

# Pairing Technology and Meals: A Contextual Enquiry in the Family Household

Hasan Shahid Ferdous<sup>1</sup>, Bernd Ploderer<sup>1</sup>, Hilary Davis<sup>1</sup>, Frank Vetere<sup>1</sup>, Kenton O'Hara<sup>2</sup>

<sup>1</sup>Microsoft Research Centre for Social NUI, University of Melbourne, Australia

<sup>2</sup>Microsoft Research, Cambridge, United Kingdom

{hasan.ferdous, ploderer, davish, f.vetere}@unimelb.edu.au, keohar@microsoft.com

## ABSTRACT

Recent research about technology during mealtime has been mostly concerned with developing technology rather than creating a deeper understanding of the context of family mealtimes and associated practices. In this paper, we present a two-phase study discussing how the temporal, social, and food related features are intertwined with technology use during mealtimes. Our findings show how people differentiate technology usage during weekday meals, weekend meals, and among different meals of the day. We identify and analyse prototypical situations ranging from the use of arbitrary technologies while eating solitary, to idiosyncratic family norms and practices associated with shared technologies. We discuss the use of mealtime technology to create appropriate ambience for meals with guests and demonstrate how technology can be used to complement food in everyday meals and special occasions. Our findings make recommendation about the need for HCI research to recognize the contextual nature of technology usage during family mealtimes and to adopt appropriate design strategies.

## Author Keywords

Commensality; Family Mealtimes; Technologies.

## ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

## INTRODUCTION

Family mealtimes are an important site for the construction of social capital. This in part relates to the organization of food consumption, such as the work done to encourage children to eat (Ganesh et al., 2014; Laurier & Wiggins, 2011) or the etiquette of sharing and coordination in eating (Fischler, 2011). But there are additional social manifestations when families come together at the same place and same time to share a meal (DeVault, 1994). Mealtimes become a site for the exchange of narrative accounts of personal and collective significance (Mintz & Du Bois, 2002; Ochs & Shohet,

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for components of this work owned by others than ACM must be honored. Abstracting with credit is permitted. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee. Request permissions from [Permissions@acm.org](mailto:Permissions@acm.org).

OzCHI '15, December 07 - 10 2015, Melbourne, VIC, Australia

Copyright © 2015 ACM 978-1-4503-3673-4/15/12... \$15.00

<http://dx.doi.org/xx.xxxx/xxxxxxx.xxxxxx>.

2006). Through such exchanges, there is a social construction of shared family knowledge, sensibilities, and moral perspectives (Larson et al., 2006).

Technology usage during mealtimes has attracted interest among researchers in the sociological (Larson et al., 2006; Ochs & Shohet, 2006) and health domains (Hersey & Jordan, 2007; Katharine et al., 2001), and more recently, among HCI scholars (Obrist et al., 2008). More often than otherwise, the use of information and communication technology (ICT) during mealtimes is considered problematic. It is accused of encouraging unhealthier food practices (Bellisle & Dalix, 2001), detracting from positive familial interaction (Fulkerson et al., 2008), or taking the attention away from enjoyment of the meal (Stroebele & De Castro, 2004). However, recent research has demonstrated the potential of more positive outcomes from ICT usage in mealtimes. For example, technology can be used to encourage children to eat (Ganesh et al., 2014), provoke familial conversation (O'Hara et al., 2012), or enhance our experience with the meal through digital augmentation (Spence & Piqueras-Fiszman, 2013). These developments, albeit experimental, warrant a deeper examination of the mealtime technology usage practices.

When considering the potentially beneficial aspects, prior research has largely focused on either creating innovative technologies or redressing problems associated with technology use during mealtimes. There is less work that explicitly aims to understand the social context of technology during mealtimes. This topic is frequently overlooked, as Haines et al. (2007) presented how the technology design is motivated by our capabilities to do so, rather than the social context and associated values. Obrist et al. (2008) also suggested that there is still a lack of studies about the context of ICT use in the home. Meals and technology are often considered 'separate' independent entities.

In this paper, we present findings from a contextual enquiry (Beyer & Holtzblatt, 1997) about the practices associated with technology usage during mealtimes in family homes. We frame food practices in the households as enacting of the complex relationship encompassing the meal itself, the participating members and their interrelationships, and surrounding elements. We were particularly concerned with context, interpretation, and focus. Our notion of family includes the extended household network, such as relatives, friends, and colleagues (DeVault, 1994). We show in our findings how meals and technology are often 'paired'. Food connoisseurs use the word 'pairing' to compare the

weight of the food and weight of the wine, which helps to match wines with meals. We follow this usage to discuss the relationship between technology and meals.

We examine current practices and seek to investigate how common beliefs, assumptions, and understandings underpin technology usage during mealtimes and the role it plays in everyday life. We aim to understand how different factors impact our technology choice during mealtimes and how we often make conscious (and unconscious) choices in this regard. Our findings show that technologies are integrated in a dynamic and situated (Suchman, 1986) fashion into mealtime activities. Before going into depth, we discuss related work and frame the research question in the next section.

## RELATED WORK

Television is the most commonly found technology used in the dining space. It is therefore appropriate to begin our review of related works by briefly discussing the role of television watching during mealtimes. We then explain how research about technologically mediated human-food interactions has progressed from the functional aspects of eating to 'celebratory eating', which affirms the social and cultural aspects of cooking, eating, and spending time together. Finally we explore recent works that emphasize the situated nature of mealtimes, and to some extent discussed the context of technology usage during different meals to position our work in the gap that these works have exposed.

