

FOODFREQUENCY: A MULTI-SENSORY PARTICIPATORY EXPERIENCE THROUGH FOOD AND SOUND

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Abstract

This paper describes the background and development of Foodfrequency, a sound installation which involves attendees to live a multi-sensory experience based on food tasting and soundscape deep listening. The audience participates in a new but quite engaging way: eating and drinking during a special dinner. Each moment of the culinary experience is guided by binaural soundscapes and auditory cues, which are played respectively via headphones and a multi-channel sound system, in order to provide information and suggestions about the cultural identity and the origin of food. Thus attendees become part of a collective performance in which the perception of flavour and taste is enhanced by the listening of specific soundscapes. Each soundscape is recorded on purpose to match each dish. The sound artists and the chef work closely together. The proposed recording technique is binaural recording. This technique allows for a more immersive experience, with a 360° reproduction of the aural space. The binaural soundscapes become the means of communicating the cultural significance of food, through the immediate representation of the territory of origin and the identity of each dish. At the same time, the use of soundscapes connected to a specific taste and flavours have proved to positively affect and enhance the gustatory experience. Different tests have been performed with some attendees in order to evaluate the effectiveness of the proposed experience.

Keywords: soundscape design, binaural recording, multi-sensory experience

1. Introduction

“Culinary art is a synesthetic art, its message being conveyed by taste, smell, touch, visual feeling and, to some extent, sounds”¹.

In this paper we propose Foodfrequency², an immersive experience designed to stimulate, by means of a multi-sensory approach based on sound and music, a deeper awareness of food, one of the most important aspects of our life, deep-seated into the culture. Indeed food represents a symbolic border, delimiting the boundaries between a country and

another, a culture and another one, and at the same time it is an important medium for humankind to express clearly its belonging to the same identity. This fundamental moment of mutual understanding is augmented by sound, an immediate and strongly emotional language. Sound is able to make physical limitations disappear, as the chair where we are sitting on or the room where we are eating. The imagination of the audience is stimulated to feel and picture the geographic area of origin of the ingredients they are tasting, as the stories and lives of people who took part in their preparation. Participants are involved in a son-

¹ <http://it.wikipedia.org/wiki/Cucina>

² <http://www.foodfrequency.it>

ic and musical journey into a country's cuisine, in order to live a moment of emotional sharing and then contribute to the creation of a spontaneous and collective performance.

The remainder of this paper is organized as follows. In section 2 we propose the previous work on which the main concepts of the project are based. A detailed description of the project is described in section 3. In section 4 we discuss the experiments performed to evaluate the effectiveness of the installation and finally conclusions and future work are presented in section 5.

2. Previous work

The relation between sound and food has been investigated in several works, both for research and commercial purposes. First of all, we must consider that our perception of the food we eat is built upon the integration of multi-sensory cues. We give prominence not only to the look (Shankar, Levitan & Spence, 2010), smell and taste of food (Small & Prescott, 2005), but also to what it sounds like in our mouth (i.e.: eating potato chips) or the stories and culture behind it (Amerine, Pangborn & Roessler, 1965; Vickers & Bourne, 1976; Vickers, 1980; Dacremont & Colas, 1993). At last we have also to consider other, more psychology-related factors as expectation (Cardello, 2007) and cognitive strategy (Prescott, Johnstone & Francis, 2004). Research focused on auditory experience evidences how dramatically sound and music can affect our perception of food and drink. Some recent works (Spence & Shankar, 2010) demonstrated that sounds produced while eating, background music and also environmental noise must be considered as real stimuli, affecting what people taste, prefer or even perceive as smell. Zampini and Spence (Zampini & Spence, 2004) clearly demonstrated that the perception of taste could be altered by the surrounding soundscape. Some other works investigated more specifically the convivial environment and the relation between sound, human interaction and perception while sitting at a table for lunch. The Gamelunch (Delle Monache, Polotti, Papetti & Rocchesso, 2007); Polotti, Delle Monache, Papetti & Rocchesso,

