method

Participants

There were 15 participants in this study. The participants were 94% acquaintances of the researcher and 6% from introductory psychology courses. 15 of the participants were female and 0 were male. The average age was 19 and the ages ranged from 18 to 22. The ethnicity included was 80% Caucasian, 6% Latino/a, 6% East Asian, and 6% other.

Materials

A lab experiment was used for this study. The experiment was designed to measure the effects of chewing gum and flavor of gum on recall by either chewing one of two different flavors of gum (mint and pineapple) and not chewing gum. Two lists of ten words (smoke, speakers, tractor, etc.), created by the researcher, was used as well two practice SAT sentence completion tests from the College Board SAT official website, in which participants were given three questions where they had to complete a sentence with the best fitting vocab word.

Procedure

Participants were told that the study was designed to find the effect of chewing gum on memory recall. Participants were asked to participate through a convenience sample and completed the informed consent form. Once the participants arrived they were randomly assigned to one of the two flavor conditions. They were also randomly assigned to which condition they would be in first. Then every participant was given the same first list of words to study without chewing gum. After three minutes of studying, they were given the same practice SAT questions as a distraction to keep their minds from the list of words. After they finished that task in two to three minutes, they were asked to recall as many words from the original list as possible in one minute. Then each subject was given their designated flavor and asked to repeat the procedure while chewing the gum. They were given different variations of the same tests. Some participants were in the no gum condition first while others were in the gum condition first. The researcher collected the answers and marked how many words each participant recalled correctly. Participants were given a written debriefing, thanked for their participation, and then dismissed.

Results

Analysis focused on testing if there was a difference between 1) whether the act of chewing gum increased memory recall as compared to not chewing and 2) whether the flavor of gum made a difference in recall scores. Results were scored by counting the number of correct answers in each condition and then comparing those mean scores. Both order effects and practice effects were controlled for by varying the order of conditions and tests.

I expected that subjects chewing gum would have better recall than those not chewing gum. I also hypothesized that subjects chewing mint flavor would have better recall than those chewing a more distinct flavor of pineapple. I found that my hypotheses were not supported using a mixed ANOVA test as there was no main effect of chewing, $F(1,13)= 1.9$, $p=.18$ and there was also no main effect of flavor, $F(1,13)= .44$, $p=.51$. There was also not a significant interaction between gum and flavor, $F(1,13)= 1.3$, $p=.27$. The difference in means in each group was not significantly different to support my predictions. Figure 1 shows that there was already a difference among subjects before the study even started.