### Television during Mealtimes

For many decades, research about the use of technology during mealtimes has been dominated by the television (De Bourdeaudhuij & Van Oost, 1998; Mintz & Du Bois, 2002). This is understandable given that almost 50% of families have a television in the area where they commonly eat (Hersey & Jordan, 2007; Katharine et al., 2001), and that the television-watching ratio during mealtimes can be as high as 60% (Kirkova, 2013). A US survey found 63% of the respondents had the television usually on during meals (Rideout et al., 2010). Clearly the television remains a popular mealtime technology.

Neumark-Sztainer et al. (2010) conducted a longitudinal study of American teenagers eating habits while watching television in the context of family mealtimes. They found no significant correlation with television viewing and the frequency of shared meals. Fulkerson et al. (2008) also discussed the role of television in family mealtimes and highlighted the adverse effect it may have on family conversation. Bellisle & Dalix (2001) found that food consumption could be increased by as much as 15% when people are distracted by the radio/television while eating. Jeffery & French (1998) associated increased television viewing with more frequent visits to fast-food shops.

These studies focus on tensions between the use of technology during mealtimes and possible risks to sociality and healthier living generally. One notable exception is (Barkhuus & Brown, 2009) that discussed how the television is positioned as a backdrop to other everyday activities (e.g., mealtimes) and practices in the home. Of particular significance though in their work is

that they identified television viewing as integrated into the broader social practices and arrangement of the household and something that is socially performed, even when watched alone.

There are far fewer studies concerned with the use of technologies other than television at mealtimes. This is surprising, given the growing proliferation of new ICTs such as mobile phones, tablet computers, and laptops in the domestic sphere. Even though there is a growing interest in the use of ICTs for food related activities generally, there is much less about ICTs during the mealtime itself.

### Celebratory Technology and Eating

Recent research has moved beyond the television to explore other information technologies and food. A dominant line of research involves solving different food related problems. These problems include, for example, providing nutritional support (Grimes et al., 2008; Mankoff et al., 2002), social media interaction around food (Kanai & Kitahara, 2011; Linehan et al., 2013), meal recommendation systems (Aberg, 2009; Svensson et al., 2005), or assistance while cooking (Hamada et al., 2005). These studies provide useful insights about the use and design of technology in food contexts, but they are not specifically oriented to mealtimes.

Meals have always been a source of social interaction, cultural heritage, enjoyment, and celebration (Beardsworth & Keil, 2002). For HCI, the social foundations of commensality were first raised as a concern by Bell & Kaye (2002). They highlighted the social and cultural aspects of food consumption and argued that technology design in this area should consider the experience, affect, and desire of eating and sharing time together. Grimes & Harper (2008) extended these ideas to investigate the ways in which we find pleasure in our interaction with food. They emphasized the creativity, endowment, relaxation, and nostalgia found in the togetherness of family meals. When viewed this way, food preparation and consumption became celebratory.

Recent studies explored new forms of social practices in commensality that has been opened up through technological opportunity. An interesting example here concerns the possibilities for remote dining experiences enabled through the use of videoconferencing technologies (Judge & Neustaedter, 2010). Such remote forms of commensality are further explored by Barden et al. (2012) who created an audio and video-based 'telematic' dining experience during family mealtimes. Wei et al. (2011) extended this approach further to create a dining table embedded with interactive subsystems to create a sense of coexistence among remote family members. Grevet et al. (2012) demonstrated that even very minor social connectedness could improve the dining experience of solitary eaters. Spence and Piqueras-Fiszman (2013) provided a survey of deployments of multimodal sensory equipment to augment the dining experience through the use of sound, fragrance, light, etc.

All these experimental and empirical works show us the potential of technologies for expanding and augmenting

our mealtime experience. However, what has not been revealed is the naturalistic way of technology usage during family mealtimes in real-life settings. With the advent of these cutting edge technologies, the need to understand how recent technologies are adopted in our everyday life has become increasingly important. So next we focus on the related works that has discussed how different factors have influenced our food and technology practices in our everyday life.

### **Differentiation in Technology and Food Choice**

Some recent work has probed deeper to inspect how technology usage is adapted based on social, ambient, or other aspects, for our everyday life in general as well as mealtimes. Stroebele and De Castro (2004) discussed the impact of social (presence of other people) and physical or ambient factors (e.g., smell, temperature, time, etc.) on our food intake and food choice. They concluded that manipulation of these factors could have profound impact on our food consumption.

In terms of technological practices during mealtimes, we are motivated by the work of Hupfeld and Rodden (2012). Their work provides a detailed account of the everyday practices associated with domestic food consumptions and how it relates to the ecology of mealtime artifacts and spaces – both technological and otherwise. Relevant to this paper, they showed how our expectations and norms in terms of technology usage differ between breakfast and dinner, i.e., they indicate that breakfasts are often less structured than dinner and hence technologies are less explicitly excluded. They also discussed the impact of sociality, suggesting that the presence of others often means that technologies are not accepted during meals.

Comber et al. (2013), on the other hand, focused on the current food practice at households through the lens of situated action (Suchman, 1986). Their work illustrates how fitting food, stocking up, and preparing and sharing meals are practised in household contexts in ways that are dynamic, relational, and occasioned. While the work by Comber et al. (2013) focussed on practices related to food itself, we are interested in the situated usage of technologies during the consumption of food.