2008) is a sonically augmented dining table in which all the interaction gestures of people are captured in real time by sensors and mapped onto physically-based sound synthesis algorithms. In (Woodsa, Poliakoffb, Lloydb, Kuenzela, Hodsona, Gondaa, Batchelora, Dijksterhuisa & Thomasa, 2011) the effect of background noise on the perception of food properties (sweetness and saltiness), crunchiness and liking, it's been investigated to explore whether sounds unrelated to food could affect taste. Results showed that background noise decreases the gustatory food properties (saltiness, sweetness) but enhances sound-conveyed food attributes (crunchiness). All these works highlight the significant role that sound can play in influencing the perception and evaluation of taste, even if people are unaware of what they are listening to.

3. Foodfrequency

Our work consists of the design and development of a collective event during a dinner, where guests sit at a communal table and enjoy the food while listening to pre-designed auditory cues and music compositions. In-headphones binaural soundscapes are alternated with external surround music, played via a four to eight multi-channel sound system. Whereas the audience can not control the sound and music elements, they are invited to participate to the experience in the most significant way: eating the food and drinking the wine proposed according to a pre-decided menu. The rhythm of eating and drinking, together with the progression of the conviviality itself (with guests more and more involved in the dinner atmosphere and getting to know each other better), affects the development of the whole performance. The interchange between soundscapes (*internal*) and music (*external*) is pre-designed but performed live: during the dinner, three performers control the sound and music flow. The audience behaviour influences the duration of the sound and music experience. We all have different rhythms in enjoying a meal or a glass of wine. The performers follow the rhythm of the tasting and adjust the duration of the soundscapes and the music accordingly. The main purpose of the

performance is to enhance the sensory experience of flavours and tastes through sounds, without interrupting the natural flow of emotions and feelings that are commonly related to a shared food and wine tasting experience.

3.1. The experience

Foodfrequency is at its core a culinary event. Participants expect to enjoy food and wine from a specific geographic area. So far the experience has been performed based on Italian cuisine and Italian wines. The first performance has been realized as a sitting dinner, where guests, alone or with their partner, shared the table together. An important point to highlight is that beside their closest partner (usually husband or wife), the participants did not know each other. After this first performance, Foodfrequency has been performed in different environments, including food and wine tasting and *aperitivo* for private and public events with guests sitting or standing at their own choice, alone or in group. In the following, the first performance will be described and discussed. During dinner guests are invited to wear headphones (**Figure 1**). The sound contents are strictly soundscapes, recorded on purpose with binaural technique in the area of origin of the ingredients and during the dishes preparation. Each dish is portrayed by a soundscape, which can be: connected to the whole dish; related to a specific ingredient; representing the chef cooking the specific dish



Figure 1. Guests sharing the same table during dinner while listening to soundscapes and music.

Thanks to the use of headphones, we invite guests to live a deep listening (Lopez, 2006)

experience. Though guests are not blindfolded, the inherently immersive characteristics of binaural soundscapes favours an intimate and solitary experience. Guests are not able to discuss and share the experience with their partner, and are therefore stimulated to focus only on the senses of taste and hearing. The use of headphones alternates with a multi-channel, external sound diffusion. The music performed is composed following the experimental results described in section 2, i.e. to stimulate the audience to grasp the relationship between frequencies, tastes and flavours (sweet, sour, bitter). The music content is partly composed on purpose, partly selected from pre-existing music. In both cases, though, the music is designed to give auditory cues to the audience, in order to create a seamless and coherent flow of sound to match the headphone immersive experience.

In this second modality of interaction guests are expected to experience the conviviality. If at the beginning the conversation is only between friends, during the performance the audience starts interacting more and more, discussing openly the headphone experience, the related feelings and emotions. The external music is also adjusted to these changes in the audience mood.

3.2 Details

The Foodfrequency performance consists of three deeply interconnected elements: food and wine, soundscapes and music.

