

# Commensality and the Social Use of Technology during Family Mealtime

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This paper examines familial interactions, which are mediated through information and communication technologies, during domestic mealtimes. We seek to understand how technologies are used and negotiated amongst family members and the influence of technology on commensality. We conducted an observational study of six families. The findings showed how technologies are integrated into the mealtime activities. Our study identifies domestic circumstances where background technologies are raised to the foreground, visible devices are hidden, unwanted distractions become desired, and ordinary technologies are integrated into mealtime experiences. We identify four patterns of arrangement between technologies and family members during mealtimes, and we discuss how technologies contribute to mealtime satiety and commensality. Finally, we present implications of our findings and directions for technological advancements focusing on the social and celebratory nature of family mealtimes.

CCS Concepts: • **Human-centered computing** → *Empirical studies in HCI*;

Additional Key Words and Phrases: Commensality; communication technologies; food; eating, family conversation; spatial arrangement; tension around technologies in shared space.

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## 1. INTRODUCTION

While there has been a growing interest in the relationship between food and interaction design [e.g., Grimes and Harper 2008; Wei et al. 2011; Spence and Piqueras-Fiszman 2013], surprisingly little attention has been given to understanding the current practices of using interactive technologies at family mealtimes. Mobile networked devices such as smartphones, tablets, and laptops are easily available during mealtimes, yet depending on familial norms, these technologies may be embraced warmly, used discretely, or forbidden entirely. Understanding the interplay between mealtime practices, family routines, and opportunities offered by personal devices is important to provide new insight about the role of technologies at mealtimes.

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This paper investigates contemporary manifestations of *commensality*, “the practice of sharing food and eating together in a social group such as a family” [Ochs and Shohet 2006, p. 37]. Commensality signifies more than the simple act of eating together. Commensality alludes to the human co-dependency, reciprocal commitment, and the social, political, and cultural aspects of eating together. Commensality is observed in ceremonial occasions, which are often marked by festivities around elaborate banquets. Here, however, we direct our attention to more prosaic occurrences of commensality. We are interested in mundane commensality, as it plays out in the social and cultural experiences of everyday family meals.

Family mealtimes are a critical site for the construction of family routines. The notion of family is deeply rooted in the practice of eating together. In ancient Greece, *oikos* (family) was defined by “those who feed together” [Lacey 1968, p. 15]. Family mealtimes are a complex assemblage of practical and social dynamics. This in part relates to the organization of eating practice, such as the work done by parents to encourage their children to eat [e.g., Laurier and Wiggins 2011] or the instructions about etiquette of communal eating. But family mealtimes is not just about eating well and eating politely. Mealtimes are site for the exchange of personal and collective narratives [Mintz and Du Bois 2002; Ochs and Shohet 2006]. Through these exchange, we find the social construction of shared family knowledge, sensibilities, and moral perspectives [Larson et al. 2006].

Social construction of family relations and the organization of family mealtimes are also bound up in the spatial and material arrangements of the dining setting [e.g., O’Hara et al. 2012; Hupfeld and Rodden 2012]. Increasingly, the dining setting has become infiltrated by various technologies, which are likely to have a discernable impact on mealtime practices. Such technologies may contribute or detract from any idealized notions of family order. In either case, it is important to understand the ways that families orient themselves to the perceived opportunities or threats.

Certain technologies have come under particular scrutiny. The most notable is the television, for the way it has influenced the arrangement of many eating spaces [Hersey and Jordan 2007]. Much of the discussion about the role of television during mealtimes has focused on the negative consequences on the social functions of commensality. That is, television is often portrayed as a distraction and hindrance to shared conversation and enactments of family togetherness. Television is typically seen as something that distracts from the sensory joys of eating or from attending to healthy eating practices. As we shall discuss later, research by Barkhuus and Brown [2009] challenge the assumptions bound up in these narratives around the television watching in the family, offering a more nuanced perspective on how we might understand its influence on family commensality.

Modern technologies such as smartphone and tablet devices have been subjected to similar critical scrutiny. These technologies offer new opportunities for family mealtimes to be distracted by people checking email and updating their social media status. Even though much of this criticism is found in journalistic opinion pieces rather than scholarly research, it nevertheless highlights a certain lack of balance in the critical discourse surrounding the position of technology in family mealtimes. There is relatively little research exploring the roles, practices, and attitudes relating to the broader set of digital technologies (smartphones, tablets, laptops, etc.) which are now finding a place in our everyday mealtime routines [Spence and Piqueras-Fiszman 2013].