In this paper, we use the work of Hupfeld and Rodden (2012) and Comber et al. (2013) as a springboard to understand the ways in which a broader set of everyday technologies become implicated in the social configuration of everyday mealtime practices. In doing so, we focus on the interpersonal relationship in the family, their norms and practices related to meals and technology usage, the opportunities presented by particular technological arrangements, and managing related concerns.

### **RESEARCH DESIGN**

We conducted a two-phase study to investigate how families might pair information and communication technologies (ICTs) with meals consumed in their homes. In particular, we were interested in exploring potential differences in ICT usage during mealtime due to time, place, and quality of the meal. The first phase was an

open discussion about ICTs during mealtimes in an online discussion forum. The second phase was a field study with six families based on observations of their mealtime and interviews to discern differences between different types of meals.

#### **Phase 1: Online Discussion Forum**

The first phase was an open discussion in an Australian user online discussion forum called OzBargain<sup>1</sup>. We provoked the discussion by opening a discussion topic with the question “Do you use phone, television, or any other device while you eat meals?” We further explained the purpose of this question and research objectives. We received 71 comments from 50 unique user-IDs from the online discussion. For the rest of the paper, we refer them as P1-P50, sorted alphabetically according to the user ID.

The text from online discussion was analysed using the software NVivo (Glaser & Strauss, 2009). This analysis identified the most commonly used technologies and indicated differences in technology usage depending on the quality of meals. Based on these findings, we developed questions for phase 2 to further investigate differences in technology use due to the time, place, meals, and presence of other people.

#### **Phase 2: Field Study in Six Family Homes**

We conducted an in-depth qualitative study in the homes of six families to examine the pairing of technologies and mealtimes in further depth. This involved two in-depth semi-structured interviews for each family combined with home tours and video recordings of two family meals.

Six families were recruited through university mailing lists, notice boards, authors’ extended social networks, and local community Facebook groups. We selected families that eat their meals together and use some form of technology during mealtime (e.g., television, radio, mobile phone, etc.). As summarized in Table 1, we recruited families with and without children, couples as well as single-parent families, aiming for breadth rather than generalizability. While appropriate to the exploratory nature of our work, we acknowledge the limitations to our small sample size and also that this work does not focus on families from varying socio-economic and cultural contexts. Each family received a \$20 iTunes gift voucher as an acknowledgement of their contribution.

Through the first interview we sought to understand the family’s mealtime experience and to identify the information and communication technologies available during meals. We discussed family norms and practices regarding technology usage during mealtimes and how these have evolved over time. Participants led researchers through a tour of their homes to understand the spatial arrangements of household items and technologies.

We then provided the families with two video cameras. One was positioned facing the participants (close-up view) and another directed at the dining space (distant view). Families were asked to produce recordings of two family mealtimes – one during weekdays and one at

---

<sup>1</sup> [www.ozbargain.com.au](http://www.ozbargain.com.au)

	Family Members	Frequently Used Technologies	Technologies Available But Avoided
Family 1	Mother (professional) Father (professional), Two children	Television, mobile phone (music), tablet (music), Apple TV	Mobile phones (call, text, or browsing), tablet, land phone, laptop
Family 2	Mother (academic), Father (academic), One child	Television, mobile phone (browsing, or music), tablet (apps), set top box	Mobile phone (call or SMS), desktop computer, laptop computer, smart light, DVD player, sound system, tablet
Family 3	Wife (doctor), Husband (engineer)	Television	Mobile phone (call, SMS, or browsing), DVD player, laptop, land phone, sound system
Family 4	Wife (student), Husband (student)	Laptop (video streaming)	Mobile phone (call, SMS, or browsing), land phone
Family 5	Mother (book- keeper), Three children	Television, mobile phone (social networking or SMS)	Mobile phone (call or browsing), tablet, DVD player, gaming console, laptop, desktop
Family 6	Mother (academic), Father (businessman), Three children	Television, DVD player, sound system, set top box, Apple TV	Mobile phone (call, SMS, or browsing), tablet, land phone, gaming console, laptop, desktop

**Table 1: Description of participants and list of the devices available to them during family mealtimes.**

weekends. This was to discern differences between technology usage during informal meals during the week and potentially more formal meals on the weekend. The video recordings of the family mealtimes were about 30 to 45 minutes long. Though we did not ask for this, all families recorded their evening meal, citing it as the most common (or only) meal they all have together. The video recordings and the household tour contributed to an understanding of the domestic ecology of technologies and the interactions around them during family meals.

After one week, we revisited the family to collect the video recordings. We reviewed the videos, and then conducted a second interview. The aim of the second interview was to encourage participants to reflect upon their use of technology during mealtimes and how it may or may not have contributed to commensality. Each interview was 30 to 45 minutes long.

#### Data Analysis

We conducted an inductive, thematic analysis (Braun & Clarke, 2006) to understand technology usage during regular meals as well as special occasions, across different social groups, and at different times and places. The first author collected the online data and transcribed all the audio recordings of the interviews. NVivo was used to analyze the online data and transcripts, as well as to analyse the video and to create detailed notes of all technology-mediated activities. These notes were refined through discussions with the other authors and grouped thematically to show commonalities across different meals depending on the type of food served, the social setting, and the time and type of meal. This analysis was done iteratively to identify similarities as well as differences between families and how they paired technologies and meals.

#### FINDINGS

The findings clearly showed that not all meals are the same when it comes to the ways in which technologies are used. Firstly, technology usage varies depending on

the time of the meal, i.e., in between breakfast, lunch, and dinner, but also between days of the week. Secondly, the sociality of the meal is an important factor, and technology usage varies depending on the people present, their values, and the social setting in which they eat. Finally, and most subtly, the quality of the food influences how technologies are used during mealtime, indicating that junk food is typically paired with junk technology whereas special mealtime occasions call for 'special' technology use.

