



Perception of food: Effect of plating on appetite & enhanced experience of eating

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Abstract

This study aims to understand how tableware or the design of plating affects people's appetite. People are also influenced by visual and tactile senses during the eating process, as well as other factors such as materials or colors of the plate. With so many different foods at our fingertips every day, it is helpful to know what we should be eating to get ourselves into the habit of eating healthy foods that will make us healthier and more energetic. The impact of our tableware on our appetite can help us develop better eating habits and guide us to make healthier choices when it comes to eating. We will go on to look at some of the innovative ways in objects like cutlery, which can have an effect on our appetite or it could potentially push even further. We can get the latest insights from research in this area as inspiration for designing some products that can affect the dining environment and therefore, achieving the affect appetite.

Keywords: *Appetite, Food Plating, Eating Experience, Cutlery, Creativity*

1. Introduction

Loss of appetite occurs when people have a low desire to eat. Several factors can cause the loss of appetite, including mental and physical illness. If the loss of appetite lasts more than a few days, it can lead to weight loss or malnutrition. The loss of appetite can be frustrating for anyone, especially underweight people and those trying to gain weight or build mass (Semeco, 2017).

To develop a healthy way of eating, we pay attention to the healthiness of the food we eat and the atmosphere and manner in which we eat. However, experiments have shown that healthy eating is not the only factor that influences this, as various environmental factors can, too, affect the way we eat. "Our appetite can be influenced by external factors," Stacy Roberts-Davis said via email. When you walk down the street and smell the delicious food wafting up the street, even if you're not hungry, you'll have a desire to eat food. Even if you're driving in a car and you see a sign for a fast-food chain and smell the fries, you can get a craving to stop.

Understanding various triggers that exist around us is beneficial in helping us to eat the best and give us the most energy. Just as we do our best to choose for ourselves the foods that make us feel our best, we can also choose to immerse ourselves in an environment that is healthy and appetizing - and that means taking the initiative to cultivate and create such an environment ourselves (Wolff, 2016).

The cutlery we use can also influence the perception of the taste and aroma of food. For example, it has been shown that tableware made from different materials can modulate the taste of foods such as yogurt due to chemical reactions between the food itself and the tableware material. Besides, the color of the cutlery we use has been shown to alter the perception of certain flavor attributes. Under known conditions, the reasons for this are not yet clear: the sensory changes triggered by the color of the cutlery may be due to the fact that we have subconsciously formed associations with certain colors and certain taste expectations, or they may be due to the strong contrast between the different colors of the cutlery and the tableware, making the food look more visually appealing. Also, the quality and weight of the cutlery we use to serving food from the plate in our hands to our mouths are likely to have a significant impact on our assessment of the food served (examples of related studies examine the tactile sensation of drinking utensils and comments on the importance of tactile feedback in the context of food/drink perception). Of particular interest here are experiments showing that the weight of the utensils affects the perceived value of the food and that the weight of the product/package itself seems to implicitly influence our assessment of the quality and value of the



food, as well as the amount of food we can eat under the influence of the utensils (Michel, Spence, & Velasco, 2015).

1.1 Background

Recently, there has been a growing interest in understanding the impact on appetite and food experience through the lens of tableware and environmental studies where the presentation and pleasure of eating and drinking do not depend solely on the edible elements placed on the plate. For example, recent research has shown that the presentation of food is the visual use of the art of food composition and can greatly influence a diner's perception of a dish. In other words, while the sensory nature of culinary preparation is fundamental in determining how the diner may enjoy a dish, our dining experience is also influenced by the visual and textural arrangement of the elements on the plate, as well as other factors such as the internal state of the diner.

Given different cultural areas, the tableware design is also very specific. Most obviously, many Eastern countries use chopsticks while Western countries use knives and forks, which has caused some difference in materials. The tableware used in Eastern countries is usually more delicate and the material selection is diverse; wood, porcelain, metal, and bamboo products are typical. Besides, special processing of many patterns is carved on the tableware, with rich cultural color. Western countries have a fast-food culture and romantic style, and the choice of materials is also very different; usually silver and porcelain products.

Research is concerned with how to influence people's appetites and eating habits and how to enrich their diets. The systematic analysis of appearance and material discusses how cutlery influences people's appetite under the influence of appearance and environment, eating habits, and the extension of the factor of experience.

