
Towards Experiencing Eating as a Form of Play

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Abstract

There is an increasing trend in interaction design to engage with food. We note that most prior work targets instrumental benefits (for example see food tracking apps to manage nutritional intake). In contrast, in this article, we highlight the potential of technology to support eating as a form of play. We reflect on our own work to articulate two design strategies for game designers on how they can facilitate playful eating experiences using novel technologies. Ultimately, with our work, we aim to facilitate a more playful engagement around the way we eat.

CSS concepts

• **Human-centered computing** → **Ubiquitous and mobile computing design and evaluation methods** • *Human-centered computing* → *Interaction design*

Author Keywords

Food; eating; human-food interaction; FoodCHI; games; play.

Introduction

“Don’t play with your food!” is a sentence that probably most of us have heard in one form or another in our childhood. In this article, we argue that we indeed should be playing with food, and that interactive technology offers novel opportunities to play with food.

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CHI PLAY '18 Extended Abstracts, October 28–31, 2018, Melbourne, VIC, Australia

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ACM ISBN 978-1-4503-5968-9/18/10.

<https://doi.org/10.1145/3270316.3271528>

Combining interactive technology with food is not new, the field of human-food interaction has been steadily growing over the years and produced interesting systems (for example, see [2,8,16,17,19,20,21,23]). We note that many prior works seem to focus on instrumental aspects of the eating experience, such as the need to eat a balanced diet, for examples see calorie-counting apps that help people track what they eat to manage nutritional intake [17]. In contrast, in this article, we highlight the potential of technology to support also the playful side of the eating experience, going beyond nutritional needs and requirements. In particular, we are interested in how interactive technology can support experiencing eating as a form of play (similarly to how research on bodily game design has previously argued to facilitate "experiencing the body as play" rather than using the body as a mere input controller alternative [30]): we call it *playful eating*. Playfulness in regards to eating can be described as a mindset whereby people approach the eating activity with an attitude similar to that of *paidia*, as something not serious, with neither a clear goal nor real-world consequences [31]. Playful eating is realized when people take a playful approach to eating.

We believe supporting playful eating is important as it not only satisfies our innate desire to play but might also facilitate associated benefits [28]. For example, it is believed it can contribute positively to social interactions during an eating experience [2,7] and aid the exploration of different properties of foods [13,5]. Furthermore, we believe that playful eating might even have the potential to contribute to mindful eating, a trend that aims to help people have a healthy approach to eating by emphasizing the benefits of an "enjoyable relationship" with food [5].

Playing with food could also result in negative outcomes, such as food waste, a perceived decreased value of the food or raising of cultural insensitivities. However, considering the widely lamented global issues society faces as a result of a misaligned relationship with food (ranging from obesity to eating disorders) [27], we argue that now is the time to re-examine our engagement with food from every angle, and this article contributes to such a journey by examining the potential of interactive technology to support playful eating.

In the next section, we present related work before describing three of our own playful eating systems. We use these playful eating systems to articulate two design strategies in the form of intermediate design knowledge [10]. We believe our strategies can be beneficial for game designers who want to venture into food and apply their expertise, and also for food and eating designers (i.e. chefs, restaurateurs, canteen managers, etc.) who want to learn from digital game and play design on how to engage with interactive technology and apply it to their practice. With our work, we hope to begin the creation of a structured understanding of playful eating with interactive technology.

Related Works

It is commonly believed that technology distracts from the experience of eating and has a negative impact [24]. Aiming to alter this common perception, several projects have emerged that aim to show that digital technologies can, in fact, have a positive impact on the eating experience. For instance, Ferdous et al. [7] suggested how re-purposing technologies as a medium for facilitating shared activities around dining can lead

to positive experiences of eating together. Similarly, Davis et al. [10] revealed how digital technologies can serve to entertain, support and bridge intergenerational interaction at the dinner table, allowing families to eat together longer. "CoDine" [26] is another example of positive use of technology to allow remote diners to eat together.

Interesting technology use has also been developed in relation to food. For example, Resner [23] introduced the concept of "Edible User Interfaces" that utilizes the multisensory experience of food to create novel interfaces such as TasteScreen, where users interact with the system by licking liquid residue of different flavors that drips onto the LCD screen [12]. Ranasinghe et al. [20] developed "Taste/IP", an interactive system to share taste remotely by combining electrical and thermal stimulation of the tongue. The same team also developed a "Digital Flavor Synthesizing" device that uses perfumes to utilize smell as a supplement for their digitally created flavors [22]. Ranasinghe et al. [21] developed the Spoon+ and Bottle+ prototypes that can be used to virtually manipulate the taste of drinks and foods. The project "Nourished" is another interesting work that artificially stimulates all senses to offer an eating experience without a caloric intake [18]. From these works, we learn that interactive technology can augment the eating experience. We build on this by focusing on the playful aspects and aim to provide an understanding of how to facilitate playful eating beyond one particular technology. To begin building such an understanding on playful eating, we start by constructing knowledge in the form of design strategies based on practical examples that we hope designers will use and benefit from in their practice.



