
Design Research on Stress, Flavor, and Sound

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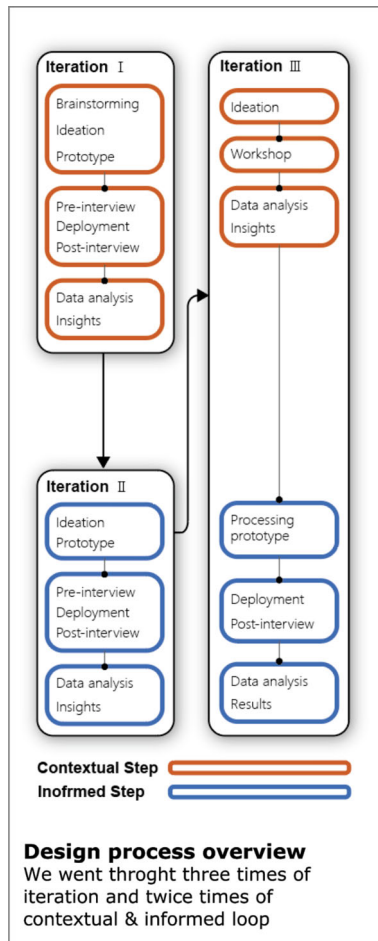
Abstract

This pictorial discusses the potential relationship between sound, flavor, and emotion; how crispy sound intervenes in people's choice of snack, and whether sound intervention can help relieve mental stress. It is an iterative data-driven design process, through contextual and informed steps, we came to the final design with a snack box equipped with buttons and sliders, an alternative processing program, and a telegram bot to collect quantitative and qualitative data. 2 participants in total took part in the weekly experiment, and 25 people participated in the sound-flavor experiment which was set up in the Miro board. From the above activities, we concluded that crispy sound does change people's perception of flavor and can have a positive influence on people's choice of snack, but its effect on relieving mental stress is not obvious.

Introduction

Keeping a good mood is always beneficial for both mental and physical health[3], yet stress causes a change of mood. Under stressful circumstances, some people experience sudden changes in appetite[14], thize[10], and the efficiency of work[4]. People have different stress coping strategies, among which, snack eating is the most popular and easiest way to relieve stress[2]), though snack eating sometimes leads to stress eating. Research[8] showed that people have complicated feelings towards snack intake, the chewing, and the rich flavors all provide a happy stress relief experience[6], but afterward, people tend to feel guilty because of the uncontrolled overeating behavior, and some expressed the concern of weight gain[7].

The situation is especially common during the corona pan-demic, as people are confined to working and studying at home and having limited chances of outside or social activities. More and more people turned to snack eating during rest times. We hope to approach people who are experiencing a certain degree of stress when working or studying at a fixed workplace. Our target group has a higher likelihood of stress eating, especially eating behavior aside from regular meals,



for example, snacks. By studying the crispy sounds' potential influence on participants' perception of flavor and choice of snack, we hope to see whether sound intervention can help create a guilt-free snacking experience that creates a good mood and relieves stress.

Study design

The research goes through an iterative data-driven design process, through contextual and informed steps, 2 participants in total took part in the weekly experiments, and 25 people participated in the sound-flavor experiment which was set up in the Miro board. Through data analysis, we generated insights and formed a better understanding of the relation between crispy sound, flavor, and snacking behavior. We then deployed our design probe again to see the influence.

From the above activities, we concluded that hearing the crispy sound before choosing a snack is a positive experience and people's perception of flavor is shown to have changed noticeably. Participants feel happy after snacking, but its influence on stress relief is not obvious.

Related work

DED process

As Janne van Kollenburg & Sander Bogers said in their Data-enabled Design thesis, nowadays, interactive products and services within intelligent ecosystems should be able to evolve their understanding intelligently with constant learning on data collection. Furthermore, data itself could not only act with the viewpoint of user experience and prototype experiment, which provides a situated design approach for design researchers[13].

Flavor

The sense of taste is the sensory system that is partially responsible for the perception of flavor. In the early 20th century, Western physiologists and psychologists believed there were four basic tastes: sweetness, sourness, saltiness, and bitterness[1]. The concept of a "savory" taste was not present in Western science at that time but was postulated in Japanese research[5]. Our tongue can also feel other sensations not generally included in the basic flavor, such as pungency(spiciness), coolness, numbness.

Stress and eating behavior

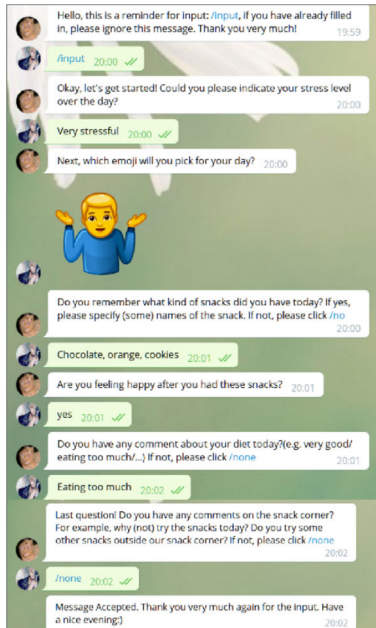
Stress has a great influence on mood, sense of well-being, behavior, and health. Stress can damage our health in the long term[11]. This negative influence is more obvious on people who are working from home under pandemic situations. Despite the advantages of WFH, the sudden transfer to WFH results in increasing stress because of blurred boundaries between work and life[15].

Ample studies have shown eating patterns can be altered by stress[12]. From the G Oliver and J Wardle research, stress affects eating behavior, especially snacking behavior. It was reported to increase in the majority of participants regardless of gender or diet status under stress[9]. On the other hand, stress has a significant influence on overall calorie consumption, food choice as well.

