

CAN LIKING FOR VEGETABLES BE INCREASED BY INCREASING LIKING
FOR THE AESTHETICS OF PRESENTATION?

A Thesis

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by

Mohamad Zukari

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ABSTRACT

Visual aesthetics have played a significant role in food selection and preference. Altering the visual perception of what the consumer will consume can affect the overall experience and liking of food. Vegetable and fruit consumption in the US is not near the daily recommendation; in 2019 only 10% of the people surveyed in 49 states are within the recommended amount for vegetables, and 12.3% for fruits. Considering the previous findings in research on how food appearance influences sensory quality and consumer behavior, we ask the question: can the liking of vegetables be increased by optimizing the aesthetics of the dish? We propose a survey study design that can be used to help answer this question.

BIOGRAPHICAL SKETCH

My name is Mohamad Zukari, a graduate of civil engineering. Cooking has been my hobby and I worked in restaurants professionally for over two years. I now have a food blog where I post recipes after extensive research. I am currently studying my master's in food science to further my education about ingredients, agriculture, interactions, and reactions in food.

ACKNOWLEDGMENTS

I would like to thank Dr. Loss for his guidance on this research and support throughout the journey. In addition, Dr. Zellner has set the path with her previous research on the topic of aesthetics on food and was the inspiration behind the research done here within.

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BACKGROUND

Multimodality of Taste Perception

Research has shown that the perception of food is comprised of not only taste but involves all the other senses as well (Spence, 2015; Bruijnes et al., 2016). Even the environment in which the food is consumed can make a difference in the overall liking of food. In a 2015 study, sound, and the perception of flavor for chocolate was studied and results showed that cross modal correspondences exist between taste and sound. (Carvalho et al., 2015). Visual perception also plays an important role in the identification of food. For example, it was found that subjects would use taste and aroma descriptors associated with red wine when consuming white wine that is colored red. (Morrot et al., 2001). Understanding of the multimodality of flavor perception can help chefs and product developers to increase liking of food. In a restaurant, for example, plating is done through an intuitive process until it ‘just feels right’ (Velasco et al., 2016). Breaking the flavor experience down into its individual modalities and better understanding how they integrate and influence on consumer experience can benefit food industry professionals and consumers.

Research that explores food aesthetics suggests that several key factors in the visual composition of food in plating can influence the evaluations of the flavor of the food by the consumer (Rowley & Spence, 2018). Many studies explore the connection between visual aspects of food and the perception of the dish (Velasco et al., 2016; Chonpracha et al., 2020; Roque et al., 2018; Suher et al., 2021). It has been shown that visual attributes of the final plate can indeed affect the experience and even the perceived liking of the ingredients on the dish (Zellner et al., 2014).

Food Aesthetics

To define aesthetics is to define beauty which in its essence is completely subjective (Palmer et al., 2013). Beauty can be drawn from people’s own lives and their own interpretation of what it is. Beauty is seen as constituent of both the properties of an object, referred to as the percept, and the characteristics of the perceiver. Beauty emerges from patterns in the way perceivers and objects relate. Beauty provides pleasure, is intrinsic, doesn’t necessarily have an expected utility, and objectified, directed toward an object. (Moshagen et Thielsch, 2010).

Food aesthetics is defined as a practice of giving food an attractive and pleasing appearance. The definition includes the appreciation of beauty in food. Food design plays a crucial role in gastronomy by increasing the appeal of food in various setting. Whether in restaurants or grocery stores, food styling can be used to increase consumer’s liking for food (Alhelaili, 2015).

Vegetables Consumption

According to the Centers for Disease Control and Prevention (CDC), adults in the US do not consume the proper amount of vegetables as per the daily intake recommendation. According to a survey conducted in 2019 with 294,566 participants in 49 states, only 10% of the participants met the intake recommendation. (Lee 2019)

Although the overall intake has increased over the years, Figure 1 below indicates that consumption of vegetables in the US is still below the recommendation by the USDA.