In this paper, we seek to address this gap by presenting a contemporary account of the evolving role of digital communication technologies during family mealtimes. We explore the influence of technologies on the content and the context of mealtime interactions. We aim to explain how particular characteristics of the technologies affect the spatial configuration of family mealtimes. We explore how such characteristics

actively contribute to both a positive sense of commensality as well as the tensions that may emerge through their use or non-use. Furthermore we look to the ways that these contributions and tensions are oriented to, managed, and normalized in the social construction of family mealtime practices. This analysis provides valuable insights about how social concerns are enacted in relation to the characteristics of particular mealtime technologies.

## 2. RELATED WORK

The most commonly used technology at mealtimes is the television. It is therefore appropriate to begin our critical review of related research by considering the literature investigating the consequences of watching television during mealtimes. This is followed by a review of technology used for food preparation and for informing eating practices. We show how research about human-food interactions has progressed from a focus on the functional aspects (e.g., nutrition and dieting) to exploring ‘celebratory eating’, which affirms the social and cultural aspects of cooking and eating together. Finally, we explore the spatiality of dining spaces, the artifacts within, and how the spatial configuration contributes to the use and experience of technology at mealtimes.

### 2.1. Television during Mealtimes

For many decades, research about the use of technology during mealtimes has been dominated by the television [De Bourdeaudhuij and Van Oost 1998; Mintz and Du Bois 2002]. This is understandable given that almost fifty percent of USA families have a television in the area where they commonly eat [Coon et al. 2001; Hersey and Jordan 2007], and that the television-watching during mealtime can be as high as 60% [Kirkova 2013]. A US national survey has found 63% of 8 to 18 year olds said that the television is usually on during meals [Rideout et al. 2010].

In terms of usage, the television is clearly a popular technology at mealtimes. In terms of the impact, the evidence is less clear. 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 and Dalix [2001] found that food consumption could be increased by as much as 15% when people are distracted by the television (or radio) while eating. This research links watching television during mealtimes with poor dietary habits or childhood obesity, and cites possible detrimental effects to familial interaction during mealtimes. These studies focus on tensions between the use of television during mealtime and possible risks to sociality and healthier living generally. However this approach, which aims to identify the negatives aspects of technology usage, tends to obfuscate any positive ways in which the technology might be implicated in the configuration of commensality.

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 technologies such as mobile phones, tablet computers, and laptops in the domestic sphere. There is, however, a growing interest in the use of ICTs for food related activities generally. This is relevant because this emerging use suggests a new possible relationship between technology and food. We review this research, before discussing the implications for mealtimes specifically.

### 2.2. Food and Celebratory Technology

Research concerning food and ICTs can be broadly divided into four categories. The first concerns research that provides information about food and eating. This research

prioritizes the instrumentality of food by helping to make choices about the nutritional aspects of food, by providing dietary information, or by seeking to improve culinary skills in preparing meals. It is well illustrated by Mankoff et al. [2002] who developed a low cost and easy to use system to capture the nutritional value of purchased food items. Another example is Svensson et al. [2005] who used social networks to select, find, and recommend recipes in real-time based on the choice of similar users, ratings, and past experiences. Aberg [2009] also developed a meal recommendation system by taking nutrient content, cost, variation, etc. into account.

The second category of research is not concerned about food information, but more interested in the social aspects of eating. Meals have always been a source of social interaction, cultural heritage, enjoyment, and celebration [Beardsworth and Keil 2002] and there are many examples of HCI research that have explored the significance of meals beyond their opportunities to develop culinary skills and nutritional value [e.g., Comber et al. 2013]. Bell and Kaye [2002] first discussed the need for food-related HCI research to go beyond efficiency, and to consider the experience, affect, and desire of eating and sharing time together. They highlighted the social and cultural aspects of food consumption and argued that technology design in this area should be conducted with greater socio-cultural sensitivity. Food HCI should focus less on correcting food-related problems and more on understanding the social values and meanings through food-related activities. Several years later, Grimes and Harper [2008] extended these ideas to explore the aesthetic aspects of mealtimes. Interested in 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*. Motivated by the social and celebratory aspects of eating, several other researchers have drawn inspiration from the pleasurable aspects of food consumption. For example, Terrenghi et al. [2007] and Paay et al. [2012] explored the pleasure of shared cooking experiences through video recordings. Davis et al. [2014] investigated the joy of recounting family histories through recipes, which have been passed down over generations of cooking. Kanai and Kitahara [2011] found that community building enables neighbors to share their ingredients and cook together.