3.2.1 Food and wine

In this scenario food has been designed for first. The chef created the recipes according to the following considerations: season; local ingredients; traditional Italian cuisine and in particular from the Tuscany region; possibility to match the dishes with particularly interesting/pleasant/stimulating sounds; possibility to match the tastes and flavours with music frequencies and instruments. For example: in the main course *Involtino di melanzane, pesce spada, pomodoro, capperi e basilico con purè alle erbe aromatiche* (eggplant, sword-

fish, tomatoes, capers and basil roulade with aromatic herbs puree) the soundscape provided was the recording of a pinewood walking along the sea, with light sea sound in the background, and cicadas in the foreground³.

After the first experience, experiments have been conducted to work deeper into the food and sound/music relationship to provide more effective auditory cues to the audience. The research is now concentrating on the possibility to start from a specific, stimulating sound, and design a recipe based on the sound. This allows us to work on the physical qualities of sounds at the same time as we work on the physical and chemical qualities of food. In a recent performance, the traditional crumble has been recreated starting from the sound of cracking and crunching wood sticks on snow, during winter, in the Alps. According to this sound, the crumble was prepared with ingredients that originate from that territory and that season and that differ from the traditional crumble recipe⁴. In the first event the definition of "auditory cue" has been culturally interpreted (Tuscan dish → sound of Tuscany countryside). Now the research focuses on auditory cues that match and stimulate the physical characteristics of food (sound of cracking wood → crispiness). This will stimulate the audience in developing a second level, deeper and partly unconscious connection between the sound and the ingredient's characteristics (Zampini and Spence, 2004). This further development of the auditory cues will allow us to experiment on the concept of deep listening as well, avoiding literal references between sounds and ingredients and stimulating the participants to concentrate on the sound inner characteristics in a search for a real immersive sound experience, as it is the goal of profound listening experiences as described by Francisco Lopez (Lopez, 2006).

The secondary goal of Foodfrequency is to stimulate the awareness on the theme of locally grown food, in-season ingredients, and healthy food. All the recipes designed for the

first event were based on Tuscany traditional cuisine (i.e. the region where the event took place), and therefore prepared using local ingredients.

3.2.2 Soundscapes

Soundscapes are of two types: kitchen soundscapes and natural soundscapes. All the soundscapes were recorded with binaural microphones, at 96,000 Hz and 24 bits. A *sonic concept* has been identified to represent the core elements of each dish, in a collaborative process between the chef and the sound designers that aimed at envisage the most effective auditory cues (Spence, 2011). Kitchen soundscapes were chosen to amplify some of the dish qualities (Figure 2).

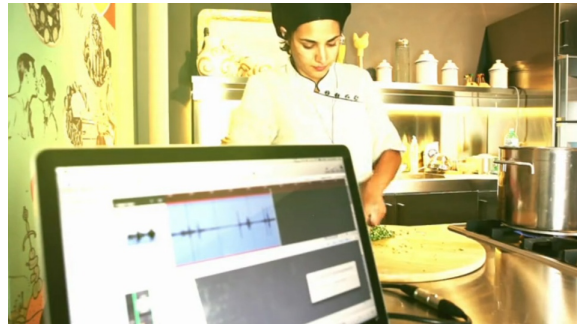


Figure 2. The chef during the preparation of a dish. The kitchen soundscape is captured via a recording software on the laptop computer. The chef herself is wearing the binaural microphones located inside the ears.

