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# Understanding the Design of Playful Gustosonic Experiences

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## Abstract

Sound plays a vital role in our relationship with food, this is highlighted through the term “gustosonic experience”. However, when it comes to designing celebratory technology for eating – i.e. technology that celebrates the experiential and in particular often playful aspects of eating –, the use of sound has been mostly underexplored. My PhD research explores the opportunity to use interactive technology to enrich playful eating experiences through sounds. Via a research-through-design approach, I designed and evaluated two systems that generate digital sounds as a result of eating ice cream, contributing to our understanding of the design of interactive gustosonic experiences. I hope that this work can guide designers in creating gustosonic experiences supporting a more playful relationship with food.

## Author Keywords

Gustosonic; Sounds; Play; Human-Food-Interaction

## CCS Concepts

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

## PhD Stage

I am a PhD candidate with a background in design and human-computer interaction. I have recently entered my

second year of a three-year PhD program in the Exertion Games Lab in the School of Design at RMIT University, Melbourne, Australia.

### **Context and Motivation**

Food is essential to our survival. Its consumption offers rich multisensory experiences, where vision, smell, touch, taste, and sound play a unique role [21, 24, 23, 5]. Although most people seem to believe that sound is the least important sense when it comes to experiencing food [20], prior research on sound-related experiences of eating has demonstrated that sound can play a crucial role [23, 25]. For example, we perceive the freshness of a potato chip by the quality of its crispy sound [22]. Crunchier sounds also make peanuts and almonds feel more palatable [20]. Our eating behaviours are also influenced by sounds. For example, fast-paced background music can increase people's eating speed and also facilitate taking more bites [16]. Furthermore, some restaurants use sound as an "extra ingredient" to facilitate a rich dining experience. For example, the "Sound of the Sea" dish encourages diners to listen to the sound of sea waves through headphones while they eat a seafood dish [27]. These links between the act of eating and listening within a combined multisensory experience are referred to as "gustosonic experiences" [28]. Drawing inspiration from this, I believe that there is an opportunity to design interactive sounds to enrich eating experiences.

I believe that eating and play go well together because eating is inherently fun [10] as food can provide people with a pleasurable experience. Unfortunately, I find that most of the work in the field of Human-Food Interaction (HFI) seems to focus on building "corrective" technology [7], which aims to fix people's eating problems or support healthy eating behaviours. For example, technologies have been developed that aim to help people make the right food

selection [29], improve eating habits [11] and balance daily nutrition [17]. In contrast, Grimes et al. [7] argued to design more "celebratory technologies" that highlight the opportunity to be more playful with eating. Related, Chisik et al. [3] defined a gastroludical experience as one that involves the physical sensations associated with eating combined with digital technology to create new games to play with food. Wei et al. [32] proposed to extend digital food games to edible food as output for virtual game rewards, connecting playfulness with active participation in eating experiences. I believe that these positive perspectives on food interaction can contribute to enrich experiential and in particular playful aspects of eating experiences. Motivated by these calls for further research, I propose the research question: *how can we design gustosonic experiences to support playful eating experiences?*

With this research, I advocate a new perspective on designing playful eating experiences through digital sounds.

### **Research Objective**

- Identify the design space of playful gustosonic experiences by looking into related literature and presenting three design prototypes that facilitate playful gustosonic experiences.
- Validate the design space by evaluating the three design prototypes through user studies.
- Generate a design framework that aids designers in creating playful gustosonic experiences through the insights gained from the studies of the three prototypes.

### **Related Work**

In HCI, researchers have begun exploring the use of interactive technology with sounds to support a playful eating

experience. For example, Koizumi et al. introduced “Chewing Jockey” [15], an augmented food texture system that uses playful sound effects. The system offers playful eating experiences by playing cartoon sounds while chewing gummy sweets. Similarly, “Straw-like User Interface” [8] is a virtual drinking system that replicates the sucking sound associated with drinking through a straw. Arnold et al. [1] developed a game that uses chewing noises detected by a sensor attached to the face as a game controller to enrich a virtual reality experience. Moreover, Polotti et al. [18] designed a sonically augmented dining table called “Gamelunch” that allows people to experience continuous sound feedback while having lunch. These works have contributed to our understanding of how to improve the food experience, but the sound-related research seems to focus mostly on the instrumental benefits, including the augmented perception of food texture, enhancing the cross-modal experiences of eating or using sound as a game interface. Nevertheless, these works teach me that interactive technologies can enrich playful eating experiences. However, knowledge about the design of gustosonic experiences is still limited.

Prior work noted that sound is traditionally a powerful design resource to support playful engagement (see for example [9, 12, 33]). Interestingly, sound can also play a significant role during eating; in fact, the role of sound during eating is generally under-appreciated [25]. In response, research in psychology on the relationship between sound and eating has emerged in recent years. What we hear during eating affects our enjoyment of food and hence the overall experience [13, 14]. This could be altered through technology, for example, several studies demonstrated that people tend to eat and drink more when increasing the loudness of background music. When high tempo music is played, people eat more rapidly [25]. Similarly, even if

an actual food texture is soft, people can perceive food as crunchy through the addition of crunchy sounds [6]. Moreover, people perceive red wine as heavier when hearing “powerful” sounds [26] and the sweetness of cinder toffee is increased with high pitch sounds [4]. Although sounds might offer opportunities as listed above to enrich the eating experiences, there is a lack of understanding on how to design celebratory technologies with sounds to facilitate playful gustosonic experiences, which is thus the focus of this research.