Design process

Study overview

Our test will be conducted at home, preferably in a fixed working place. We are targeting people who are experiencing a certain degree of stress when working or studying at a fixed workplace which may result in stress eating, especially eating behavior aside from regular meals, such as fruit, snacks, etc. Our design process went through multiple iterations.



Telegram input example in Iteration I

The question included choosing an emoji for the day, indicating the stress level, typing in the names of the taken snacks, commenting on the diet style of the day, and ending with an open question allowing all types of input.

Iteration I - Contextual step

This section describes the design process of iteration I, the contextual step. We first establish a link between the mood with measurable types of data. This was decided through the inspiration from the workshop, brainstorm, and discussion. After defining our research question, the prototype was designed based on the type of data we would like to collect. An analysis of the collected data and found insights will also be included in this section.

Research question

We decided to focus on the connection between snack eating and mood. As we mentioned in the introduction, snack eating is one of the most popular and easiest ways to release stress, while it can also cause some issues related to an unhealthy lifestyle. We hope to design through the research on stress eating behavior, and potentially reduce the guilt of stress eating while providing the stress-relieving snacking experience based on the people’s perception of flavor and health.

Prototype design

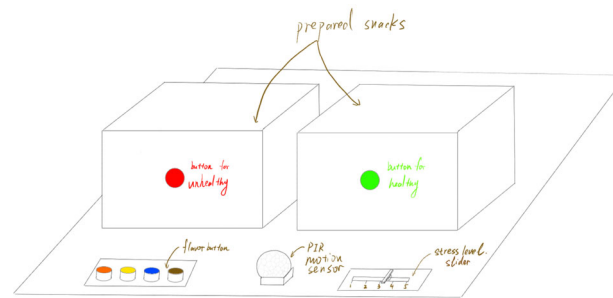


Figure 1: draft design of the 1st prototype

Based on the explorations, the prototype was created based on the four basic flavors, sweet, salty, sour, and bitter. The deployed prototype was a snack

box made up with a PIR sensor to detect the presence of the user trying to get snacks, a slider mapping to four levels of stress, four buttons for each basic flavors, and two buttons for healthy and unhealthy properties of the snack. The prototype was linked with Data Foundry via participant’s Wi-Fi. When the participant wanted to have snacks, the PIR sensor would detect the motion of the participant’s hand first. When choosing the snacks, the participant needed to press the healthy or unhealthy button and indicated the flavor of the snacks using the flavor buttons. The slider was used to collect the stress level before and after having snacks, thus the participant needed to move the slider to a certain position at both timepoints.

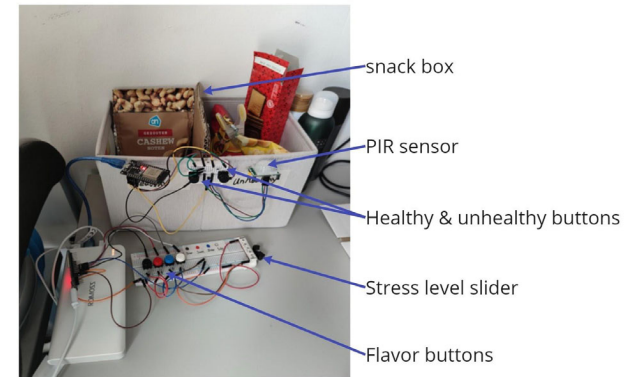
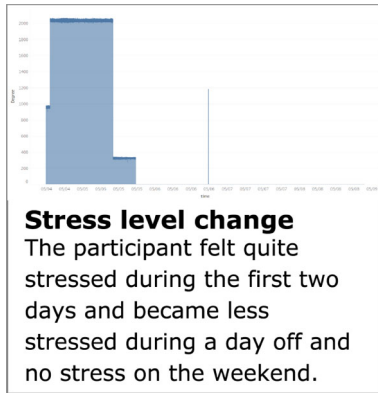
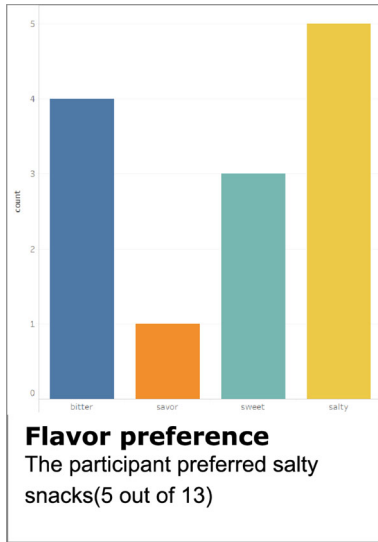


Figure 2: Deployment of 1st prototype

Insights

We got the basic information of the participant from the pre-questionnaire. The participant had a healthy 3-meal lifestyle, getting up, sleeping early, and is not experiencing serious stress. The participant preferred salty and sweet snacks and mostly had them in the afternoon and evening, approximately 2 to 3 times per day.