The third category of research concerns remote dining experience enabled through the use of videoconference technologies, such as Skype or FaceTime. Here a screen-based technology is used to facilitate the sharing of a meal with distant family or friends [Judge and Neustaedter 2010]. These remote forms of commensality are explored by Barden et al. [2012] who created an audio and video-based telematic dining experience during family mealtimes. Instead of the typical videoconference configuration, Barden and colleagues employed a pair of networked tables on which representations of remote parties were projected. In addition, features of the table could be manipulated to trigger actuation of corresponding components at the remote site. Wei et al. [2011] extended this notion of remote shared-eating experience to create a dining table embedded with interactive subsystems, which included gesture-based screen interaction, ambient pictures on tablecloth, and 3D printed edible messages. Grevet et al. [2012] demonstrated the use of a simple system to share the location (i.e., home or outside) and activity (cooking, eating, cleaning, or none) with friends, and discussed how such minor social connectedness could improve the dining experience of the solitary eaters. Tsujita et al. [2010] took this further to share video recorded meals with others in a time-shifted environment. Nawahdah and Inoue [2013] compared this with their proposed adaptively synchronized video playback system to enhance the perceived presence of the remote person in a time-shifted tele-dining experience. All these works illustrate the potential of technology to enhance commensal experiences.

The final category concerns research that is both celebratory (rather than informational) and collocated (rather than remote). One of the few examples here is the *4Photos* table centerpiece concept [ten Bhömer et al. 2010; O’Hara et al. 2012]. In this system, photos from diner’s Facebook collections were displayed on the *4Photos* system. The system was designed to sit comfortably in the middle of the dining table amongst the other mealtime items. Control of the system was available to all diners around the table. It could be viewed and be interacted with regardless of where one was seated, accommodating the other material and spatial factors organizing the bodily configuration of the family during the meal. The role of the photos was not specifically to promote conversation (which they did) but rather to provide meaningful objects through which contextually appropriate identity and relationship work could be conducted. Importantly, the system was not something that was singularly foregrounded or backgrounded during the meal but rather dynamically brought in and out of the conversation as contextually and socially appropriate throughout the meal.

### 2.3. Technological Practices during Mealtimes

Two key papers offer a significant grounding in our understanding of current technological practices during mealtimes. The first by Hupfeld and Rodden [2012], 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. They discuss the role that tabletops, dining spaces, and culinary artifacts play in the social organization of domestic eating practices.

The second by Barkhuus and Brown [2009], on the other hand, explored the recent changes in television watching practices in response to video streaming and personal video recorders (PVR). While their work is a general commentary on television viewing practices, they raise a number of key points that are relevant to our concerns in this paper. First, they note that much of our television watching practices can be characterized as *ambient* rather than *focused* watching. That is, in ambient form, the television is positioned as a backdrop to other everyday activities and practices in the home. The television here is something that is dipped into and out of, as other everyday activities are performed. Their work also highlights that shifting between ambient and focal attention is distributed in different ways across family members. The focused viewing of one family member could occur at the same time as the ambient viewing of other family members. Of significance is that television viewing cannot be simply regarded as just a distraction from familial interactions, as it is often portrayed. Rather, mealtime television viewing is an activity that is integrated into the broader social practices and arrangement of certain households. It is always something that is socially performed even if being used to be deliberately antisocial.

These findings are echoed in recent research, which has demonstrated the growing presence of mobile and networked devices at the dinner table [Ferdous et al. 2015; Hiniker et al. 2016; Moser et al. 2016]. Moser et al. [2016] identified different factors influencing family members’ attitudes towards technology usage during mealtimes and argued for incorporating social awareness features into mobile phone systems to alleviate tensions and conflicts among the family members regarding such usage. Hiniker et al. [2016], on the other hand, discussed the differences and consequences of restrictions parents impose among their children’s technology usage vs. their own during family mealtimes and recommended finer control over contextual constraints regarding technology usage in the family. However, how the presence and usage of these mobile and networked devices have impacted the social settings of family mealtimes remain largely uninvestigated.

### 3. STUDY: THE TECHNOLOGICAL PRACTICES OF FAMILIES DURING MEALTIMES

In this paper we investigate how families manage technologies in their everyday mealtime practices, and how these technologies influence the content and context of their social interactions.

We use the work of Barkhuus and Brown [2009] and Hupfeld and Rodden [2012] as a springboard to understand the ways in which a broader set of everyday technologies become implicated in the social configuration of everyday commensality practices and family relations at mealtime. Rather than making moral arguments with respect to the position of technology within mealtime behavior, we look to the ways that such technologies contribute or detract from any idealized notions of family order in these settings. In this respect we explicate the ways that families orient to the opportunities presented by particular technological arrangements and how they *enact* a moral order of family life through their practices.