#### Temporal Aspects in Technology Usage

The findings show that the time of the meal had implications for the ways in which technologies were used. Technology usage varies between weekdays and weekends, with weekend meals allowing more freedom both about technology use and meal consumption. Furthermore, there are differences according to the time of day: breakfasts are often more technology-infused than lunch or dinner.

#### Technology and Different Days of the Week

Family meals on weekends are usually longer and more relaxed than weekday meals, and accordingly often also more relaxed in terms of technologies allowed during a meal. For example, family 6 reported eating dinner in the lounge rather than using the dining table during weekends. Also the meals were less structured, with meals consumed at the couch rather than at the dining table, different members finishing it at different times, and with increased use of technologies such as the TV, smartphone, or tablet devices.

*"It is very different on a Friday night I suppose, because we are closer to the TV... On Friday, we often get takeaway, and we'll sit around here [couches in the lounge, with TV on] and have it, it is just as something different"* (Father, family 6)

*"We generally eat at the dining table around 5 nights a week and in front of the TV the other two (generally Fri/Sat)."* (P7)

While all the families watched television (or streaming media) during weekday meals too, in that period, it is considered as more functional and pragmatic - something that is generally more rushed and squeezed during the week as one needs to study, work, or do household chores. The change in technology usage reflects the relaxed nature of weekends. In particular, parental rules that restrict technology use for children, i.e., for personal devices like phones and tablets during meals are often relaxed on the weekends. Our data showed that in both family 1 and family 6, children could use personal devices (e.g., phones, tablets) during weekend meals, whereas both of these families had strict rules to avoid such devices during weekday meals.

*“On weekends, the first things kids tend to do is to get up, [name of child], she will get up, she will get her iPad and she will play Minecraft. So the television might not be on but she will play Minecraft and she will probably play that right up until she has a breakfast, umm, and lunch.” (Mother, family 1)*

#### **Technology and Different Meals of the Day**

Breakfast is often more rushed and less structured than other meals with a view of hurrying to start the day (Hupfeld & Rodden, 2012). Many family members consume breakfasts according to their personal schedules, with little time spent eating together with other members. Hence, people often use personal technologies in this time, partly because breakfast is often organized by oneself. Given the time of the day, technologies are sometimes used during breakfast as a tool to organize events and activities (as also noted by Hupfeld & Rodden, 2012) rather than for entertainment.

*“[During breakfast] I check work, personal, or business emails, stock market, etc.” (Father, family 6)*

*“I will check it [phone] in the morning, usually Facebook, Gmail, but she [wife] usually does not see it [Email] in the morning unless she has a meeting at 10 [am] so she just sees what the status is or if it’s still on time.” (Husband, family 4)*

Breakfast is often held in a different place to other meals. For example, family 4 has breakfast in the kitchen whereas lunch (during weekends) and dinner (everyday) are consumed in their lounge; family 5 reported having a quick breakfast in kitchen bar table rather than at the dining table. This was motivated by the convenience of preparing and consuming the meal at the same place, as breakfasts require efficiency to fit in the busy schedules of families. All the participants reported having lunch either in office or school (for kids) in regular weekdays. Contrary to the breakfast and dinner, many of them reported technology non-use during lunch to have a break from their technology-dominated lifestyle.

*“Lunchtime I am the almost opposite, especially at work. I make a point of getting out of the Office.” (P33)*

*“During lunch at work, I like to try and get out of the office because too often I’m stuck working through lunch anyway.” (P29)*

On the contrary, dinner is often the only meal that recommends the presence of all the family members, and their technology practices are also adjusted accordingly. We discuss how families have developed their own set of rules and practices in this regard in the next subsection.

#### **Technology Usage and Sociality**

Technology often gets used during meals consumed alone. During meals shared with family members or guests, technology tends to be restricted, either completely or to shared technologies like TV and radio.

#### **Solitary Meals**

Almost all participants reported technology use while they eat alone, as if the technology serves as a companion to forget the loneliness. In contrast to meals shared with other family members, we can see an increased use of personal technologies (computer, smartphone) over shared ones (television, radio).

*“When I’m alone I smash the technology, every lunch if I’m alone I’m on the iPad.” (P11)*

*“Any time I eat by myself I’ll be found using some form of technology; at home I will be in front of the computer or at work/out and about I’ll play games on my phone or just general browsing.” (P26)*

Two notable aspects of technology can be noticed here. First Internet enabled and mobile devices have let people connect with others through browsing or social networks. Second, technology use in such instances are not done on purpose, rather these practices are in situ, utilizing any available technology or content.

#### **Meals Shared with Family Members**

Technology usage changes when people share meals with their family, either through partial or complete restriction of technologies during mealtime. Some families completely restrict technology use, as they see technology interfering with the social rapport created by shared meals. Family members often justified the rejection of technologies based on family values. The values of adults were typically based on their childhood when they learned to socialize during mealtimes, and they applied these values to their own families as adults.

*“Growing up I was taught by my mum that eating in front of the TV was rude and as a result my sister and I were banned from doing so.” (P30)*

*“No disturbance when eating unless it is really important or the whole family thinks it’s worth being disturbed.” (P48)*

Some families only restrict personal uses of technologies like checking messages on phones, but they allow shared uses. Shared usage of technologies with other family members, i.e., TV and radio, tends to be allowed because it helps to create a shared experience that enhances the sociality of the meal. Rather than hindering family communication alongside their dinner, technology is seen here as supporting communication by either enabling the members to pick topics of conversation (e.g., children in family 1 mocking each other referring to a TV character) or supporting conversation (e.g., mother in family 2

searching for information in her smartphone about a restaurant mentioned in the mealtime conversation). In some cases the sharing even went so far that technology was only used when all family members were present.