Figure 1. Arm-A-Dine participants show signs of great enjoyment, feeding themselves and each other with their on-body robotic arms.

Playful eating systems

We now present three of our own existing playful eating systems that exemplify our thinking. We then articulate two strategies on how designers can facilitate playful eating experiences. The strategies have emerged through an iterative process in which thinking about eating and play has also influenced our design practice in return, similar to prior work that used a set of systems to provide an initial understanding of an emerging field (for example, to generate knowledge on bodily games [14], sensor-based systems [4] and proxemics play [15]). By engaging with such a meta process across multiple systems, we hope we are able to paint a picture of playful eating that is abstract in nature yet close to design practice.

Arm-A-Dine

Arm-A-Dine is a two-player playful eating experience [29] (Fig. 1). Each participant wears a robotic arm, attached to a vest, turning it into a third arm used for eating and feeding others. The scenario is a casual eating experience while standing up, as often experienced in conference settings. As the robotic arm is attached to the body via a vest, participants also need to move their bodies in order to align the arm's gripper with the food on the table when picking it up (allowing the selection of certain foods by moving slightly around) and when presenting it to their eating partner. Once the third arm picks up a particular food item, it feeds the food item either to the wearer or to the partner, depending upon whether the system senses (through a mobile camera attached to the partner's vest) the partner making a more negative (for example, if the partner did not enjoy the previous food item being eating) or positive facial expression (as a result of having enjoyed the food or the interactions

with the partner). If the system senses neither a particularly positive or negative facial expression, the third arm makes ambiguous movements in mid-air as if to tease both participants with not revealing who will be fed next before making a random choice.

Arm-A-Dine was designed to explore playful eating by focusing on the feeding action from the plate to the mouth while considering the strong affinity eating has with affect and emotions. An associated study [29] suggests that Arm-A-Dine can facilitate social interactions, promote bodily engagement and generate a lot of laughter.

You Better Eat to Survive!

"You Better Eat to Survive!" (YBEtS!) [1] is a two-player virtual reality (VR) game involving food (Fig. 2). One player puts on a VR headset and tries to find a way to call for help after being stranded on a virtual island. The game uses the narrative of a survival adventure game, where the main character has not eaten for days and is on the brink of passing out, thereby constantly losing vision in the game. We refer to the loss of vision as blackout phases and represent them using a steadily shrinking view (Fig. 3). If a blackout phase starts, the only way to regain vision is by eating real food. The eating activity is detected using a microphone attached to the player's cheek.

Auditory feedback (digital chewing noises) and visual feedback (virtual crumbs in the VR world) are used to portray the chewing activity in the game. With every chew, the player's view gets increasingly restored until there is full vision again. In case not enough food was eaten or there is no food left, the player dies and loses the game.

A major challenge for the VR player is that he/she does not see the food because he/she is wearing the head-mounted display (Fig. 2). The food is prepared and rationed on three tables set up in a triangle around the players, resembling a playing field. The job of the second player is to lead the VR player around the playing field and guide him/her to the food and then feed him/her. Physically, the players resemble one body because in the physical world the player embraces the VR player from behind and uses his/her own hands as if they would be the VR player's hands to feed him/her, while the VR player is not allowed to use his/her hands (Fig. 2).

EdiPulse

EdiPulse [11] is a system that transforms heart rate data from a physical activity into cheerful messages, emoticons and treats, 3D-printed out of chocolate (Fig. 4). For example, a message such as "Well done!" can be printed in chocolate to congratulate an individual on successful completion of an activity goal or a user can get a 3D-printed smiling emoticon. The user receives chocolate regardless of whether or not a significant amount of physical activity was performed. The form and thickness of the chocolate is based on the duration and intensity of the physical activity performed as measured via a heart rate monitor. In this way, the system offers a delightful and positive representation of one's physical activity in edible form. An associated study [11] revealed how an artistic and playful culinary rendering of bodily data in an appealing material like chocolate can facilitate social interactions around eating in families and inspire individuals towards achieving their fitness related goals.



Figure 2. In "You Better Eat to Survive!", the non-VR player feeds food to the VR player as he cannot see the food.



Figure 3. Transition of vision during a blackout phase.



Figure 4. Emoji, graphic and slogans are printed through a 3D-printer based on participant's physical activity.

Design strategies to facilitate playful eating

In order to provide designers with an initial understanding of how they can design playful eating experiences, we now describe two strategies derived from the examples above. These strategies are aimed to highlight the potential of using food as a play design resource.