#### 3.1. Participants

This study was conducted in Australia with six families. Family 1, 2, 5, and 6 have Anglo-Celtic family background (English and Australian). Family 3 and 4 have Asian origin (Bangladesh and India, respectively). Most participants had been well settled in Australia for many years. The exceptions are the women in family 3 and 4, who moved in Australia about one year before participating in the study. The families were recruited through university mailing lists, notice boards, authors' extended social networks, and local community Facebook groups. Criteria for participation required that families had to be regularly engage in shared mealtimes and have some form of technology present during these shared mealtimes (e.g., television, radio, mobile phone, etc.). We purposefully chose families who already use technology during mealtimes in order to understand how the devices are managed and negotiated within family context. Each family received a \$20 iTunes gift voucher as an acknowledgement of their contribution.

Our participants come from diverse family backgrounds and family structure. As summarized in Table I, the families included those with and without children, couples as well as single-parent families. The families were also diverse in their education and economic capabilities. Among adults, the educational qualification varied from a high school degree to post-doctoral qualifications. The participant occupations include home duties, academic positions, self-employed business people, and private/government employees. In terms of income, the recruited families varied from 240 AUD to 720 AUD approx. per person per week (50,000 AUD to 1,50,000 AUD per family per year), after tax. The children age ranged from pre-school to 7th grade. Although a diversity of participant background was important, our aim was neither to focus on any particular segment of society nor to obtain a representative sample for generalizability. Instead we sought some diversity of family setting as a context for an in-depth examination of the familial practices with technologies at mealtimes.

#### 3.2. Data Collection

The qualitative data was collected from three sources: (i) in-depth semi-structured interviews (before and after the mealtime recordings), (ii) a technology tour of the home, and (iii) video recordings of two family meals.

We visited each family in their respective homes. The initial visit began with an interview, aiming to elicit background information about the family and its routines. In particular we discussed the typical organization of mealtimes in the context of the normal day-to-day life and how the configuration of these practices might relate to the pragmatic demands and expectations of family life. We sought to understand the

Table I: Description of participants and list of the devices available to them during family mealtimes

	Participants (occupation)	Ready-to-Hand Devices	Present-at-Hand Devices
Family 1	Mother (private sector), Father (government job), Two children (10 yo and 12 yo)	- television, - mobile phone (music), - tablet (music), - Apple TV	- mobile phone (call, SMS, or browsing), - tablet, - land phone, - laptop
Family 2	Mother (academic), Father (academic), One child (4 yo)	- 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 (home duties), Husband (engineer)	- television	- mobile phone (call, SMS, or browsing), - DVD player, - laptop, - land phone, - sound system
Family 4	Wife (student), Husband (student)	- laptop	- mobile phone (call, SMS, or browsing), - land phone
Family 5	Mother (book-keeper), Three children (8 yo, 12 yo, and 14 yo)	- 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 (8 yo, 11 yo, and 13 yo)	- television, - DVD player, - sound system, - set top box, - Apple TV	- mobile phone (call, SMS, or browsing), - tablet, - land phone, - gaming console, - laptop, - desktop

kinds of technologies typically present during their mealtimes and an indication of the attitudes towards their presence and use at mealtimes. We interviewed all the family members together. While we did not observe any reluctance with participants honestly expressing their opinions in the presence of others, we acknowledge this may be a methodological limitation. Each interview was between 45 minutes and 1 hour long.

During the initial visit, participants took the researchers on a tour of their homes to understand the spatial and material arrangements of household, in particular the

dining areas. Through the interviews and the tour, we developed a deeper sense of mealtime organization in relation to the dining room's setting, furniture, seating arrangements, and the presence of any personal and shared devices that might have some bearing on the organization of family members during mealtime activity.

Each family was then provided with two video cameras. We minimized the influence of the video observation by asking the participants to place the camera a few meters away from the dining table. Using two cameras for each meal enabled the meal to be captured from multiple viewpoints. The first camera was positioned so as to face the participants (close-up view using a zoom lens). The second camera was then directed at the dining space (using a wide angle lens). 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.

Participants were asked to choose two shared mealtimes over the following week (one weekday meal and one weekend meal) and to self-record these with the video cameras provided. Capturing both a weekday and weekend meal allowed us to become aware of different daily routines and their impact on technology use.

After approximately one week, we collected the video materials and cameras from the families. We analyzed the first interview and video recordings. At the end of the study week, we then returned back to the family to conduct a second interview. We used the video recordings of the two selected meals to direct our questions and to focus on any specific episodes during those meals that related to the socio-technical landscape of the mealtime. The second interview lasted approximately 30-45 minutes. Each interview was audio recorded, transcribed, and then analyzed.