*"If someone walks away [from the meal] for something, we would pause it [video streaming], so that the other person can join" (Wife, family 4)*

*"Yes, definitely the TV. To make it work, you just watch it together, grows the bond between two people when you're sitting on the couch being so accessible to each other :) Not sure how it would work with kids though as their cartoons would be too kiddy to watch." (P23)*

Again, such practices of using technologies to enhance the mealtime experience are shaped by values that adults developed when they were socialised as children. Some parents acknowledged the change in the technologies available in the home compared to when they grew up, particularly the emergence of mobile phones.

*"For us (parents and myself), I grew up with watching the news at dinner time. It helped to get me interested in what was going on around the world and it's something that I still do now. Our family is perfectly functional, we all love and get along with each other, and I don't regret it at all :-)" (P16)*

*"There is now a lot of technologies, a lot more distractions" (Father, family 6)*

What is also notable is that people do not change their meal pattern with the change in their preferred media. Mealtimes in most families are routine activities and families generally have their own timeframe for having meals. All of our families mentioned that they do not change their mealtime according to the change in their television program or when the season of their preferred TV show ends. For example, family 1 regularly watches 'MasterChef' during their dinner, but in those days when the program is not available, or when the show ends, they would see other programs available in that time. Another participant reported a similar incident, which illustrates that technology choice is paired with the time of the meal, but not the other way around:

*"We used to have 30 minutes news from 8 - 8.30 p.m. back home and that's the time I eat even today with my own family in here. However this is bit late for the dinner in here and I don't think there's any channel telecast news at this time." (P37)*

#### **Meals Shared with Occasional Members and Guests**

A different pattern emerges when guests or irregular family members (e.g., extended family members, or family members living elsewhere) join the meal. In this case, families typically resort to technology non-use or ambient uses of technology, like running the TV in the background. The quotes below illustrate that such occasional members not only include friends, but also family members that do not regularly attend meals.

*"On the rare occasions my Dad was home for work in time for 'kids dinner' at 6pm, my mum would insist we*

*all sat at the dining table together with no TV on." (P29)*

*"I always watch TV while eating either breakfast, lunch or dinner. If it's family that frequently visit (like weekly/monthly) I'll still have the TV on but normally can't pay too much attention to it cause of the noise levels. If it's family I rarely see, I normally have it off despite being bored." (P49)*

Often such orientations are adopted out of courtesy or paying more attention to the conversation with the uncommon member of the family mealtimes. During special occasions, or when there were guests in the family, our participants often used to listen to music rather than television programs to entertain and create ambience to support the social gathering. All of our participating families (except family 2 and 5, who celebrate special occasions with guests in restaurants) said they selected music to create the right ambience to celebrate special occasions with their families and guests.

*"When we have people over [here], we'll have music in the background, sometimes I may have my iPhone or iPad playing music, while other people are here." (Father, family 6)*

Here then, technological resources were configured to contribute to mood and ambience through their assembly.

#### **Technology and Quality of the Meal**

Finally, we found a connection between the quality of the meal and the type of technology or media used during mealtime. In particular, it appeared that the more effort participants invested in preparing a meal, the more restrictive families were with technologies, unless they used technologies deliberately to celebrate a special occasion. These observations align and partially overlap with observations about meals with guests and special meals on weekends. Beyond that, however, they also show the value of food itself, or the lack thereof, when junk food is consumed alongside with junk technologies.

#### **Junk Technologies for Junk Food**

Many participants associated the consumption of *junk* food, (i.e., quick meals, ready-made food, or snacks) with *junk* technology use. By 'junk' technology we do not mean that the technology itself is of little value, but rather that the ways in which they are used are not very deliberate. For example, people switch between different channels rather than choosing a program to watch, or they browse through content on their phone to pass time, without paying much interest to it.

*"I have a bad habit of emotional eating on weekends. And I eat KFC/Charcoal chicken or some other junk food. And I have to be watching something, usually a TV show or YouTube. I think as I want to increase the pleasure I am getting from the food or to distract me from realising I'm eating bad food and not feel guilt." (P20)*

Family norms and practices associated with technology usage during mealtimes are often relaxed for these quick meals or snacks, as reflected by P15 and the mother in family 1:

*“We rarely eat in front of the TV unless, both of us can’t be bothered cooking or we have ‘fend for yourself’ nights, where we make our own quick dinner.” (P15)*

*“If it’s a mealtime I won’t let her play it [Minecraft] and eat. But if she is having a pack of chips or something, yeah, she will [play].” (Mother, family 1)*

It appears that technologies are used here to enliven the monotonous experience of everyday meals, i.e., through entertainment technologies like the TV and updates from social network sites. During weekdays, all six families in our study kept their television running in the background. The families in our study often watch reality TV shows and sitcoms, because they do not require constant attention and thereby also allow them engage in social interaction during the meal.