Challenge cultural norms around eating

This strategy is concerned with the extent to which the system supports challenging cultural norms around eating by means of interactive technology. Challenging cultural norms can be a powerful strategy to facilitate playful experiences [15], as previously pointed out by work that demonstrated the benefits of making participants playfully “uncomfortable” through interactive experiences [3].

Arm-A-Dine exemplifies this strategy, as it challenges the cultural norm of how to consume food. The robotic arm has a gripper installed at the end that picks up the food and then feeds it to the wearer's or partner's mouth (the gripper is cleaned before each use). The gripper could have also held a piece of cutlery, such as a spoon or fork, however, preliminary experiments showed that this would have made picking up food very difficult. In response, the gripper itself picked up the food. As the robotic arm was attached to the human body and looked a little like a hand, it appeared that participants started conversations about eating with cutlery versus hands.

In YBEtS!, participants had similar discussions around eating with one's hands, which was exaggerated by the fact that the other player was putting the food into the VR player's mouth, which can be seen as a rather

intimate action. This led participants to discuss issues of trust, as they reflected on how easy it is to cause someone harm simply through feeding something wrong, whether intentionally or unintentionally (e.g. something allergenic without knowing). This high degree of trust required in YBEtS! stands, for us, in stark contrast to the level of trust required in purely digital games, where players (i.e. their avatars) sometimes also eat (virtual) food. In a virtual game, the avatar might lose health points if eating something toxic, however, with real food, bad indigestion might be the result long after the game is turned off. This highlights for us the potential to play with cultural norms, in particular through a high level of risk that arises when engaging with food as a potential way to facilitate an uncomfortable, yet engaging experience. A well-known example is the eating of Tetraodontidae, a fish that is a delicacy but poisonous if prepared wrongly.

In EdiPulse, the cultural norm around sharing sweets such as chocolate was challenged as the data embedded into the chocolate made it more personal. Participants reported how they usually share their chocolates, however, with EdiPulse, they felt hesitant to share their treats as it belonged “more” to themselves because it contained their personal bodily data: “*Food is generally shared, but once it has data elements to it, it becomes more personal.*” Participants had invested physical effort into the production of the food, which changed how they saw the possible sharing of the food. It appeared as if the participants wanted to “return” this bodily effort as represented through the chocolate back into their body.

Reduce autonomy over the eating process

This strategy is concerned with the extent to which the system reduces participants' autonomy over the eating process. Autonomy is defined as having interesting and meaningful choices that allow people to act volitionally [9]. Having a high degree of autonomy is usually considered desirable in digital games [9]. In contrast, we argue that reducing autonomy over the eating experience could be a powerful resource for game designers to facilitate playful eating.

For example, in Arm-A-Dine, participants experienced reduced autonomy over the eating process as they were not able to select their own food when it was presented by the other player. Furthermore, they experienced limited autonomy in terms of how to feed themselves or the other person, as the robotic arm's movement was preprogrammed to be influenced by their facial expressions. This included the closing and opening of the gripper, so participants often had to quickly act in order to avoid the food being dropped back onto the table, having to coordinate the timing when to open their mouth. This reduced autonomy appeared to contribute to an engaging experience.

In YBEtS!, the VR player experienced reduced autonomy over the eating process as she/he was not able to see the food nor be able to select it. This resulted in a bodily reliance on the other player, which appeared to contribute to the playful character of the experience. It appeared participants cared for each other in both the virtual and physical world, facilitated by the need to eat food.

In EdiPulse, participants experienced reduced autonomy over the eating process: they said that

sometimes they would have preferred to be able to eat the chocolate straight away, yet the reduced control facilitated a feeling of ownership and control over one's desires: "*Although chocolate was so accessible, you also knew that every night you would have a bite of chocolate. And when I did not exercise, I knew from the system that my body did not ask me to eat more chocolate. So, it really made me eat less chocolate than what I normally do.*"

Conclusions

There is an ongoing interest in the intersection between interactive technology and food, fueled by technological advancements. We believe that this trend of interacting with food supported by novel technologies could not only serve instrumental aspects, but also facilitate playful experiences. In this article, we argued that there are benefits to experiencing eating as play. To illustrate our thinking, we have articulated two design strategies based on our experiences of having designed and studied three playful eating systems, which designers can engage with when interested in the intersection between interactive technology and food.

We see our work not as a complete investigation into playful eating, however, nevertheless believe that our work can serve as a valuable springboard for future investigations. We hope our work can encourage game designers to consider how their expertise could be useful for the future of food. Furthermore, food experts and chefs may be inspired by our work to consider the skills of game designers when creating novel eating experiences. Altogether, the result will be more playful eating experiences. Ultimately, with our work, we aim to facilitate a more playful engagement with the way we eat.

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