Physical prototype

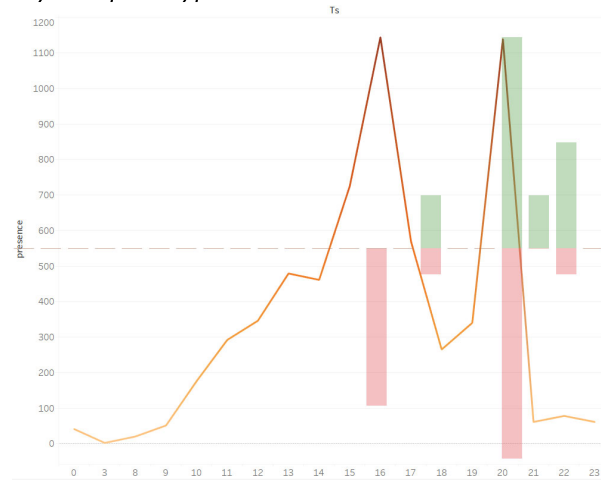


Figure 3: Presence during the day combined with healthy & unhealthy snacks (2 peaks)

The data collected in the physical prototype was visualized using Tableau Desktop(education version). The first peak was around 15-17h during the working hours. The participant tended to have more unhealthy snacks. The second peak was around 20-22h before going to sleep. Healthy food was more preferred. This corresponded to the result from the pre-interview that the participant mostly had snacks in the afternoon and evening. It was mainly because healthy snacks like fruit were usually saved in the fridge, where the participant might not have enough time to take. The snack box was deployed on the participant's study table, during studying hours, unhealthy food nearby was easily reached and could make the participant feel relaxed.

Through the data of the stress level slider, we found out that the stress level was also related to the holiday and weekend. The participant preferred salty

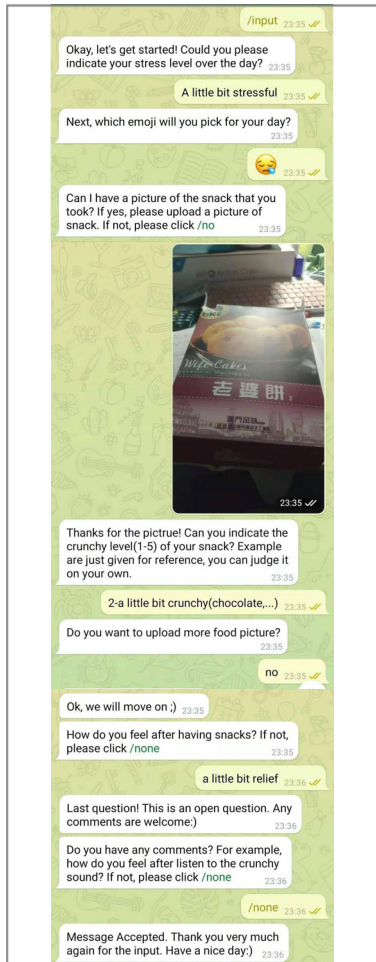
snacks as the pre-interview collected, but whether salty food had a positive impact on the participant's mood was not clear.

The week of deployment was not a stressful week for the participant. The participant could recall what types of snacks he had for the day, which corresponded to the count of approaching the snack box that was collected through the PIR motion sensor and the buttons. The participant reported that he felt happy in general, and no guilty feeling after taking the snack.

23 questions were answered during the post-interview via Teams video chat. The questions were divided into two types, personal lifestyle and attitude toward food.

We learned that the participants had typical Dutch meals and focused on eating comfortably instead of calories control. Snacks could be found everywhere at home and mostly unhealthy snacks around the study place. This corresponded to the result in the previous section about more unhealthy snacking during the afternoon. Additionally, he also mentioned that strong flavor was his favorite. Most of the snacks he chose are crispy and he found it very stress relieving.

In general, the participant was a student who studied in a relatively fixed area and time. He paid great attention to balance his study and rest and tried his best to avoid getting stressed. He considered snacks as one of the quickest ways to generate happiness but would prefer exercises if time allowed. The participant believed that snacks do not necessarily need to be healthy if one has control over the snacking behavior, instead of relying on snacking to relieve stress, but it would be nice to have more healthy snacks such as fruits.



Telegram input example in Iteration II

The question included the stress level, emoji, pictures with crunchiness and feelings, and an open question.

Discussion

Since this prototype was finished within a limited amount of time, wires and board were exposed, resulting in a rough design.

During the first deployment, the participant did not fit in our target group well, since the participant was not facing much stress. This resulted in a lack of information on stress relief experiences after having snacks. We also did not consider whether providing more(or fewer) snacks than normal will have an impact on their snacking behavior. The above insights showed us opportunities, we would be able to approach their snack eating behavior at a specific stressful period during the day.

Iteration II - Informed step

This section describes the design process of iteration II, namely the informed step. We designed one intervention and modified the prototype and test process based on the insights and feedback obtained from the contextual step. The pre-interview was conducted to find suitable respondents, intervention frequency, and period. An analysis of the collected data and found insights will also be included in this section.

Research question

In the informed step, we hope to find out how the crispy sound of snacks influences the user's choice of food, their perception of flavor, and how the snack eating experience causes mood change.

Prototype design

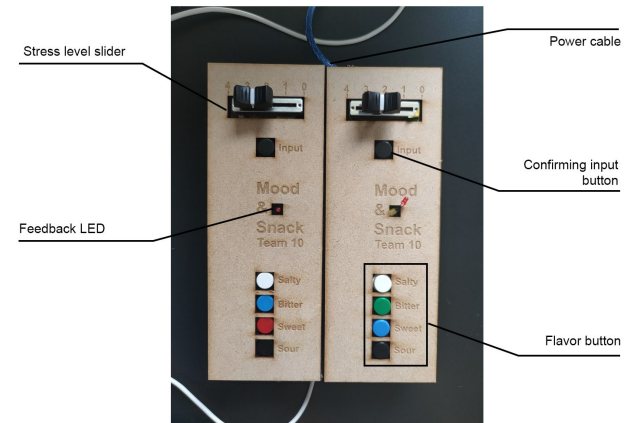
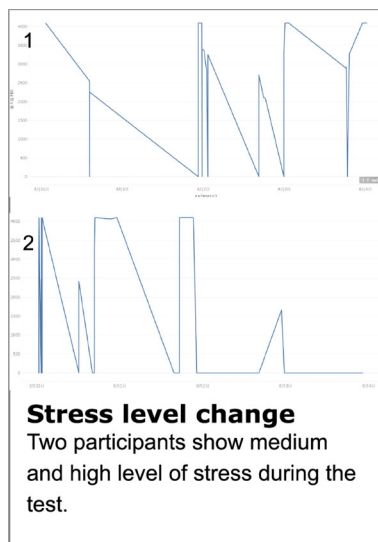