2. Objectives

1. To analysis the factors that can affect the appetite that can stimuli the people's appetite
2. To create a motivating way to enrich the eating experience and promote the joyful relationship with food
3. To design some of the edible tableware regarding healthy food.

3. Material and Methods

- 3.1 Study the background of healthy food and the motivation way on eating experience
- 3.2 Find some food ingredients and some materials and try to combine the two materials to make them strong and create new functions and textures in the continuous experiment to understand the characteristics of different materials and choose the most suitable one
- 3.3 To design and make the edible tableware regarding healthy food using a variety of materials such as rice, rice paper, cookie dough, bread, jelly, and flour.

4. Result and Discussion

4.1 Effect Factors 1

How can we slow down our chewing and taste more sweetness while still consuming less sugar? The first study from Jinhyun Jeon in South Korea called "Tasty formulas" used the tasteful silverware to help us understand the interesting ways in which we consume food, using explanations of temperature/ toughness/ color/ volume/ weight/ shape in an interactive way:

$$\text{SWEET} \times 36.5^{\circ}\text{C} = \text{SWEET} \text{ +++}$$

$$\text{SALTY} \times < 36.5^{\circ}\text{C} = \text{SALTY} \text{ ++}$$

$$\text{SOUR} \times 36.5^{\circ}\text{C} = \text{SOUR} \times 100^{\circ}\text{C}$$

$$\text{BITTER} \times > 36.5^{\circ}\text{C} = \text{BITTER} \text{ --}$$

$$\text{SWEET} + (0.5\% \times \text{SALT}) = \text{SWEET} \text{ ++}$$

$$\text{SALT} \div \text{SOUR} = \text{SALTY/SOUR} \text{ --}$$

$$\text{SALTY} \times \text{SOUR} = \text{SWEET} \text{ +}$$

$$10\% \times (5R \frac{4}{14} + 5YR \frac{4}{14} + 5Y \frac{4}{14}) = 2.0$$

$$90\% \times (5R \frac{4}{14} + 5YR \frac{4}{14} + 5Y \frac{4}{14}) = 0.1$$

[784]



$$20\% \times R > 20\% \times Y$$

$$5\text{cm}^3 \times \text{SOUND/ SIGHT} = 10\text{g} \times \text{TOUCH}$$

$$1\text{mm} \times \text{TOUCH} > 10\text{mm} \times \text{TOUCH} (y=f(x)) \times \text{TOUCH} = Y \text{ (Chalcraft, 2012)}$$

1) Color

Warm colors have been shown to increase appetite such as red and orange that are used on fast food signage and are more appetizing when used sparingly as shown in Figure 1 (Spence et al., 2015).



Figure 1 warm color spoons (DeZeen, online)

Comparison of sweetness between red and yellow with the same sugar content shows that red (crimson, scarlet) foods have a stronger sweetness than yellow. Orange stimulates the appetite because it has been found to increase the oxygen supply to the brain and stimulate mental activity in the brain. Yellow speeds up the body's metabolism, so it is a good choice for tableware or tablecloth. However, if food and tables are displayed in warm colors, the appetite may be reduced. Warm colors are most effective when used sparingly to create unexpected highlights.

2) Volume and Form

It was noted that the volume of the hollow part of the spoon's middle-end influenced and enhanced our hearing, taste, and appetite for the scraping sound of glassware. A spoon may give us a sense of stability when it weighs 40 grams. However, if we reduce the weight of the plate to 10 grams, we can sense the amount of food we are eating.

Adding a new element to the original shape of the spoon aims to increase the presence of the spoon in the hand and give a comfortable feel in the hand, as well as making the spoon more convenient to use. Changing the thickness of the handle makes it possible to be more aware of the amount of food one feels when eating, and large quantities of food increase the awareness of the moment of consumption (Figure 2).



Figure 2 Different materials and shapes of spoons can make people feel different (DeZeen, online)

These spoons are made of plastic, stainless steel, and silver. The tactile sensation of the mouth is stimulated by the different materials and shapes.