### 3.3. Analysis

We used an inductive, qualitative analysis approach to discern the technologies used (and not used) during mealtimes, their position in the broader spatio-material configuration of the mealtime, and influence on commensal practices. NVivo was used to analyze the video and to add detailed notes of all technology-mediated activities. These notes were refined through discussions between the authors. We identified recurring patterns in our video analysis and in the interviews. After conducting the study with four families, we noted several common themes. We then conducted the study with two more families. These data strengthened the evidence of our analysis, but did not generate additional themes. Nevertheless, we acknowledge the possibility that additional themes may have appeared if the sample size were larger.

Based on interviews and video data, we identified the technologies available in the families' homes. We also created maps to illustrate how families, technologies, and other household items were spatially arranged on and around the dinner table. We conducted a thematic analysis to characterize the family norms and practices regarding mealtimes and technology use to understand how this shaped various aspects of commensality (e.g., sociality, satiety). This analysis was done iteratively to identify common themes across families as well as unique family practices.

## 4. FINDINGS

First, we give an overview of the relevant mealtime technologies. We then present the spatial arrangement of these technologies around the dining space. Finally, we describe how technologies contributed to commensality.

### 4.1. The Availability of Technology: Ready-to-Hand and Present-at-Hand

All families owned a range of information and communication technologies. However only a subset of the technologies were used during mealtime. As shown in Table I,

five out of six families owned televisions, with families 1, 2, 5, and 6 owning multiple televisions. All family members (including most of the children) owned smartphones. Other devices such as tablet devices, set top boxes, laptops, desktops, DVD players, sound systems, gaming consoles, etc. were also common in the family homes, but many were not used during mealtimes.

Amongst technologies used during the meal, we observed notable differences in how they were incorporated into the meal. On one hand, we noticed that some technologies (often televisions) were incorporated seamlessly into the meal experience and became an almost invisible extension of the interactions around the dinner table. On the other hand, other technologies were equally available during the meal, but removed from the social interaction amongst the family members. When these technologies were incorporated into the meal, e.g., in response to a mobile phone ringing in a person's pocket, then the technology drew attention to the fact that it was a separate entity that was brought to the shared meal.

This distinction in how some technology is incorporated seamlessly into the meal experience while other technology is considered separate is reminiscent of Heidegger's concepts '*ready-to-hand*' and '*present-at-hand*' [Heidegger 1962]. These concepts describe the coupling between tools and human actions. Tools that are present-at-hand are regarded as being separate from the action, while tools that are ready-to-hand form a single unit with the body in performing an action [Mansbach 2002]. For example, when using a hammer for nailing, the hammer is an "invisible extension of my arm", we are involved in the task and the hammer is considered *ready-to-hand*. However if the hammer were to be used as a door-stop, it stands apart from the context and becomes *present-at-hand* [Dourish 2004, p. 138-139].

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While Heidegger's (and Dourish's) concern is the relationship between an individual and his/her tool, we find this distinction equally useful for characterizing devices in the context of a family meal. Just like in the family meal, the distinction between devices that are ready-to-hand and those that are present-at hand is not a feature of the technology per se, but emerges from the particular activity in question. Our characterization (Table I) shows that the same technology could be both ready-to-hand (e.g., mobile phone streaming background music during mealtime) and present-at-hand (e.g., mobile phone at easy reach in case someone sends a message). We now provide more details about each.

*4.1.1. Ready-to-Hand Technologies.* It is not surprising that television was the most common technology used during dinner for all of our families. Television viewing occurred on traditional television sets (family 1, 2, 3, 5, and 6) and on laptop for video steaming (family 4). Reality shows, news, movies, etc. were the most common programs watched during mealtimes. Some participants reported playing movies from their DVD player or connecting the laptop to their television, thus obtaining a bigger and shared view of the content in the large screen. Once configured, these devices along with the tele-

vision became an (invisible) intermediary between the user and the content they were watching.

Mobile devices were also popular during mealtimes, albeit with restrictions. None of our participants changed their phones to ‘silent’ mode. It was generally accepted that family members would avoid making phone call/SMS during mealtimes. However, they would respond to a call during mealtime, especially if they thought it might be urgent or expected (for example, family 5 had one relative in hospital, family 4 expected calls from overseas family members). Children often had stricter restrictions, for example, unlike their parents they were not allowed to have phones with them (family 1 and 6), have no SIM in their phone (family 2), or refrain from making or receiving calls (family 5). Here the technological opportunities of communication with others (not at the dining table) are seen largely as something that separates the individual from family togetherness. By contrast, we observed that the use of phones or tablet devices as a source of music played through the sound system or television was allowed (family 1, 2, and 6).