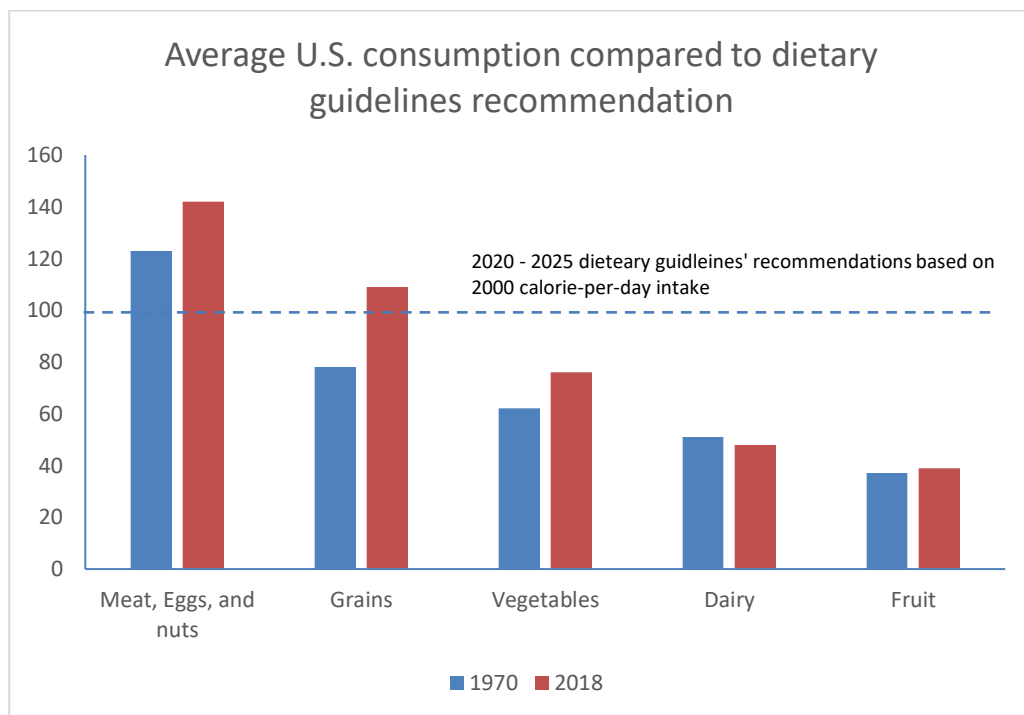


Figure 1: Consumption of different food groups done by USDA against the 2020 – 2025 dietary guidelines

The question this begs: Can we increase consumption of vegetables in the US with improved visual aesthetics in their presentation?

Case Studies

Several experiments have been conducted to measure how liking for flavor is influenced by altering the visual design of food.

In the first study conducted by Zellner et al. 2010, they measured how liking for a simple food can be influenced by changes in the visual presentation. In the experiment

they presented the participants with water chestnuts in different arrangements. The findings conclude that there were no significant differences in liking by altering the color and balance of the plate. She concluded that further analysis is required by with altering the food to be more “complex” that one ingredient on a plate.

In the second study, Zellner (2011) tested the following:

Hummus with veggies, and chicken salad on a lettuce. The overall liking for food that was more balanced and neater were higher than the control the participants were presented. Balance was defined as when food is distributed in a way around the center point of the dish that the perceived heaviness in one area appears balanced by an equal heaviness on the other side of the plate in terms of concentration of the food on each side. (Zellner et al., 2011).

In the latest experiment conducted by Zellner et al.(2014), they compared two different plating appearances; traditional and modern in a parallel manner and measured the attributes mentioned below using a 201 bipolar scale. The parallel experiment here was to ask the same exact questions to two different sets of people were only the aesthetics of the presentation of the food was altered. The participants were separated on two different days in a restaurant setting as to not influence the results.

The modern presentation was rated higher on the following attributes:

- Overall liking of the dish and each ingredient on the dish
- Attractiveness of the presentation
- Care by preparer
- How visually balanced the presentation was?
- Willingness to pay for the dish

Although every aspect that was measured was rated higher, the liking of the green beans on the plate was the same for both appearances. Further drawing into the question, whether we can increase liking of vegetables by altering the visual aesthetics?

Further studies were conducted to measure liking of food by altering the visual aesthetics of the plate. A study in 2018 with 188 participants draws the conclusion that people were attracted more to colorful choices, typically the colors of vegetables, for lunches. This conclusion can lead to an overall increased consumption of vegetables if the presentation is done according to what consumers prefer aesthetically (Paakki et al., 2019).