3) Tactility

According to Dr. Linda Bartoshuk from Yale University School of Medicine, taste buds can perceive sweet, sour, salty, and bitter flavors as long as they are present (Bartoshuk, 2013). When sweet and salty flavors, which are equally strong, are mixed, they produce a taste that never occurs. When salty and sour flavors are mixed, the flavor becomes softer. When the salty and sour flavors are fully blended, a sweet flavor is produced. The sweetness becomes stronger when it is stronger than the savory taste. When your tongue, lips, and palate come into contact with different materials and shapes of spoons can stimulate our tactile sensitivities. Depending on the sensitivity of each individual's tongue will produce different effects as shown in Figure 3 (Jeon, online).

4) Temperature

Taste has a specific effect at different temperatures. Sugar below body temperature is sweeter when it first tastes, salty flavors will become stronger at decreasing body temperatures, whereas sourness does not change its sourness with temperature. When you feel a decrease in bitterness it is when the temperature around you has risen above your body temperature (Chalcraft, 2012).



Figure 3 different types of sensitive tactile spoons (DeZeen, online)

4.2 Effect Factors 2

The second study was carried out in the experimental restaurant of the Institut Paul Bocuse in Lyon, France, where three different desserts were served on separate white and black plates of the same material and size. Each dessert was prepared on three days of a week (Wednesday, Thursday, or Friday) and served on a white or black plate at lunch or dinner for a period of two weeks (Figure 4).



Figure 4 Example of served desserts with different color (Institut Paul Bocuse, online).

The experiments showed that when food was served on different colored plates, it had different effects on the perception of the food, depending on the ingredients of the dessert being experimented with (Institut Paul Bocuse, online). These effects could not be explained by color contrast alone. They could also be associated with taste. For example, the combination of black and chocolate produces a strong chocolate flavor, especially in the case of refined chocolate. More interestingly, the perceptual pattern of each dessert was constant for the plate used; all desserts served on the same plate were rated higher for all the attributes assessed.

In the above experiment, since the desserts were considered to have different colors, flavors, and decorations, the final result could not be justified by the color comparison between the dessert and the plate. It was found that Dessert B, a dark brown shade presented on a black plate, received a higher score. This result proved that consumers prefer the complexity and variety of certain foods, and even believe that certain attributes of the food are enhanced when moved from one container to a different background. Just as Dessert B received a higher score it may be that the black background evoked a stronger flavor, resulting in a higher attractiveness and appetite score. However, the taste of the dessert itself was not significantly altered (Piqueras-Fiszman et al, 2013).

To perceive more clearly the interaction arising from the contrast between the food and the color of the plate (the color of the bowl or the cup), some experiments can explain the perception of more saturated colors. For example, when the orange color of carrots was placed on separate blue and white plates, the orange



color was intensified when placed on the blue plate. The hypothesis is that the color of the plate or background color affects the perception of the color of the food, which in turn affects the perception of taste. It was concluded that the color of the plate would indirectly affect the perception of taste. Piqueras-Fizman et al. conducted an in-house experiment in the laboratory with white and black plates with participants. The results of the experiment showed that strawberry mousse of equal color and texture tasted more intensely sweet and correct and more enjoyable on a white plate than on a black plate. The results of these experiments are interesting but are based purely on what people see and feel, and are not tested with other, more complex subjects in a study done on an ecological basis (Piqueras-Fizman et al, 2013).

With respect to the information gathering from Journal Papers (BioMed Central) and the internet source (<https://www.dezeen.com/tableware-as-sensorial-stimuli-cutlery-by-jinhyun-jeon/>), some factors involving healthy food and taste motivation are described.