## **Research Approach and Methods**

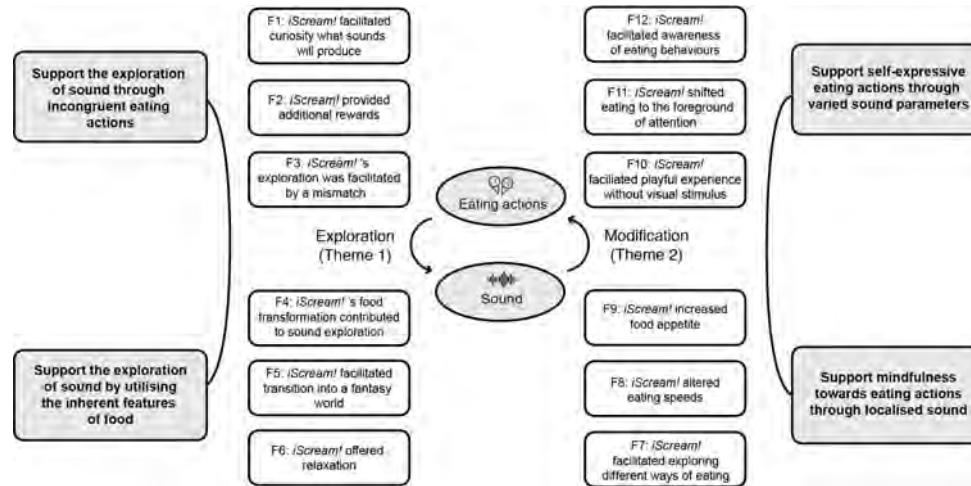
To answer my research question, I utilize “Research through Design” (RtD) [34] as my research approach. This approach helps designers to reflect on their design and research results through prototyping, leading to the evaluation of the design. The RtD approach could also aid designers to contribute to design theories, such as design frameworks based on the iteration of prototypes to guide future designs. In this work, three prototypes will be developed to enrich playful gustosonic experiences. Through using the RtD approach, I will also contribute to design theory by proposing a design framework for playful gustosonic experiences. I adopt both “lab-based” and “in-the-wild” qualitative research approaches [19] to understand the user experiences of the design prototypes. I conducted semi-structured interviews about the user experiences of each prototype and used thematic analysis to derive a set of themes [2], forming my initial design framework (see Figure 1)[31, 30].

## **Dissertation Status and Next Steps**

The starting point of this investigation is a design prototype called iScream! (see Figure 2) that is a capacitive-sensing ice cream cone. The system dynamically generates digital sounds while the player performs lick-on and lick-off actions. The iScream! system has been demoed at the In-



**Figure 2:** The 3D-printed cone contains a wireless microcontroller connected to removable food-safe aluminium foil that then makes contact with the ice cream.



**Figure 1:** The initial design framework shows the ongoing loop between eating actions exploring sounds and sounds modifying eating actions.

teractivity venue at CHI 2019. I also conducted a lab-based study with 32 participants, providing them with four different sounds (a roaring, crunchy, giggling, and burping sound in order to explore fantasy facilitation, food congruency, anthropomorphism and bodily response) when eating ice cream (see Figure 3).

Through the user study, I derived two themes from six findings each, which detail how players explored the different auditory interaction possibilities with their eating actions while the sounds in turn modified those eating actions. I then articulated four design tactics based on two themes aimed at guiding designers when developing playful gustosonic experiences to facilitate a playful relationship with food (see Figure 1). A long paper describing the results has been published at CHI PLAY 2019.



**Figure 3:** The player is playing with iScream!

Based on the results, I extended the work by investigating social aspects of playful gustosonic experiences to deeper understand how players explored the different auditory interaction possibilities with eating actions. Another playful system was developed to allow participants to interact with musical sounds produced through the act of eating ice cream together. I also conducted an in-the-wild study with five pairs of participants to understand the user experiences. The results will inspire me to design the third case study (yet to come) and help build the final design framework. A paper describing the results has been submitted to CHI 2020.

### Expected Contributions

- This work will contribute to our understanding of the design of playful gustosonic experiences both in practice and theory.
- The work extends the current understanding on designing celebratory technology by focusing on experiential, and in particular playful aspects, of eating experiences. As such, this work combines food with interactive technology to enrich eating experiences. This is important, as an enhanced understanding could be beneficial for game designers who aim to venture into food and apply their expertise. Food designers and chefs can also engage with interactive technology and food to apply it to their practice.
- Overall, my work introduces the opportunity of how interactive sounds can facilitate a playful gustosonic experience to the HFI community, contributing to theory by proposing a design framework that is aimed at guiding designers to create playful gustosonic experiences.

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