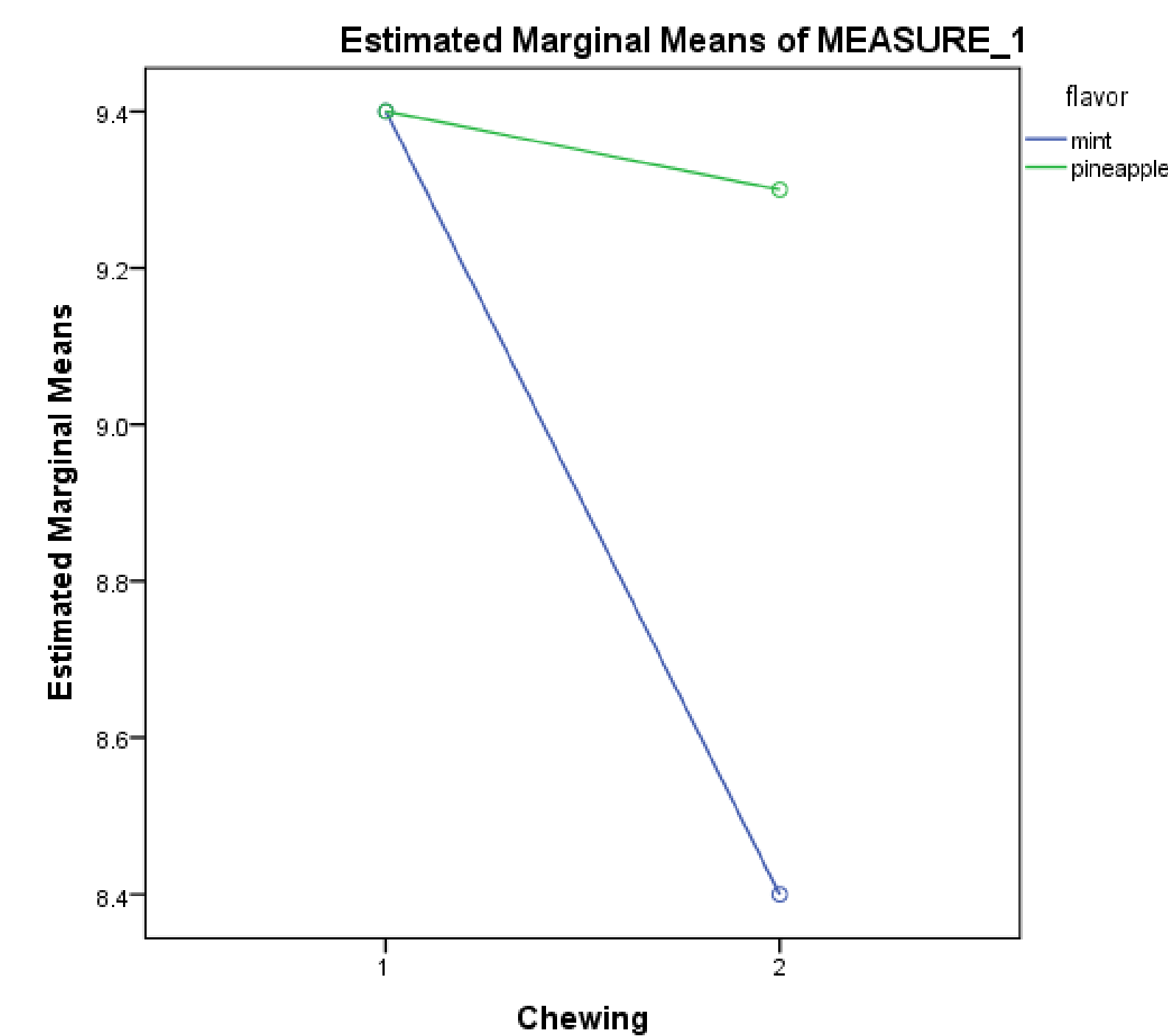


Figure 1. Mean scores of 1 Gum and 2 No Gum and flavor.

Discussion

I was exploring the effect of gum chewing and then flavor of gum on how it could affect memory recall. The subjects completed word memorization and recall in both a chewing and non-chewing condition. They were also randomly assigned a flavor of gum to chew. I hypothesized that subjects would perform better while chewing gum than without chewing. I also hypothesized that subjects chewing the mint flavor would perform better than those chewing the pineapple flavor. However, my predictions were not supported.

My findings are not consistent with previous research done by Wilkinson, Scholey, and Wesnes (2002). They found that chewing significantly increased word recall whereas my participants did have slight improvements, but not anything significant. Previous research in flavor by Baker, Bezance, Zellaby, and Aggleton (2004) was also inconsistent with my results. There was no difference in flavor. According to Figure 1 it shows that there was already a difference between subjects when no gum had been administered. This is most likely due to random variation and small sample size.

Such a small sample size reduced any statistical power in this study and is one of the larger problems. Looking at individual scores I saw a pattern of participants getting all the questions right or only having one point differences meaning my tests were not difficult enough. If I were to do this study again, I would create longer word lists to make them more sensitive to testing. Previous research has also indicated that different consistencies of gum could make a difference if one gum is harder to chew than another. I used two different brands of gum that could have different consistencies and skewed my results. I also just chose the pineapple flavor at random and any flavor could have been used and given different results.

Research in the future could incorporate flavor more and test even more flavors than I did such as cinnamon, other fruit flavors, etc. Also longer memory retention could be studied. I only had subjects wait a few minutes before being tested. As most students are not just studying minutes before the exam, it would be helpful to see if this idea worked over a longer period of time.

In summary I did not find any major patterns or results to suggest this idea of gum chewing to improve memory in contrast to previous research. Students are so desperate to do well they will try anything they see on the internet, like Twitter. They say you cannot believe everything you see on the internet and in my experience here I find that to be true.

References

- Scholey, A. (2004). Chewing gum and cognitive performance: A case of a functional food with function but no food?. *Appetite*, 43(2), 215-216. Doi:10.1016/j.appet.2004.07.004
- Johnson, A. J., & Miles, C. (2008). Chewing gum and context-dependent memory: The independent roles of chewing gum and mint flavour. *British Journal Of Psychology*, 99(2), 293-306. doi:10.1348/000712607X228474
- Onyper, S.V., Carr, T.L., Farrar, J.S., & Floyd, B. R. (2011). Cognitive advantages of chewing gum. Now you see them, now you don't. *Appetite*. 57(2), 321-328. Doi:10.1016/j.appet.2011.05.313
- Stephens, R., & Edeltyn, N. J. (2011). Do individual differences moderate the cognitive benefits of chewing gum?. *Psychology*, 2(8), 834-840. doi:10.4236/psych.2011.28127
- Smith, A. (2009). Effects of chewing gum on mood, learning, memory, learning, memory, and performance of an intelligence test. *Nutritional Neuroscience*. 12(2), 81-88. Doi:10.1179/147683009X423247
- Life Hacks (2013, August 6). Chewing the same flavor gum when taking a test as you did when studying will improve your memory. [tweet]. Retrieved from <https://twitter.com/lifehacks/status/364949795074347010>