Personal devices such as mobile phones or tablets are sometimes shared with other members of the family, provided that the owner of the device thinks the content is compatible with other members’ interest. People remain cautious around this concern, along with the privacy issues (family 2 and 5).

*“[If] something awesome happens on a [phone] screen, we will definitely alert the others and the others will show suitable interest and in that context we will share a screen. But in any other context, we won’t just sit there and watch someone else browse the Internet, for example.” (Mother, family 2)*

**4.1.2. Present-at-Hand Technologies.** Other technologies were available in the home, but for various reasons (e.g., spatial considerations, concerns devices would be dirtied or damaged, or concerns children would become distracted), they were not readily available or were not used at all. In this sense they were present-at-hand. Game consoles, laptops, and desktop computers were nearby in the house, but were not used during mealtime. We observed (in the video recordings) laptops being used immediately before and after the meals, and not used during the meal itself. Sometimes laptops remained on the dining table while family members ate together (family 2, 3), but it was not used during mealtime. When the laptop was used (family 4, video recordings), family members configured the device before the meals and only performed very simple interactions during mealtime (for example, pause the video when someone leaves the table to fetch more dishes). The familial norm of keeping some technology at a distance from the mealtime experience renders them present-at-hand.

## **4.2. Spatial Arrangement of Technology during Mealtime**

There is spatial relationship between how families arranged themselves and their technology during mealtime. In particular, we observed four patterns of familial arrangement around the furniture and available technologies during mealtime, each family showing multiple of these patterns in their spatial arrangements, as discussed below.

**4.2.1. Technologies Orientate to Families.** Firstly, the families arranged particular technologies that are ready-to-hand to enable easy and convenient access to them. For example, families reported that the best television viewing took place when the television was situated near the dining place. Family one, for example, mounted their most sophisticated (favorite) television on the wall closest to the dining space so that all family members would have an unimpeded view. Family six situated their largest television near the dining table. The rationale for this placement was that mealtimes are