Figure 4: Deployment of 2nd prototype

Prototype inherited most features from the last step (see Figure 4). To get more stable data input, we offered LED light feedback and a confirming button on the middle and top part of the prototype indicating if the data input is valid. We wrapped the rough prototype with laser cutting wood, to reduce the influence of exposed wires and electronics on users. Apart from that, we also refined our telegram bot question. In addition, we added more questions inside the Telegram bot to inquiry users about eating experience for getting comprehensive understanding about their decision making on snack choosing, including choosing the crispy level of snack, writing feedback on the sound-intervened eating experience, and so on. Similarly, we still intensively observed the user eating behavior by placing our prototype next to the snack corner. To avoid the influence on the user's normal snacking behavior, the extra snack would not be provided to the user this time.

No.	Preferred time	Platform	Frequency
1	4-5pm & 9-10pm	phone alarm	15 mins
2	5-6pm & 11pm-1 am	Teams call	15 mins

Table 1: Preferred time and Intervention plan



Pre-interview data

We did pre-interviews for 2 participants to find out their snack eating habits, recent stress level, snack preferences, and attitude towards intervention. The preferred snacking times are stated in Table 1. Both of them stayed at a more stressed level than usual because of the upcoming study deadline. Their preferences on snacks were different, participant 1 preferred hardcore food, while participant 2 liked eating bland snacks more. After confirmation, they both consented to sound intervention.

Sound intervention

We designed a sound intervention to alter their perception of food flavor and food choice. 9 types of crispy food sound were selected during the test, including the eating sound of popcorn, instant crispy noodles, carrots, toast, apples, chocolate, watermelon, biscuits, and rice crackers. All of the sounds were free audio resources downloaded from the ear0 platform[17]. Looking at the intervention setup, the sound was designed to separately play at a fixed time every day based on the result of the pre-interview. It would be triggered with alarm clocks or Teams calling according to the user's situation. The detailed intervention method is shown in the table. The test lasted for 5 days.

Insights

Based on data collected from the flavor button input, we found that participant 2 preferred to eat light salty food, and this corresponded to the pre-interview result. However, due to the poor stability of the prototype of participant 1, the data we collected is not as accurate as participant 2, which would not be included in the data analysis. For the same reasons, the slider value input would not be taken into consideration as well.

According to the telegram input, participants expressed their stressful feelings through negative

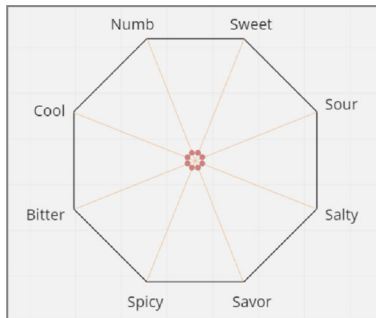
emojis like angry, cry, scream, sad, etc. the participants were experiencing a stressful week during the deployment period. Participant 2 ate more crispy food before the deadline. However, participant 1 ate less amount and a variety of snacks. After the deadline passed, participant 2 responded with happy and positive emojis and she did not take any more snacks.

The interview result reflected the similarities and differences between the 2 participants. Both of them expressed freshness at the beginning, but showed negative attitudes, including ignoring and annoying, towards the uncontrollable sounds after the test. Besides, they both had the awareness to control the snack input for health consideration, but without systematic management in the long run. Two participants shared the same belief that there was no need to change stress eating behavior itself. Essentially, they thought the most effective way to release stress was socializing and snacking was one of the social activities.

However, they held the opposite habit of stress eating. Participant 1 would limit her snack consumption when realizing too much snack intake. Participant 2 answered that she was attracted to getting snacks after hearing the sound at the beginning, but lost interest quickly after multiple times of stimulation

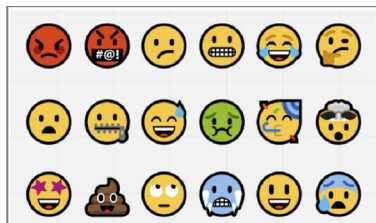
Discussion

The physical prototype showed its disadvantages in its portability as well the input stability even though we have modified it with a feedback light and confirmation button to be user-friendly. The form of the intervention itself, particularly Team call, hurt participants' moods during the test. They complained that the fixed time calling was not flexible and caused inconvenience. Even though they were all accepted the intervention method before,



Sound-flavor radar chart

The chart has 8 kinds of flavor/taste that participant can slide the central dot to express the flavor they feel according to each test sound



Emoji indication

Participant can choose one of emojis above to express their feeling to the test sounds

they could not help showing the negative attitude to the distractions made by those crispy sounds. As a result, they could not fully engage in the test. Out of this, we wanted to redesign the informed step and involved the participants again for another week of sound intervention.

Iteration III - Contextual & Informed step

In iteration III we mainly modified the intervention method based on the results from the workshop and did the informed step once again. We then analyzed the collected data set to see if watery crispy sound and dry crispy sound could influence their choices of snacks and create a good snacking experience.