*“We try to watch those serials or those movies which do not require much attention. Otherwise we keep watching it and forget to eat. Some comedy series are seen out of order too.” (Wife, family 4)*

*“We have a dining table in our living area where the TV is. The TV is generally on but on some sort of pointless channel, which is more just background noise.” (P22)*

#### **Good Food Encourages Less Technology Use**

Just as people tend to use junk technologies for their regular meals, we could often see technology non-use for meals that are prepared to their taste, and (possibly) with much more care and attention:

*“If the food isn’t good, we’re probably more likely to check our phones during the meal. But if it’s decent/awesome then we’d just eat and enjoy it along with each other’s company.” (P6)*

If, however, the family has put a lot of effort into preparing a meal, then food was often considered as a special treat and mundane technologies were more likely to be avoided. For example, family 5 demonstrated less concern with the children using their mobile phones at regular mealtimes. But when their mother prepared special lasagna (different from their regular lasagna), we observed that the children did not consider using their mobile phones. It was a time when they would devote attention in on the family rather than out onto the world through their respective mobile phones. Also, The father in family 2 stated, *“There is no doubt; good food encourages conversation”*. The assumption being made by the participants is that technology would dampen conversation and therefor undermine the experience of enjoying good food. Family 4 also confirmed that when someone puts a lot of effort in cooking a good dish, there is an inherent expectation of less technological interaction, which would (by implication) nurture more interaction amongst family members. Similar evidence came out from other participants too:

*“Growing up with 2 younger siblings we ate together most nights with only the news in the background, which was normally turned off for special meals (if mum did a roast or we had my nan or grandparents*

*over for dinner) not so much for politeness, but for us to focus on family time.” (P27)*

#### **Technologies for Special Occasions**

A separate theme arises when our participants had special and celebratory occasions in their home. As noted above, these occasions often included sharing meals with additional guests. Just as mundane technologies were avoided for special meals, occasionally special technologies (as with special foods) were chosen to enhance an exceptional occasion. For example, the husband in family 3 described how they carefully choose a suitable movie to accompany their meal to celebrate an anniversary.

*“Me, taking an initiative to watch a TV during my dinnertime, so that will be very infrequent. For example, last time we did, it was our anniversary, first anniversary. So, we put on the DVD and we were watching it.” (Husband, family 3)*

Some families used technologies to create a distinctive ambience for a special meal. Family 2 had smart lights installed in their living room for which the intensity and colour could be controlled via their smart phone. This family used these features for special dinners to create a party environment in their house. This was sometimes combined with other technologies to create the desired environment. For example, family 1 used a YouTube video with sound muted and played old music from another device to create a mix of “1920’s environment” for a birthday party. Here then, technological resources and configurations were deliberately designed to contribute to mood and ambience but also to convey significance and meaning in their assembly.

#### **DISCUSSION**

In this paper, we have presented findings from our study investigating how technology is incorporated into mealtimes. While previous work has often focused on the potential downsides of technology during mealtime (i.e., a diminished a social experience or health risks) or on developing cutting edge technologies to enhance and augment the mealtime space, our research suggests a richer story. In exploring the everyday practices of technology usage during mealtimes, we have found that technology is often *paired* with the mealtime occasion. Whether and how technologies are used during a meal often depends on the time and day of the meal, the people that are present, the food that is served, and family values.

We propose that viewing technology practices *paired* with food consumption as a form of situated action helps to illuminate the complexity of such practices, the social and temporal contexts in which they occur, and the actions and interactions among people and technologies that make them work. We recognize the patterns of technology usage are adjusted dynamically based on the context of everyday life. Indeed, our research highlights that the enactment of shared concerns in the family remain at the heart of technology integration. What is notable though is how such rules are at times not strictly adhered to but rather are considerations that are oriented to as necessary. There are exceptions for instance where

such practices have the family and togetherness as a central concern in their organization.

### **Technology at Mealtimes and Situated Timeliness**

We observe that food practices, as discussed by Comber et al. (2013), are aligned with the associated use of technologies. While there are detailed and scrutinized plans for technology usage during special meals for a number of occasions throughout the year, almost all regular everyday meals are underpinned by routine, and taken-for-granted familial practices; and so is the use of the accompanying technology.

We see this, for example in the situated timeliness (Comber et al., 2013) of our mealtime technology use. Some families watch a regular TV show during mealtimes (e.g., family 1 watches MasterChef). However, the participants reported that they do not adjust their mealtime if the program changes. Instead they find another program to watch in that time. This shows that technology use is *paired* with the timing of the meal (but typically not the other way around).

Our study also reveals other temporal patterns in pairing technology usage and mealtimes. Family norms are rather loosely structured and regularly adapted to adjust to the context of the meal under consideration. Informal meals during weekdays and the less structured and relaxed food practices at weekends have implications for technology usage, i.e., typically these meals allow for increased usage of technology. Also our study suggests technology is used as an organizational tool during breakfast (similar to Hupfeld & Rodden, 2012), and has characteristics of relaxation and conviviality during family dinner. However these observations do not prescribe which technologies are used, or how they are used every day. Each household pairs technology and meals in their own unique ways.

### **Technology to Support Familial Interactions**

The pairing of technology usage during mealtimes is also evidently influenced by social factors, i.e., who is present during a meal. We see this, for example, in people embracing technologies when they eat alone, preferring social bonds over personal technologies when they eat with their family, and technology non-use or use for creating a particular ambience during meals with guests.

Technology practices are significantly shaped by our social setting, and the social setting is equally shaped by such practices. Technology often acts as a companion for people eating alone, and related work has examined the use of technologies to support remote sharing of mealtime experiences (Barden, et al., 2012; Wei, et al., 2011). However, eating alone also offers opportunities to use and enjoy personal technologies that were otherwise avoided. Eating with other family members takes precedence over other concerns, especially technology usage, and we often saw this reflected in family norms and rules discussed in our study.