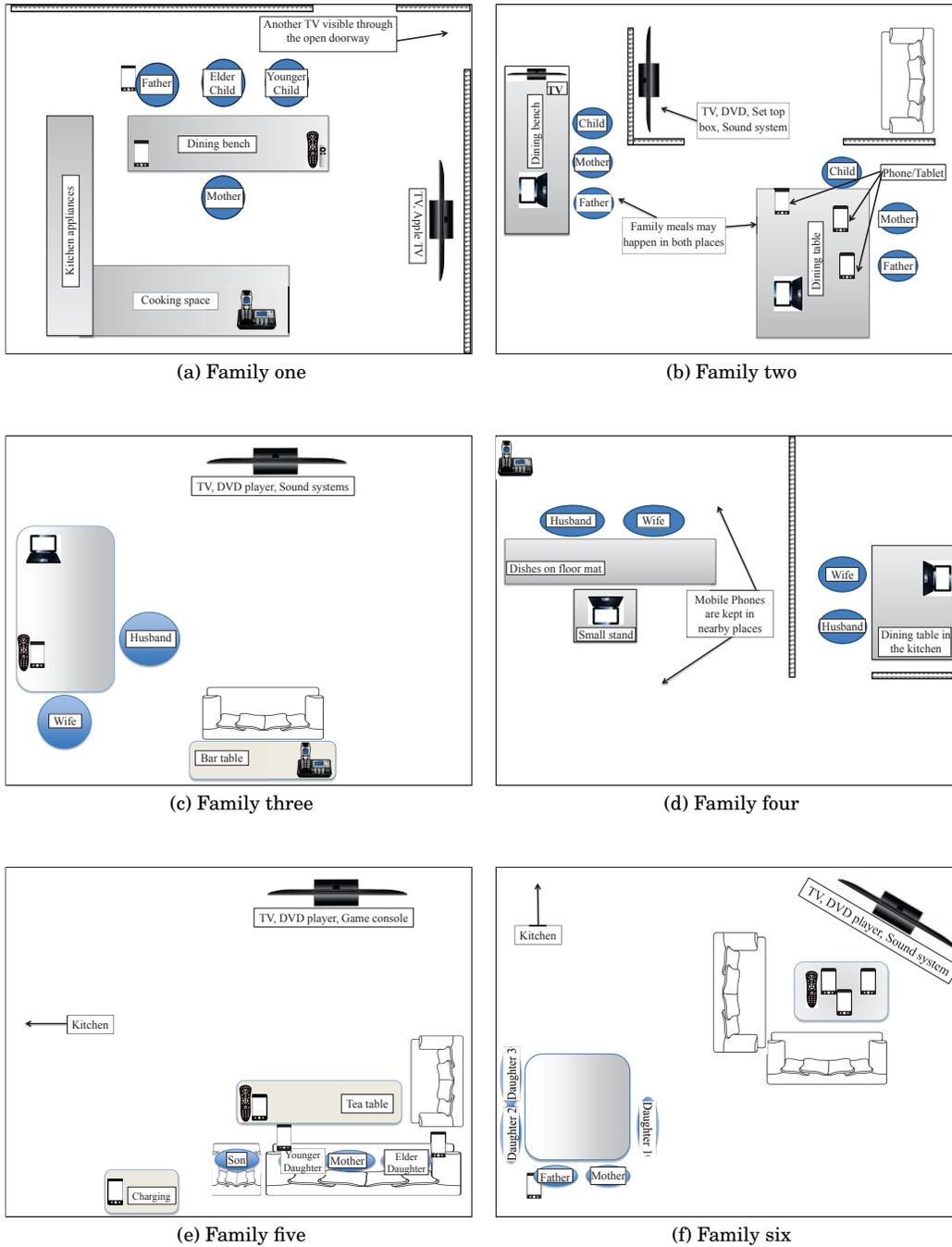


Fig. 1: Spatial orientation of the families and devices in the dining space.

one of the few occasions that brought all family members together, and that often the television was a source of interaction for the family. The DVD player, sound system, set top boxes, and Apple TVs were also often used with the television. When our participants had land phones (always cordless), they placed one handset in the kitchen for easy access. The other handset was usually in the bedroom. While some of these devices are heavy and cannot be easily re-configured (e.g., televisions), others are small items (e.g., apple TV, land phones), yet families carefully considered how and where to place these technologies so that they make sense with the social context of the mealtime. Such orientations can then influence the interactions both with the technologies and among the family members. For example, it mandates the family members to sit together in the couch to enjoy movie playing through the DVD player (Family 3), or it requires the mother in family 1 to answer calls in the land phone placed in the kitchen while preparing meals or dining, as its placement allows only her to access it without getting away from the table.

*4.2.2. Families Orientate to Technology.* Participants also arranged themselves around the technology so that all family members could have the best possible access to it. For example, Figure 1(a) shows the spatial organization of family 1 during mealtimes. The mother sat on the inner side of the bench, giving her easy access to all the kitchen equipment as well as a good view of the television to watch while she cooked. The father and the two children sat on the other side, but notably, their sitting arrangement was fixed according to their heights so that everyone can enjoy watching the television without obstructing others. Similar patterns were seen with family 2 (Figure 1(b)) and family 6 (Figure 1(f)). Family 4 used a temporary arrangement – they placed their laptop on top of a small bench and sat on their floor mat in front of it (Figure 1(d)). Family 5 sat on a couch parallel to the television (Figure 1(e)), so their sitting arrangement was of less concern regarding television watching.

Certain circumstances revealed interesting scenarios of family practices in the mealtime context. For example, family 1 would eat in the kitchen where they had a smart television on the wall. A second television was placed at the back of the lounge room, which could be seen only from the side where the father sat while dining (Figure 1(a)). It was evident from the orientation of the room that he had located himself to watch this second television without interrupting the other members' viewing experience of their preferred program. This sort of arrangement is not always possible, for example with family 3, where one member had to sit at a corner of the table that was not optimal for viewing the television (Figure 1(c)). They sometimes took their dinner to the couch in front of the television or moved their body/chair to get a better view of it.

*4.2.3. Hidden Technologies.* Thirdly, we noticed that various technologies were hidden (i.e., deliberately positioned so that it is a bit away from the mealtime artifacts) but available if needed. Some of these devices are the same as the ones listed as 'present-at-hand' in Table I, but here they are categorized for their spatial orientation at the mealtime rather than their acceptability in usage. For example, mobile phones were kept either in pockets or on the dining table (family 1, 2, 5, and 6), or in a nearby place (family 3 and 4). Then, remote controllers for the Apple TV and television remained in the dining table (family 1, 2, and 5) or in a nearby table at the kitchen (family 3 and 6). Family 2 and 3 kept their laptop folded up but in reach in case it needed to be used.