Data collection instrument

short-term workshop for contextual step

The past sound deployment in iteration II was not a success, we couldn't get clear insights from the participant behavior because their emotion was very much influenced by the sound alarm clock experience. Two factors could be disaggregated from this experience, the selected sound, and the intervention method. From their interviews, we knew that a fixed alarm and Teams' call for snacks caused unpleasant feelings and did not have a clear influence on snack choice. But we also wanted to make sure it was not the sound that made the participant feel uncomfortable, so we organized a workshop that involved 25 people and then involved these two participants again in the second round of the informed step process.

The workshop was designed to collect target groups' general perception about the relationship between the crispy sound and flavor, further on, how they feel when hearing the crispy sound. The workshop was divided into two parts, the warm-up interview helped people get to know our topic, participants brainstormed about crispy food/sound and its potential influence on emotion. Then participants

were asked to listen to 9 selected crispy sounds, used 8 flavors adjacent to describe sounds, wrote down what kind of food they assumed, what flavor they expected, and described their emotions.

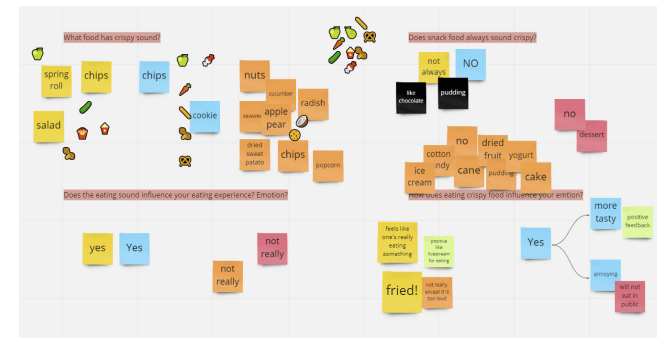


Figure 5: Warm-up interview



Figure 6: Sound-flavor radar test

Long-term processing deployment for informed step

The ultimate goal was to intervene in the participant's choice of snack and create a nice snacking experience. Thus, we did another round of tests with participant 1 from the informed step. The last intervention was still based on the crispy sound display, however, we set a more specific context for participants which only involves the sound



No.	Group A	Group B
1	carrot	crisp instant noodles
2	apple	toast
3	watermelon	rice cracker

Table 2: Built-in processing music type

intervention at the moment that the user wanted to take a snack. We intended to reduce the friction and discomfort during the test's experience and decrease the impact on the emotion due to the sound triggering. We used the stethoscope as a metaphor for our design, where the participant would have to listen to the crispy sound of the snack before actually choosing one. We hoped to see whether different types of crispy sounds could influence the flavor they wanted to experience, and the snack choice. Sounds were divided into two groups, dry crispy sound in group A and watery crispy sound in group B, each group containing 4 respondents who participated in the previous workshop. The test process was separated into two parts, before-snacking and after-snacking. At the before-snacking stage, users have to choose desired flavors and their current stress level. The flavor choices have been expanded into 8 types for providing more flexibility without the limitation on electronics. Then a random sound from the list will be played for 20 seconds and participants needed to decide what flavors they wanted to pick after listening. After finishing the before-snacking stage, users could eat snacks. Once snacking ends, users need to go back to processing, write their stress level and general feeling about eating experience and submit the test finally.

Participant story

Every time the participant appears at the snack corner, the PIR sensor will pick up her presence and send the participant a message. She will input her stress level and flavor choice, she is then asked to listen to a few seconds of crispy sound through the earphone (in our case, manually triggered by the processing program), she will choose what flavor she's experiencing. Now she is free to choose her snack in the snack box, and she will input her stress level again after eating.



Figure 7: Storyboard of intervened experience

Data analysis

From the workshop, 25 participants showed that they could divide crispy sounds into two categories, watery crispy and dry crispy. There was a clear relation between the crispy sound and the flavors people experience. The large proportion of water sound is generally related to sweet and sour food, such as fruit and vegetation; while a large proportion of dry-crisp sound is generally related to salty and savory food, such as chips. The 7th sound(watermelon) was the most popular sound that most people feel enjoyed; while the 2nd and 6th sounds(crisp noodles & chocolate) were the most unpopular sounds that almost half of the people feel negative. The watery crispy sound was considered satisfying and the food was generally more healthy than dry crispy sound, the insights were further applied in the refined informed step.



Figure 8: Radar chart & word cloud for 9 types of sounds

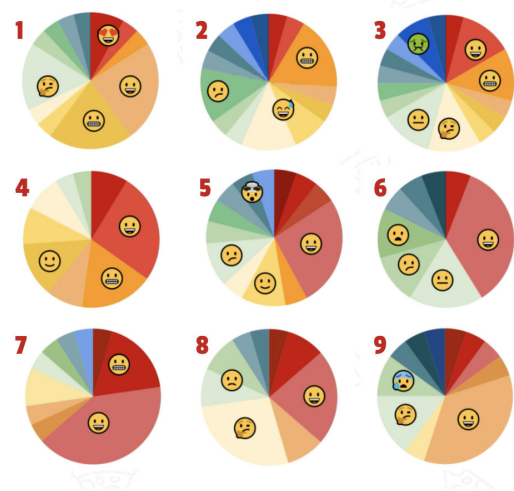


Figure 9: Pie chart for emoji

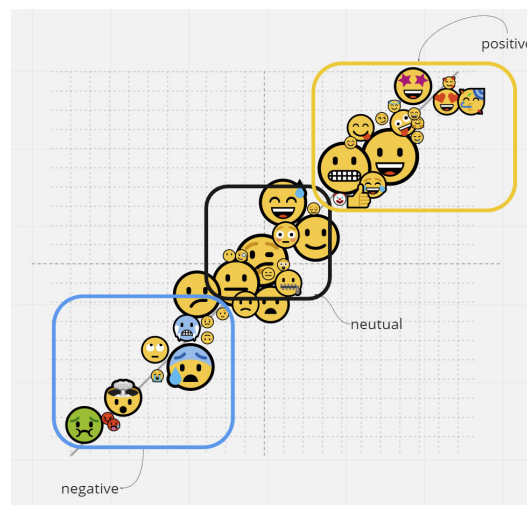


Figure 10: Emoji coordinate map

In Figure 10, the idea of the coordinate map for emoji visualization was from Sheery Wu and Clair Sun[19], and the positive(negative) division was based on an emoji sentiment analysis list done by EMOJIAL[18]. Most of the emojis chosen by our participants were either neutral or positive, while only very few fell in the negative area. This result confirmed that crispy sound did have more positive influences on people's moods.