There is a common belief that using technology during mealtimes prohibits family conversation or suppresses conviviality. While some of our participants agree hold similar beliefs, others have pointed out that this is not

necessarily the case, and that technology usage rather depends on the particular family attitude and their relationships. The findings show how technology has indeed enriched conviviality by provoking familial interactions during mealtimes (e.g., a news readers glitch caused family members to burst into spontaneous laughter in family 5 or family members were mocking each other after a particular TV actor in family 1). In such contexts, technology does not detract from shared familial conversations and time, but rather provides an avenue for engaging and enjoying the presence of others.

### **Technology Usage and the Perception of Meals**

Finally, the pairing of technology usage and mealtimes is also influenced by the meal itself. This is because families often perceive the entire process of mealtime (from planning and preparing, to serving the meals) as a gift (Lupton, 1996; Sidenvall et al., 2000). For example, children in family 5 were not using technology while having their favourite lasagne, and family 4 enjoyed their meals without technology when they put more than the usual effort in preparing their food. P27 and many others also reported technology non-use, or adopting the technology so as to enhance the social experience of being together according to the quality of the meal.

This finding opens up new design opportunities for dealing with behavioral change – for example, rather than restricting people from using their devices, one can encourage them to prepare special meals that make the use of technology seem inappropriate. Some recent work has gone up to the point of imposing control of children's mobile phone use during meals (e.g. DinnerTime Plus, 2014) or shutting down the Wi-Fi network at home as people start the meal (e.g. "Pepper Hacker" in Hutchings, 2015). These studies have considered food and technology separately, whereas our findings suggest that the meal itself, the effort that a person may put into its preparation, and the appreciation of a special meal by other family members may also be effective in helping people who wish to limit their technology usage.

### **CONCLUSIONS**

In this paper we have explored the complex and contested issue of technology usage during mealtimes. We demonstrate that the norms and practices of technology usage are enacted in different ways to accommodate the temporal, social, and food related aspects and to recognize the fact that technology is situated in the context of mealtimes in individual families. We explain how a situated action lens can assist the technology designers understand the domain and the benefits technology can bring about for familial interactions. It's not only that food and technology are closely associated per se, but also are *paired* during mealtimes to encourage conviviality, ambience, and to complement the 'special' features of a meal. Our research highlights the growing need for HCI to investigate the ever-increasing technology space for household mealtimes and we encourage researchers to explore such practices as a rich context for design.



## REFERENCES

- Aberg, J. An evaluation of a meal planning system: Ease of use and perceived usefulness. In Proc. BCS HCI 2009, ACM Press (2009), 278-287.
- Barden, P., Comber, R., Green, D., Jackson, D., Ladha, C., Bartindale, T., Bryan-Kinns, N., Stockman, T. and Olivier, P. Telematic dinner party: Designing for togetherness through play and performance. In Proc. DIS 2012, ACM Press (2012), 38-47.
- Barkhuus, L. and Brown, B. Unpacking the television: User practices around a changing technology. *ACM Trans. Comput.-Hum. Interact.* 16, 3 (2009), 1-22.
- Beardsworth, A. and Keil, T. *Sociology on the menu: An invitation to the study of food and society.* Taylor & Francis, 2002.
- Bell, G. and Kaye, J. Designing technology for domestic spaces: A kitchen manifesto. *Gastronomica*, 2, 2 (2002), 46-62.
- Bellisle, F. and Dalix, A.-M. Cognitive restraint can be offset by distraction, leading to increased meal intake in women. *The American Journal of Clinical Nutrition*, 74, 2 (2001), 197-200.
- Beyer, H. and Holtzblatt, K. *Contextual design: Defining customer-centered systems.* Elsevier, 1997.
- Braun, V. and Clarke, V. Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3 (2006), 77-101.
- Comber, R., Hoonhout, J., Halteren, A.V., Moynihan, P. and Olivier, P. Food practices as situated action: Exploring and designing for everyday food practices with households. In Proc. CHI 2013, ACM Press (2013), 2457-2466.
- De Bourdeaudhuij, I. and Van Oost, P. Family members' influence on decision making about food: Differences in perception and relationship with healthy eating. *American Journal of Health Promotion* 13, 2 (1998), 73-81.
- DeVault, M.L. *Feeding the family: The social organization of caring as gendered work.* University of Chicago Press, 1994.
- Dinnertime Plus. <http://www.dinnertimeapp.com>, 2014, Accessed on 09/10/2015.
- Fischler, C. Commensality, society and culture. *Social Science Information*, 50, 3-4 (2011), 528-548.
- Fulkerson, J.A., Story, M., Neumark-Sztainer, D. and Rydell, S. Family meals: Perceptions of benefits and challenges among parents of 8- to 10-year-old children. *J Am Diet Assoc*, 108, 4 (2008), 706-709.
- Ganesh, S., Marshall, P., Rogers, Y. and O'hara, K. Foodworks: Tackling fussy eating by digitally augmenting children's meals. In Proc. NordiCHI, ACM (2014), 147-156.
- Glaser, B.G. and Strauss, A.L. *The discovery of grounded theory: Strategies for qualitative research.* Transaction Publishers, 2009.
- Grevet, C., Tang, A. and Mynatt, E. Eating alone, together: New forms of commensality. In Proc. GROUP 2012, ACM (2012), 103-106.
- Grimes, A., Bednar, M., Bolter, J.D. and Grinter, R.E. Eatwell: Sharing nutrition-related memories in a low-income community. In Proc. CSCW 2008, ACM Press (2008), 87-96.
- Grimes, A. and Harper, R. Celebratory technology: New directions for food research in HCI. In Proc. CHI 2008, ACM Press (2008), 467-476.
- Haines, V., Mitchell, V., Cooper, C. and Maguire, M. Probing user values in the home environment within a technology driven smart home project. *Personal and Ubiquitous Computing*, 11, 5 (2007), 349-359.
- Hamada, R., Okabe, J., Ide, I., Satoh, S.I., Sakai, S. and Tanaka, H. Cooking navi: Assistant for daily cooking in kitchen. In Proc. Multimedia 2005, ACM Press (2005), 371-374.
- Hersey, J.C. and Jordan, A. Reducing children's TV time to reduce the risk of childhood overweight: The children's media use study. In *Nutritional and Physical Activity Communication Team (NuPAC) Centers for Disease Control and Prevention*, 2007.
- Hupfeld, A. and Rodden, T. Laying the table for HCI: Uncovering ecologies of domestic food consumption. In Proc. CHI 2012, ACM Press (2012), 119-128.
- Hutchings, E., Peeper Hacker, <http://www.psfk.com/2015/03/dolmio-pepper-grinder-dolmio-pepper-hacker-unplug-during-dinner-time.html>, 2015, Accessed on 12/06/2015.
- Jeffery, R.W. and French, S.A. Epidemic obesity in the united states: Are fast foods and television viewing contributing? *American Journal of Public Health*, 88 (1998), 277-280.
- Judge, T.K. and Neustaedter, C. Sharing conversation and sharing life: Video conferencing in the home. In Proc. CHI 2010, ACM Press (2010), 655-658.
- Kanai, H. and Kitahara, K. A menu-planning support system to facilitate communication among neighbors. In Proc. CSCW 2011, ACM Press (2011), 661-664.
- Coon K.A., Goldberg, J., Rogers B.L. and Tucker, K.L. Relationships between use of television during meals and children's food consumption patterns. *Pediatrics*, 107, 1 (2001).
- Kirkova, D. <http://www.dailymail.co.uk/femail/article-2292657/Britons-eat-meals-television-new-research-reveals-nation-dining-table-dodgers.html>, 2013, Accessed on 12/06/2015.
- Larson, R.W., Branscomb, K.R. and Wiley, A.R. Forms and functions of family mealtimes: Multidisciplinary perspectives. *New Directions for Child and Adolescent Development*, 2006, 111 (2006), 1-15.
- Laurier, E. and Wiggins, S. Finishing the family meal. The interactional organisation of satiety. *Appetite* 56, 1 (2011), 53-64.

