The Cake is a Lie: And Other Insights

Kevin Bu[1]

Abstract

Cake flavor selection represents a difficult to optimize task that is critical for population satisfaction at any major gathering. Here we present the results of a non-blinded and silent taste-testing where we measured both subjective cake flavor approval as well as intra-couple concordance. Our results suggest that Taro and EarlGrey are the most statistically appealing flavors, with Taro having the least variance and Pistachio the most. Additionally, we show that Richard and Kevin are the least concordant couple, though no inter-couple comparison results yielded statistical significance.

Introduction

It is a well-known fact that weddings are difficult to plan [1]. Among the many stressors is cake selection; the wedding organizers must choose a cake that not only appeals to a broad and diverse palette of the wedding attendees, but must also be presentable, within-budget, structurally resilient, and survivable in harsh wedding environments where refrigeration and climate control may be scarce. We thus employ an empirically driven approach to determine an optimal cake flavor among a selection of 8. Participants were hand-selected from the wedding attendees to offer unbiased opinions and rankings in a silent taste test. We hypothesize that this approach will yield the most objective measurement to date of what is a critical yet a subjective metric of "best cake flavors." Additionally, this rating process enabled us to assess intra-couple concordance, as our participants were conveniently divided into four pairwise couples: AK (Allen-Kathy), JG (Jesse-Grace), ME (Mike-Estella), and RK (Richard-Kevin).

Results

We sought to answer two main questions with our analyses: (1) which flavors had the least and most mean and variance in rating, and (2) which couples were the least and most discordant in their ratings.

<u>Taro and EarlGrey are the most popular flavors, while Pistachio and KeyLime are the most controversial flavors</u>

Figure 1 shows ScaledRatings plotted as a function of flavor, with n = 8 data points color-coded by sex. Flavors are ordered in decreasing mean average ScaledRating, with matcha being the least popular (ANOVA p=5.21e-05). In **Supplemental Figure 1,** we plot the same data with boxplots and the flavors ordered with decreasing *variance*. We observe that both Taro and EarlGrey also exhibit the least variance, while Pistachio and KeyLime had the greatest variance. These results are summarized in **Table 1**.

<u>RK was the most discordant couple while JG was the least, which is largely driven by Pistachio</u>

Figure 2 plots the mean absolute differences in ScaledRating per couple across each of the 8 flavors. Couples are ordered by decreasing mean discordance, with RK being the most discordant and JG being the less discordant. Notably, the effect size is statistically nonsignificant (ANOVA p=0.72). We also assessed which flavors were the least and most divisive within a couple. Interestingly, the top flavors of Taro and EarlGrey were not the top ranked in terms of intra-couple concordance; Chocolate was the least divisive, while Pistachio was the most divisive (ANOVA p=0.0498). These results are presented in **Supplemental Figure 2**.

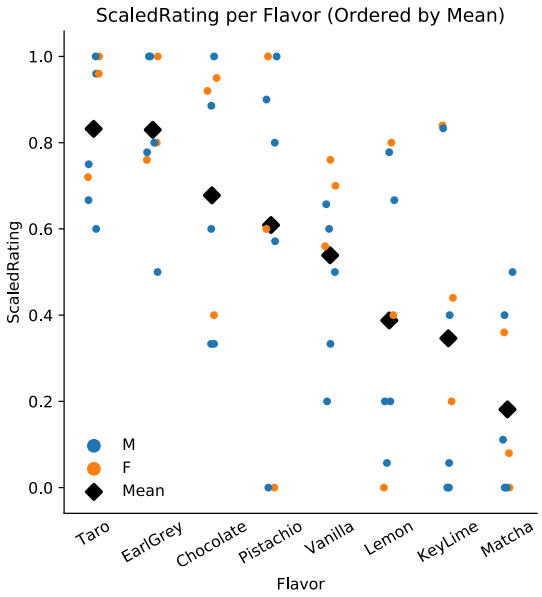


Figure 1. Taro and EarlGrey have the highest ScaledRatings (0.8321 and 0.8297, respectively) while Matcha has the lowest (0.181). Means of each flavor are plotted as black diamonds, with sex stratified as blue and orange for male and female, respectively.