The processing deployment lasted for a week and we received 9 valid inputs in total. The participant listened to 4 sounds from group A and 5 sounds in group B, the collected data showed that she was experiencing mid-level stress during deployment, and preferred strong-flavored unhealthy crispy food before the sound intervention, which was mentioned in her pre-interview. But her flavor tended to become cool and sweet after hearing the sound from group A, and she added fruits twice as her snack choice than before. When listening to the sound from group B, there was no clear change of flavor preference. From the post-test interview, we learned that the participant felt like she was going through a formal and nice relaxation routine. When she heard some of the sounds, which proved to be group A sounds, she felt fresh and summery at times, even though she had been craving salty and spicy food, she'd like to add fruits as part of the between-meal snacks. She still felt stressed after the snack, but she appreciated the opportunity to do this relaxing routine. Now she knows what flavor she'd prefer to try for snack time.

Result

It can be concluded that crispy sound has a positive influence on people's emotions, but is influenced by the chewing frequency, volume, rhythm, and also the kind of food.

The participant showed a clear change of flavor because of the sound she heard, but her stress level remained quite the same. The stress eating behavior cannot be easily changed, nor did the participant want to make a change, but it is possible to alter their choice of snack by influencing their flavor preference using the watery crispy sound intervention.

The watery crispy sound makes people associate the sound with healthy food, including fruit and vegetables, and encourages them to take healthier snacks. However, dry crispy sounds do not show the obvious influence on changing user eating behavior.

When asked about how they felt after knowing that they have eaten healthier food than unhealthy food for snacks, they were happy to see the change. But they doubted whether the sound intervention could have a long-lasting effect because participants tended to get used to the sound intervention after about a week. Only when the sound was constantly updating could the user feel the continuous stimulation.

Discussion

In this data-enabled design process, we finally came up with the crispy sounds to influence their choice of snack and create a happy snacking experience. But the sound is not in its best form yet. It is important to avoid discomfort caused by overloud chewing, reduce the sharp sound in the intervention, such as wrapping paper, etc. We'd Recommend choosing the sound of fruits like watermelon or apple as an intervention.

Currently, we only researched stress eating behavior without concerns about the large picture on WorkingFromHome. While it can be influenced by multiple stressors, such as air quality, noise level, and even work efficiency. How the eating behavior

can be involved in a bigger IoT network, and benefit from the data-sharing network, and also contribute data to the system.

Limitation

From the perspective of data, it is very difficult to gain the passive data by sensor because the research topic on mood is rather subjective and can easily be influenced by personal preference.

Looking at the whole design study, we couldn't shift entirely from our research perspective in the contextual step to the more design-originated informed step. We have focused too much on analyzing the data, so the design of sound intervention is not ideal. Our design showed sounds' possible influence on flavor, snack choice, and emotion, but a longer period of deployment needed to be done to understand how sound might play a part in relieving the stress eating process. For future work, we will focus more on the sound design and the snack corner design.

Conclusion

Through eight weeks' data-enabled design process, we concluded that crispy sound does change people's perception of flavor and can have a positive influence on people's choice of snack, but its effect on relieving mental stress is not obvious. To create a happy snacking experience and help people choose more healthy food for snacks, using a crispy sound might be a good intervention method.

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Appendix 1-Interview

Interview question list for Iteration I

01. How long will you work in the same place?
02. What is your daily work status? And what is your daily work routine and schedule? (eg. sitting on a chair working for a long time, taking breaks frequently, and do some workout, etc.) .
03. Do you usually pay attention to your dietary health and eating regulation? Do you monitor/record and actively manage your eating habits?
04. What flavor do you prefer?
05. What do you eat on a regular diet/meal?
06. Where you put snack at home generally?
07. What snacks do you usually prepare/store for yourself (at home/at work)?
08. What food do you think is a snack?
09. Under what kind of circumstances do you usually go for snacks?
10. What is the way to relieve stress usually for you?
11. stress eating| Are there any behavior changes related to stress?
12. What do you think of stress eating? (Do you think this needs to be changed?)

13. What do you like to eat when you are stressed? What do you like to eat in your leisure time?
14. Describe the taste of your favorite snacks?
15. What is the feeling when you eat them?
16. What simulation do the snack flavors give you? Why do you want to eat them?
17. How do you feel before eating? How do you feel after eating? To what extent can snacks change your mood?
18. In addition to the health and taste, what other aspects do you think snacks can affect your mood?
19. Will eating xxx relieve your stress when you are stressed?
20. Would you consider whether snacks are healthy when eating them if you are stressed?
21. What snacks do you think are healthy? What is unhealthy?
22. Will there be a mental burden after eating unhealthy snacks?
23. If so, how would you deal with such emotions?