METHODOLOGY

With that question in mind, we set forth on building a visual presentation of two different appearances of the same vegetables and a hummus dip. A survey was built where the following attributes were to be measured:

- Overall liking for the appearance of the dish
- Liking for the appearance of the vegetables
- Liking for the appearance of the hummus
- Attractiveness of the presentation
- Neatness of the presentation
- Care put by the preparer of the dish
- Willingness to pay

For the liking of the dish, we used a bipolar 201 scale where -100 is “dislike extremely”, 0 is “neither like nor dislike”, and $+100$ is “like extremely”. For the attractiveness of the plate -100 is “extremely unattractive”, 0 is “neither attractive nor unattractive”, and $+100$ is “extremely attractive”.

A 0 to 10 scale was used for neatness of the presentation, where 0 is “not at all neat (messy)” and 10 is “extremely neat (not at all messy)”. For the care of the preparer 0 is “no care” and 10 is “a lot of care”.

After meeting with Erika Mudrak, a statistician at Cornell, she gave us the following recommendations:

- Have a broader scale of measurement to allow for significant statistical differences to be detected -100 to $+100$ works great.
- Do not have a reasonable minimum and maximum price for the willingness to pay question, as users will choose the average.
- Develop a parallel study design for the two appearances so the participants are not influenced by the different plating. 50% of the participants will get the survey in the Appendix with appearance 1 and 50% with appearance 2.
- On a separate page, have the two appearances next to each other and take a note of what the participants prefer, only after they fill the details measure above, as to not influence the numbers.
- Run a pilot of the experiment and from the results and the means we can determine how many participants are needed to get a 95% confidence in the results.

Below is a figure with two different appearances of the same ingredients:

- Hummus
- Cauliflower
- Celery
- Carrots
- Cherry Tomatoes



Appearance 1



Appearance 2

NEXT STEPS

A pilot will be conducted to determine level of variance between the different setups. At least 6 participants for each plate presentation will be needed. Please refer to Appendix A for the complete survey.

A meeting with the statistician is highly recommended to estimate the number of participants required to conduct the experiment.

In addition to conducting an online survey, we highly suggest conducting the experiment in person with an edible sample for evaluation. As food perception is multimodal, we need to see how taste plays a role into the overall liking of the dish.

CONCLUSION

Studies indicate that visual aesthetics can alter the overall liking of the food. With that in mind we want to utilize the previous findings to see whether this methodology of neatness and balance can be applied to vegetables, and lead to an increased liking of a food that should be a staple in our diets.

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APPENDIX

SURVEY DESIGN – PAGE 1

This survey is designed to gather information that will help better us understand the effects of plating on the consumer experience. Please complete the questions to the best of your knowledge. Thank you.

[Survey estimated time is approximately 8 mins]

How often do you eat vegetables a week?

- every day
 - 4 - 6 times a week
 - 1 - 3 times a week
 - I do not consume vegetables
-

Comments

SURVEY DESIGN – PAGE 2

Look at the presentation of vegetables and hummus dip. Answer the following questions to the best of your ability.



Overall liking for the appearance of the dish

[-100 is “dislike extremely”, 0 is “neither like nor dislike”, and +100 is “like extremely”]

dislike extremely

neither like nor dislike

like extremely

-100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100

-



Neatness of the presentation

[0 is "not at all neat (messy)" and 10 is "extremely neat (not at all messy)"]

not at all neat (messy)

extremely neat (not at all messy)

0 1 2 3 4 5 6 7 8 9 10

-



Care put by the preparer of the dish

[0 is "no care" and 10 is "a lot of care"]

no care

a lot of care

0 1 2 3 4 5 6 7 8 9 10

-



How much would you pay for this dish at a restaurant?

This is a portion for 2 people.

USD

0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40

Price



Please add any comments you have in the space provided below.

SURVEY DESIGN – PAGE 3

Two different set ups of the same ingredients



Appearance 1



Appearance 2

Which appearance do you prefer?

Appearance 1

Appearance 2

Comments

SURVEY DESIGN – PAGE 4

Gender

- Male
- Female
- Other
-

Age

10 13 15 18 20 23 25 28 30 33 35 38 40 43 45 48 50 53 55 58 60

Click to write Choice 1



Email Address

Name

Comments