4.2.1 Food ingredients for edible tableware

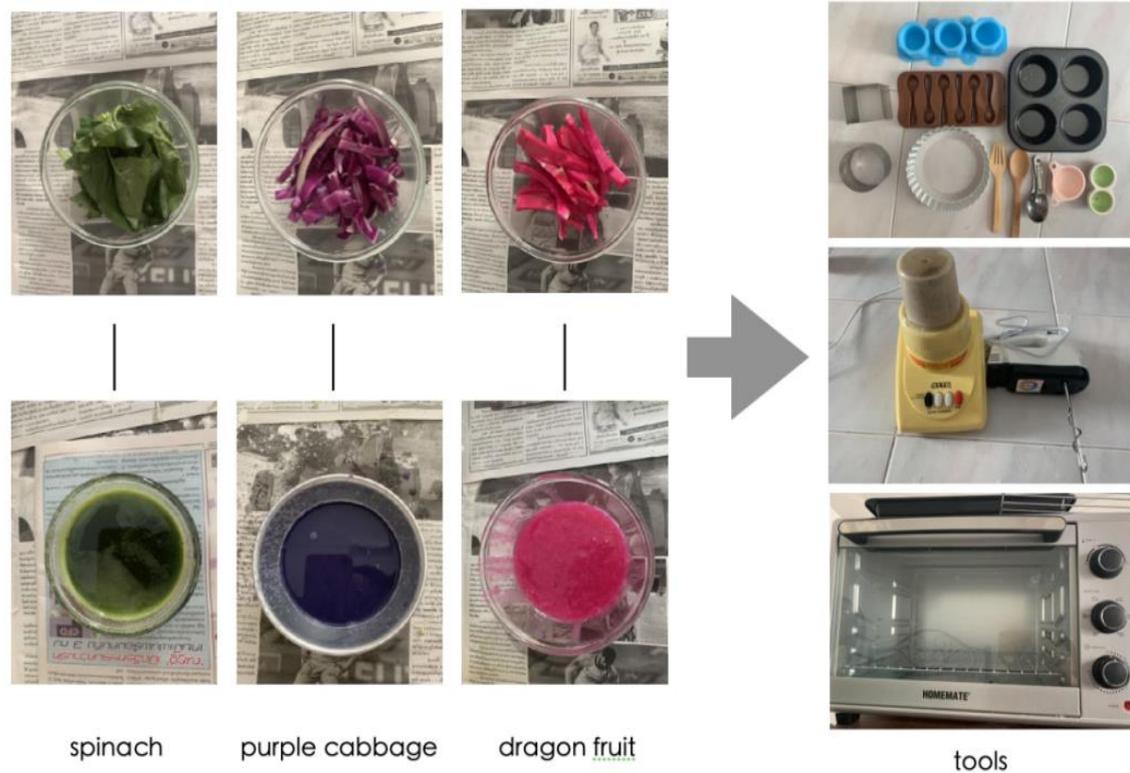


Figure 5 Ingredients and tools for cooking

For the design of edible tableware, safety, health, and biodegradability must be considered. Thus, all the experimental materials were from natural food materials while tools included shredder, blender, oven, vegetable juice (spinach, pitaya, and purple cabbage), and a variety of cutlery and molds (Figure 5).

4.3 Edible tablewares

This design aims to meet the practical function based on daily edible flour as materials and combined with modelling of the tableware. The extracted spinach juice was added to form a green decoration, give a person a pure and fresh sense of the vision, and increase the natural interest and edible design. At the same time, the plate and decoration were used to arouse people's interest in food in the process of using. The product can significantly improve the user experience but the use of the product itself will not be affected by the improvement and consideration of the function.



4.3.1 Experiment 1: rice and jelly



Figure 6 Tableware made from fruits and vegetables such as jelly and rice

At the beginning of the experiment, the author chose jelly as a food container, and during the experiment, the author found that the advantage of jelly was its transparency that allows us to see the ingredients of the food; however, it was too soft to bear the weight (Figure 6).

4.3.2 Experiment 2: Spinach juice and flour



Figure 8 Hand-kneaded spinach flour spoon

Since jelly could not hold the weight, the author tried to make edible dishes out of flour instead. It is important to have a good proportion of flour to water and oil because, in the beginning, utensils made of an inappropriate proportion of flour tended to crack. Besides, due to handicraft restrictions, the utensils could not stay in the shape of the tableware. The author tried to get help from professional bakeries.

4.3.3 Experiment 3: Cookie dough product

To improve the craftsmanship and have a deeper understanding of the material ratio, the author visited a cooking studio named Food Player near Rangsit University to learn how to make cookies and used cookie dough to make forks and spoons. The cookies tasted delicious but were hard to keep and easily breakable (Figure 9).



strengths: Smell good
weaknesses: easy to crack

Figure 9 fork and spoon made of cookie dough

4.3.4 Experiment 4 : Tableware from flour (final product)

Due to the limitations of mold and craft, the above works were not perfect. Their shape and color needed to be improved. After many experiments, the author finally came up with the following tableware by adjusting the ratio of flour, water, and oil and the shape of the mold.