Interview answer list for Iteration I

01. Mostly the whole day somewhere. Not fixed and changing every day. Sometimes at university or sometimes at home.
02. Start working around 10, end in 5 or 6. Then take dinner and relax. Sometimes I work at night if needed, but I avoid doing so.
03. Not really consciously thinking about what I should eat.
04. Savory food, sweet and salty sometimes
05. Most bread, dinner is always a warm meal, such as rice or pasta.
06. All over the place. Under the table, fridge, desk, or storage space. No central place for snacks. (under my table, a little storage

- space for chips. In the fridge, I put the fruit or chocolate. Or cookies on my desk. For example, I don't have a central snacking... Normally, then others.)
07. Chips and chocolate. After dinner or a little break from work.
 08. smaller, like mini-meals. Most unhealthy.
 09. Mostly just when I feel like I have to or want to eat something. It is not expected, mostly in the afternoon or evening, like a snack after dinner, eating chips while watching a movie, or taking a snack for a little break from working. Also, eat between lunch and dinner as the gap time between them is long.
 10. Depends on what the stress is. Generally, take a break, do some reading. If the stress comes from DDL, I will try to finish it, then after I go into relaxation mode. I always take into account that I relax enough when working, if not, I will reduce my workload and avoid the stress.
 11. If there is no time, I will take a snack instead of taking a break, or something in between, mostly unhealthy, which makes me feel good. If I have time, do sports, take a break, but snacking is a quick solution to relieve stress.
 12. A good solution to certain degrees. Should not take snacks every day, should not be a habit. It is fine to do once in a while, but there are other ways of coping with stress, like meditating or running, which are better.
 13. No answer
 14. It's mostly salty. And sometimes sweet, but not too much. I think it's mostly to catch your nuts or chips, for example, or savory, like some cookies, or also some chips are savory.
 15. Guilty pleasure. Manage eating snacks in control or at a certain level, how often can I

- do it? It is important to make it controllable, if it is out of control, I will feel guilty.
16. Give more pleasure to those snacks. I do not think fruit is a snack. I always have fruit, I put fruit in the visible and visible so that I can see them, but fruits are not as easy as snacks to eat, snacks are in convenient packages and quicker to eat. I wouldn't eat the fruit if I'm in a meeting or while I'm working or something.
 17. Eating what I want, not considering whether it is healthy or not, but if I notice I am in 'snack' mode, I will get out of there, it is important to stay in control.
 18. Nutrition, make you not hungry, should not be empty snacks.
 19. If I feel guilty after eating a snack, the whole point of eating a snack is gone. So I do not feel guilty, I manage intake, I do not want to get into a stress loop/cycle.

*Interview question list for Iteration II
(Its list is expanded with extra questions about sound based on the question list for Iteration I)*

24. How do you feel about crispy sounds?
25. Can you associate or imagine what kind of food the sound represents?
26. Does the sound influence your mood?
27. Is there any influence by sound on your snacking behavior?
28. Does the sound influence your choice of snack?
29. Does the sound influence your perception of snack flavor?
30. Do you have expectations on crispy snacks or sound?
31. What is your consideration of snack choices when you are stressed?

Interview answer list for Iteration II -Participant 1

01. Basically, work from home
02. Work while listening to music, playing mobile phone, Sudoku. Start working after 1 o'clock, until 4-5 o'clock, 8 or 9 o'clock in the evening to 12 o'clock. I would put a doll next to me, hold or pinch him, and make it more comfortable and boring.
03. There will be a sense of management, no systematic habit, and will eat meat, vegetables, and starch every day. It will be very uncomfortable in my heart.
04. Salty and spicy.
05. Curry, large plate chicken, sweet and sour pork ribs. Strong taste.
06. The snack box in the corner is responsible for storage, and there will be some snacks that you can eat on the table.
07. Very mild biscuits, white toast. I don't like to eat snacks in flavor. Very full. Can't eat after 12 o'clock. Eating too much oil and sweet snacks can make people uncomfortable.
08. Reprocessed foods are even snacks.
09. I'll eat when I want to, and when I'm watching a show.
10. Chat, video chat, snacks.
11. Cry.
12. Anxiety needs to be changed, because anxiety eats a lot, and then realizes that it has eaten a lot and cannot concentrate so that it is necessary to change anxiety.
13. No answer.
14. Konjac cool.
15. It's spicy and refreshing, but it's salty if you eat too much.
16. The taste is elastic and crunchy.
17. Snacks have changed some moods. When you eat, you will relax, you will become

- anxious after eating, and you will regret eating a lot.
18. The health of snacks is occasionally considered, mainly due to taste and price. The intake is not large, so it's nothing.
19. No answer.
20. No answer.
21. Unprocessed snacks, fruits, unflavored nuts.
22. No answer.
23. Stop eating. Eat fewer snacks next time
24. The sound is like eating potato chips, but I don't like it. Like a library, the movie theater feels like someone is eating, and the sound is uncontrollable.
25. Can't associate.
26. A little bit.
27. I think not.
28. It did not make me change.
29. No.
30. Not too much.
31. Knowing that you will eat a lot when you are anxious, you will choose something slow to eat, such as biscuits.