For example: in the starter *Crudo di zucchini al fresco di menta* (raw zucchini with fresh mint), the sound of the knife was recorded while cutting on a metal chopping board to amplify the feeling of freshness, whereas for the main course *Gnocchi di ceci, salsa al pomodoro, baccalà* (codfish and tomato chickpeas gnocchi) the knife chopped on wooden board, for a warmer feeling⁵. Examples of natural soundscapes include: soundscape of cows recorded in the countryside for the starter *Crudo di Zucchini al fresco di menta*, prepared with zucchini, mint, balsamic vinegar, pine nuts and parmigiano, in order to stress the cheese and the freshness of the herbs as core sonic elements. As for the first and main course, both

³ Soundscape 1: pinewood and seaside walking. Recorded at Castiglione della Pescaia, Italy, <http://bit.ly/18vQ6uS>

⁴ Soundscape 2: winter woodwalking. Recorded at Lago di Cei, Italian Alps, Italy. <http://bit.ly/1bIfMEr>

⁵ Soundscape 3: kitchen soundscape. Recorded in Italy, <http://bit.ly/16Xuvv2>

fish dishes, the same core sonic element - the sea - was differentiated in order to convey a different feeling offshore and seashore). Only a limited editing has been applied to the sound files (fade in/fade out) and no post-production effects were used, in order to obtain the most realistic sound experience. For each soundscape, a direction of the recording needs to be planned and organized in advance in order to obtain the expected sound effect (Figure 3). For example, the farm recording used for the dessert has been realized interacting with the animals (chicken, hens, chicks and turkeys) with the permission of the farmer, in order to push the animals to be *noisier*⁶.



Figure 3. The sound designer is wearing the binaural microphones with the windshield during the farm recording session.

3.2.3 Music

Music alternated the soundscapes during the whole dinner, and was played through a four channels sound system controlled by a Max⁷ patch for spatial movement. The patch allows the performer to control in real time the movement of the tracks. The speakers were located at the four corners of the dinner area, surrounding the participants. Music was played in three different moments: at guests arrival, in order to create the atmosphere for the evening; accompanying each dish, after the end of soundscapes; and after the dinner.

The auditory cues, at this first stage, included: music that could mimic soundscapes sound qualities; choice of musical instruments that matched the tastes and flavours qualities as in (Spence, 2011) music with beat that stim-

ulated a certain rhythm of the experience (rhythm accelerating toward the end of the dinner following the increase in conviviality). The music was played live by the DJ of the performance (Figure 4).



Figure 4. The live sound and music performance. One performer manages the soundscape, while the other is the DJ in charge of the music.

4. Results

We conducted a test session on the first performance in order to evaluate the effectiveness of the provided experience. The experiment was performed in 16th of June 2011, in a restaurant in Florence (Italy), with 15 participants, building two different surveys on paper proposed and filled out immediately after the experience. A first survey focused on technical aspects of the performance such as dish presentation, sound quality, and service. A second survey focused on open questions in order to collect personal comments and observations on subjects such as music and sound contents. This open observations have been taken into account for further development of the project. As a consequence some aspects of the performance have been reconsidered, such as: kitchen soundscapes (largely reduced or eliminated), natural soundscapes (increase in duration), external music (soft background music, with no fixed alternation with headphones). The possibility of the public to choose how to live the experience (as an intimate or convivial event, short or long) and to choose, to some extent, the menu and the soundscapes, has been extended and it is still being experimented.

⁶ Soundscape 4: the farmyard. Recorded in Fiesole, Tuscany, Italy, <http://bit.ly/17UhtKI>

⁷ <http://cycling74.com/products/max>

5. Conclusions

This paper presents a cross-modal experience mainly based on sound and food performed during dinner. Participants are driven in a sonic journey while eating and drinking respectively food and wines representing the culture and history of a specific area of an Italian region. The experience turns to a real collective performance in which people are immersed in a country's cuisine and can share emotions and ideas about taste, flavour and life. An evaluation of audience participation and effectiveness of the association sound-food tasting has been performed by means of a series of surveys conducted with the audience after the first event used as prototype of the whole experience. In particular the possibility of choosing different food and soundscapes and to control the duration of the experience has been much appreciated and it is now the centre for further developments. On the other hand the matching between the ingredients and the soundscapes is still mandatory, as it is the result of a deep interaction between the chef and the sound designer.

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⁸ <http://www.loreleiproject.com>

⁹ <http://www.kitchenwishes.it/>