- Linehan, C., Leeman, T., Borrowdale, C. and Lawson, S. Crowd saucing: Social technology for encouraging healthier eating. *Interactions*, 20, 1 (2013), 53-57.
- Lupton, D. *Food, the body and the self*. Sage, 1996.
- Mankoff, J., Hsieh, G., Hung, H.C., Lee, S. and Nitao, E. Using low-cost sensing to support nutritional awareness. In *Proc. UbiComp 2002*, Springer-Verlag (2002), 371-376.
- Mintz, S.W. and Du Bois, C.M. The anthropology of food and eating. *Annual Review of Anthropology*, 31, 1 (2002), 99-119.
- Neumark-Sztainer, D., Larson, N.I., Fulkerson, J.A., Eisenberg, M.E. and Story, M. Family meals and adolescents: What have we learned from project EAT (eating among teens)? *Public Health Nutrition*, 13, 7 (2010), 1113-1121.
- O'hara, K., Helmes, J., Sellen, A., Harper, R.H.R., Ten Bhömer, M. and Van Den Hoven, E. Food for talk: Phototalk in the context of sharing a meal. *Human-Computer Interaction* 27, 1-2 (2012), 124-150.
- Obrist, M., Bernhaupt, R. and Tscheligi, M. Interactive TV for the home: An ethnographic study on users' requirements and experiences. *Intl. Journal of Human-Computer Interaction*, 24, 2 (2008), 174-196.
- Ochs, E. and Shohet, M. The cultural structuring of mealtime socialization. *New Directions for Child and Adolescent Development*, 2006, 111 (2006), 35-49.
- Rideout, V.J., Foehr, U.G. and Roberts, D.F. *Generation m: Media in the lives of 8-to 18-year-olds*. Henry J. Kaiser Family Foundation, 2010.
- Sidenvall, B., Nydahl, M. and Fjellström, C. The meal as a gift—the meaning of cooking among retired women. *Journal of Applied Gerontology*, 19, 4 (2000), 405-423.
- Spence, C. and Piqueras-Fiszman, B. Technology at the dining table. *Flavour*, 2, 16 (2013).
- Stroebele, N. and De Castro, J.M. Effect of ambience on food intake and food choice. *Nutrition* 20, 9 (2004), 821-838.
- Suchman, L. *Plans and situated actions*. New York, Cambridge University, 1986.
- Svensson, M., Höök, K. and Cöster, R. Designing and evaluating kalas: A social navigation system for food recipes. *ACM Trans. Comput.-Hum. Interact.*, 12, 3 (2005), 374-400.
- Wei, J., Wang, X., Peiris, R.L., Choi, Y., Martinez, X.R., Tache, R., Koh, J.T.K.V., Halupka, V. and Cheok, A.D. Codine: An interactive multi-sensory system for remote dining. In *Proc. UbiComp 2011*, ACM (2011), 21-30.