Flavor	Mean ScaledRating	Variance
Taro	0.832	0.027
EarlGrey	0.830	0.029
Chocolate	0.678	0.086
Pistachio	0.609	0.167
Vanilla	0.539	0.036
Lemon	0.388	0.104
KeyLime	0.346	0.120
Matcha	0.181	0.042

Table 1. Mean and variance of ScaledRatings of all participants (n = 8) for each flavor.

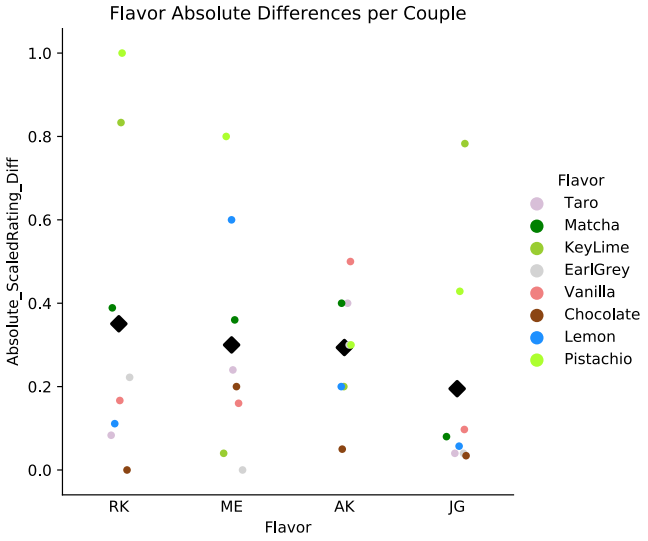


Figure 2. Discrepancy in rating of each flavor per couple; couples ordered by decreasing mean discordance (indicated by black diamonds).

[1]Department of Genetic and Genomic Sciences, Icahn School of Medicine at Mount Sinai.

Discussion

Based on the limited sampling of 8 flavors here, Taro and EarlGrey were the most popular flavors. It is perhaps also unsurprising that Taro and EarlGrey had the least variance, as in order to perform well on a mean-rating scale, likely the raters all had to rate those flavors highly. Similarly, the less desirable flavors also had lower variance (Matcha) as most subjects rated that flavor poorly. Matcha may have performed poorly due to expectation-reality mismatch, as this flavor is generally popular but perhaps was executed poorly in this cake setting [2]. These results suggest that Taro and EarlGrey are both promising flavors for a wedding, especially if the aforementioned subjects are a representative demographic for the wedding. As the population of testers came from a largely Asian demographic, these preferences may be attributed to cultural familiarity and upbringing, as well as convergent preferences over time. Further mechanistic studies are needed to assess this hypothesis, however. Nonetheless, a Taro-based cake is promising given JG have a cat named Taro, and on behalf of the test subjects, we can express gratitude that there were no uni-flavored cakes.

When we stratify by couple, chocolate became the least divisive flavor on a per-couple basis, suggesting that this is a safe flavor to choose should a couple disagree on a flavor to get (and thus result in the least intra-couple arguments about flavor opinions during the wedding itself). Taro and EarlGrey also exhibited comparable levels of intra-couple discordance, further reaffirming the recommendation of these flavors. Vanilla ranked 4th in terms of intra-couple discordance. Although EarlGrey and Taro were the most popular flavors, these results suggest that vanilla and chocolate, both timeless flavors, are also safe bets in that they elicit minimal disagreement. When the couples are ordered in terms of intra-couple discordance, it is perhaps unsurprising that RK were the most discordant (largely due to differing opinions on pistachio). However, these inter-couple differences were not statistically significant, perhaps owing to insufficient sample size (in terms of flavors tested). One can still argue however, that it is for the better that R and K are not dating.