After experimenting with so many materials, the author finally chose flour due to its newness, editability, and ease to keep in shape. Besides, the author added some elements to make it more appealing, such as fruits and vegetables.

In conclusion, the above experimental results show that the color, material, and shape of the tableware can indeed influence people's perception of food during eating and can be influenced by the external environment, producing different tastes of the same food in different contexts. Thus, we expect that changing the dining environment will, in turn, influence our eating habits.

The edible cutlery design has evolved to the point where it can transcend the limitations of old cutlery and influence people's appetites and expand the dining experience. The design of edible tableware should pay more attention to the psychology of eaters, connect with food and health, arouse people's interest in food, and expand the eating experience as the ultimate goal of design. As a new design direction in the future, edible tableware provides theoretical guidance for people to develop a new way of life and has important practical significance. This article illustrates that a series of edible tableware based on related theories in tableware design has a profound impact on the process of summary from depth. The edible tableware in tableware design activities also has characteristics as well as the application of specific principles, and edible tableware design stable can take root and grow in the middle of the market.

Besides, with the help of the case study, the influence of various factors in tableware on people's appetite was discussed, from how to determine the research materials to the experimental methods and the whole process of tableware, to promote the current design concepts of simulating nature to be more specific and explicit. For tableware design, its existence is the very critical significance and function. Keep curious about food and constantly seek design sources. In the design process to increase the balance between tableware and nature, the product design is refreshing.



Figure 10 final product of edible tableware

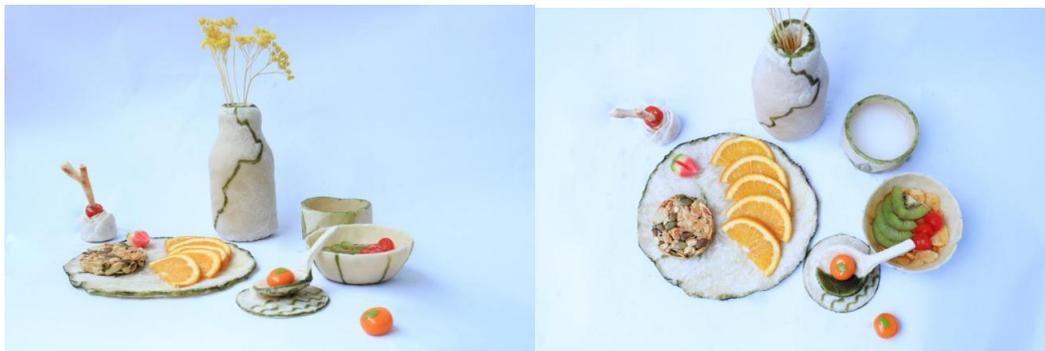


Figure 11 edible tableware with food plating of works
(To design some of the edible tableware regarding the healthy food)



Figure 11 Details of the spoons and cups taken from different angles



Figure 12 Details of the bowls taken from different angles

5. Conclusion

This study aims to encourage people to eat more in more atmospheric environments affected by the influence of the environment and plating of cutlery, such as they will eat in restaurants on holidays or festivals.

Traditional tableware will affect people's tastes and senses through its characteristics and designs. However, the author wanted to take edible tableware as the starting point to further influence people's appetite through its edibility and food arrangement and express a particular season or holiday with color and texture to enhance the dining atmosphere and enrich people's eating experience.

This study designed 4 tablewares. First was made of jelly and rice that were transparent and allowed the user to see the inside of the food, which effectively increased the level and flavor of the food. The second was made from cookie dough, which had a delicious taste and could support delicious food that can stimulate one's appetite. The last tableware design was made of flour with spinach, which had green color and can support the greenish of food and help people feel safe for these dishes.

These edible tableware designs may promote a good feeling for people can stimulate people's appetite greatly since eating is not only a physiological need. These designs can even increase the functions and aesthetic of the tableware to achieve the result that affects people's vision and taste. By creating the edible tableware, people can feel the taste of the food and the edible tableware, in a combination of each other and with novelty, and the atmosphere can be immersed in the enjoyment of eating, It also provides new ideas and reference directions for the development of edible tableware in the future.

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