Interview answer list for Iteration II - Participant 2

01. No fixed time. Depends on.
02. Start working from 9.30 to 11:00 am, take a break for lunch for 1 hour, have dinner at 7-10 pm, and work until 2 a.m. Doing manual work will focus on the work while watching the video thinking.
03. There is no deliberate restraint because I don't eat much, so I can't take care of it because it has little impact. But I like to eat fresh things and prefer to eat vegetables and light food. Because I have a healthy taste, I can't manage it. The taste is strong, and the food with various seasonings will be unhealthy.
04. The original taste of the food

05. Not fixed, eat everything, prefer noodles.
06. It will be placed very deep in the box in the cabinet. Do not want to eat snacks unintentionally, which will lead to an unhealthy diet and various health problems.
07. I don't like chocolate. I prefer nuts without salt, which are full, nutritious, and chewy; sweet and sour foods, such as hawthorn. Hard-boiled eggs, oatmeal. Generally speaking, what to eat.
08. What you can eat or not eat are snacks. In the food pyramid, nutrition is not necessary.
09. Snacks are not eaten in daily life, only snacks are eaten at parties and festivals. When you are in a bad mood, when your brain is confused (not clear), under positive pressure, you will eat snacks in a generally positive state.
10. Playing games, chatting, sports.
11. Crying, and the above behavior.
12. When you are anxious, you can't eat anything when you are negative, and you even forget to eat. Regulating behavior cannot solve the problem, and eating with friends may relax.
13. No answer.
14. Seaweed.
15. Light, no carbon water inside, very healthy, without mental and physical burden.
16. Light taste, from crisp to soft.
17. Feeling of restarting, pause yourself, short empty.
18. Price, opportunity to eat.
19. No answer.
20. No answer.
21. Conventional standards go against the original color of food.
22. No answer.
23. Sharing with friends.
24. At first secrete saliva, but later ignore it.
25. I cannot.
26. No answer

27. After listening, I did take snacks, but maybe the position of the snacks is more influential.
28. No too much influence.
29. No too much influence.
30. No too much influence.
31. I just want to eat what I want.

Appendix 2-Code & processing interface

Code screenshots for Iterations

```

// Example of the ESP connecting to WiFi and accessing items in an
// database on the Data Foundry.
// This code only works with an existing account, project and database on
// the Data Foundry https://datafoundry.com/
// *****

#include "WiFi.h"
// *****

// SSID of your WiFi network, the library currently does not support WPA2 Enterprise networks
const char* ssid = "TK8081-106379_Mi-Fi5";
// Password of your WiFi network.
const char* password = "Linnashah";
// put the address of Data Foundry here
const char dataFoundry = "https://api.datafoundry.com/";
// create connection to database with server address, database id, and the access token
// *****
int Button_1 = 34;
int Button_2 = 35;
int Button_3 = 32;
int Button_4 = 33;
int Button_5 = 25;
int ledPin = 2;

// put your setup code here, to run once:
void setup() {
  Serial.begin(115200);
  // *****
  // establish WiFi connection
  WiFi.begin(ssid, password);
  Serial.println("Connecting to WiFi.");
  while (WiFi.status() != WL_CONNECTED) {
    delay(1000);
    Serial.print(".");
  }
  Serial.println("Connected to the WiFi network");
  pinMode(Button_1, INPUT);
  pinMode(Button_2, INPUT);
  pinMode(Button_3, INPUT);
  pinMode(Button_4, INPUT);
  pinMode(Button_5, INPUT);
  pinMode(ledPin, OUTPUT);
}

void loop() {
  //Buttons
  int Button_1_State = digitalRead(Button_1);
  int Button_2_State = digitalRead(Button_2);
  int Button_3_State = digitalRead(Button_3);
  int Button_4_State = digitalRead(Button_4);
  int Button_5_State = digitalRead(Button_5);

  // if condition checks if push button is pressed
  if (Button_1_State == LOW) {
    int button1State = LOW;
    int ledPin = 2;
    Serial.println("1-Button1");
  }
}

```

```

crispy_sound_test_A1 function
27 myTextLabel0 = p0.addTextLabel({description?})
28 .setPosition(10,70)
29 .setSize(200)
30 .setFont(crsFont("Georgia",15))
31
32 myTextLabel1 = p0.addTextLabel({description?})
33 .setPosition(10,150)
34 .setSize(200)
35 .setFont(crsFont("Georgia",15))
36
37 myTextLabel2 = p0.addTextLabel({description?})
38 .setPosition(10,70)
39 .setSize(200)
40 .setFont(crsFont("Georgia",15))
41
42 myTextLabel3 = p0.addTextLabel({description?})
43 .setPosition(10,150)
44 .setSize(200)
45 .setFont(crsFont("Georgia",15))
46
47 feedback = p0.addTextField("")
48 .setPosition(10,300)
49 .setSize(200,70)
50 .setFont(crsFont("Georgia",15))
51 .setPassive(false)
52 .setColor(color(255,255,255))
53 .setAutoclear(false)
54
55 myTextLabel6 = p0.addTextLabel({description?})
56 .setPosition(10,280)
57 .setSize(200)
58 .setFont(crsFont("Georgia",15))
59
60 endFg1 = p0.addTextLabel({heading?})
61 .setText("Congratulations")
62 .setPosition(10,25)
63 .setSize(200)
64 .setFont(crsFont("Georgia",20))
65
66 endFg2 = p0.addTextLabel({heading?})
67 .setText("You have submitted test successfully!\n\nIf you still want to take the test, click 'play again' \n\nIf not, click quit")
68 .setPosition(10,70)
69 .setSize(200)
70 .setFont(crsFont("Georgia",15))
71
72 player1 = m1.m1.loadFile("1.wav");
73 player2 = m1.m1.loadFile("2.wav");
74 player3 = m1.m1.loadFile("3.wav");
75
76
77 checkbox = p1.addCheckbox({checkbox?})
78 .setPosition(10, 100)
79 .setColorBackground(color(120))
80 .setActiveColor(255)
81 .setLabelColor(255)
82 .setSize(40, 20)
83 .setToggleView(0)
84 .setSpacingColumn(50)
85 .setSpacingRow(15)
86 .addItem("Sweet", 0)
87 .addItem("Sour", 1)
88 .addItem("Salty", 2)

```

Processing interfaces