Conclusion

We conclude with a reference to a portal meme and adage, ”The Cake is a Lie” (**Supplemental Figure 3**), which serves as a timeless reminder that meaning lies with the journey, not with the destination [3]. Indeed, one can argue this cake is indeed a “lie,” as the wedding coordinators have opted to go with a cake vendor not tested by the aforementioned test subjects. Nonetheless, the process of compiling, analyzing, and interpreting these results are broadly applicable to future studies. Lessons regarding intra-couple concordance and flavor preferences will endure beyond this cake study and inform decisions for generations to come.

Methods

N = 8 participants were selected by the wedding organizers, who also participated in this study (JG). Each cake was divided into 8 fragments, and raters were asked to consume and rate each cake on a scale of 0-10, with each piece being consumed at the same time and in the same order for all parties. After all 8 pieces were consumed, raters were allowed to retroactively modify their ratings. No discussion or collusion was permitted, although this was difficult to enforce.

Ratings were then normalized on a per-rater basis using min-max proportions, whereby each value was scaled to be between 0 and 1 with the bounds determined as each rater’s max and min values. All analysis was done in Python 3 using Jupyter Lab; plotting was done using the Seaborn library. ANOVA one-way tests were performed for testing the null hypothesis of no difference in group means.

Code

All source code is freely available at https://github.com/kevinbu314/cake.git

Acknowledgements

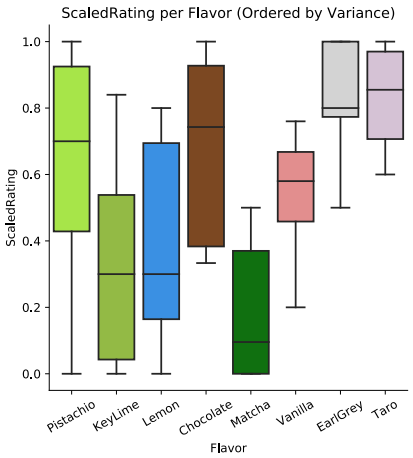
The author would like to thank R.W. for surrogate couple-ship, as well as participants J.C. and G.D. for coordinating the event. Additional gratitude to aforementioned participants as well as A.C., K.C., M.M., and E.X. for contributing scientific ideas and enthusiasm during the process.

References

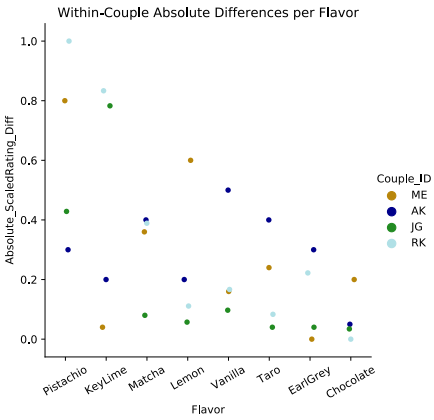
[1] First-hand testimony from study participants, many of whom are planning for weddings.

[2] "The Expectation Vs Reality Trap." VeryWellMind. May 4, 2023. https://www.verywellmind.com/expectation-vs-reality-trap-4570968.

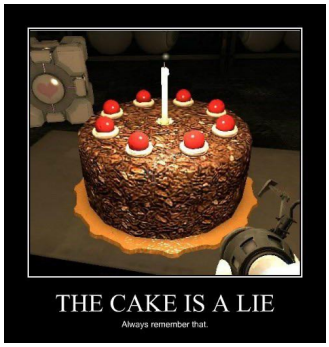
[3] "The Cake Is a Lie." KnowYourMeme. May 4, 2023. https://knowyourmeme.com/memes/the-cake-is-a-lie.



S1. Boxplots of flavors with spread of rater values ordered by decreasing variance of ScaledRating.



S2. Absolute differences of individuals in each couple plotted for each flavor, ordered by decreasing mean of within-couple absolute difference.



S3. The Cake is a Lie meme, adapted from the popular game *Portal*.