*4.2.4. Displaced Technologies.* Finally, several technologies were deliberately placed away from the dinner table so as not to interfere with mealtime interactions. This is done not only for practical concerns related to managing the dining space, but also to comply with family norms regarding technology usage. For example, family 1, 5, and 6 deliberately moved their laptops and tablets to other rooms and kept the din-

ing table free from other technologies or artifacts that would not be required during mealtimes. Often some family members, particularly children, also leave their phones (mother and children in family 6, children in family 1) in a different table or room (either voluntarily or asked to).

*“They [laptops, iPads] could be anywhere but they are not brought here, not in the kitchen.” (Father, family 1)*

*“Yeah, not really at the table. I try to make it more of an open space ...” (Mother, family 1)*

*“And if they were doing their homework with the computer here, we usually put down table mats and stuff, like that so they need to clear the table off to get room ...” (Father, family 1)*

#### 4.3. Mutual Shaping of Technology and Commensality

4.3.1. *Technology and Mealtime Conversations: Enacting Family Relations Through the Technology.* It was apparent in our video based observations and the interview discussions that technology and media content were invoked in the enactment of particular family relations. Rather than being a distraction, elements of the media content (on television and mobile devices) occasionally provided opportunities to enact particular forms of social encounters with other family members and express particular forms of sentiment. The relationship between technology and familial conversation at the mealtimes was twofold. Firstly, technology served as a conversational resource – it was, in itself, a topic of conversation. Secondly, we saw how technology was used to support family coordination and conversation in practical ways. For example, certain media (such as television programs) would become the focus of conversation and contribute to a shared sense of conviviality. In a particular instance (family 1) we see how interactions in television program provoke shared familial memories or shared family narratives. Therefore, family members may orientate to these media specifically because they represent, reflect, or celebrate particular shared narratives. For example, in our interview, family 1 recounted from the video recordings about a shared memory invoked by interaction in a television program:

*“Sometimes, [name of a child] gets off the car and runs behind it while we go down that slope in front of our house. We were laughing because a man in that TV was running after the car just like her.” (Mother, family 1)*

The significance of the content is not any inherent humor or meaning but rather the ways in which it is actively bound to socially significant elements of family narrative. In their shared laughter (“We are laughing”), they are demonstrating a shared affection for the behavior of their child and sibling. The television content then is significant in offering the family members opportunity for, in this instance, this display of affection. More generally though the point is that such media content is actively oriented in the context of family relation rather than being just a distraction from family relations.

We see this too in relation to various forms of mobile phone content whether it be general media or more specific forms of communication media. While such information may be personal communications that are received through personal device, it is in the acts of opening them up to social scrutiny by others at the table and the acts of commentary by these others through which the media objects more actively contribute to the social concerns of the mealtime. For example, the mother in family 2 describes the mealtime practice of using mobile phones in her family:

*“It also does serve as a point of content for every now and then for us to comment on what each other is looking at. So it’s not like we are devoid of*

*conversation, I think we can call it virtual co-presence; even though you are sort of separated from each other by being on this [phone], you are actually interacting and using that as a point of interaction.” (Mother, family 2)*

What we see in this snippet is an acknowledgement by the mother of the potential for these technologies to draw members into their individual communication bubbles at the table. It is clear that there is concern for this and ideas of togetherness remain important values being oriented to during mealtimes. Rather than simply cede to any individualizing tendencies apparent in these technologies, what we see in response is a deliberate orientation to these pieces of information and communication content as resources for enacting the social.

Rather than a unidirectional response to the technology and content, we too explored the ways that technological interactions were oriented in response to particular episodes in conversation. A common example in our discussions with families was the use of mobile phones at the dinner table to perform Internet search queries via various mobile devices to obtain information pertaining to a particular conversational topic.

*“Because often we need it as a point of reference too. Something comes up in a conversation, one likes to try and be historically correct or accurate, and so it’s a great way just to check facts. You know someone mentions like, you know, perhaps a new restaurant that has opened, for example this [name of a place] I am obsessed with, you have to start queuing up at 5 pm, what’s the other people say about it? As I am telling it in a dinner party conversation, so we need to quickly check a blog and then everyone will see what they can find about it.” (Mother, family 2)*

Here again, we see an acceptable orientation to technology interaction at the dining table – one in which the interaction is demonstrably aligned with particular values underpinning commensality.

**4.3.2. Pragmatics of Family Coordination.** The contingent nature of attitudes towards technology interaction at the table was further evident in the context of family coordination pragmatics. One of the elements of family mealtime is how the entailed family quorum creates opportunity for the discussion on practical family matters of the coordination of schedules and upcoming activities.

Networked information and communication technologies, in this regard, were used in support information searching, coordination, and scheduling. The acceptable use of technologies during mealtimes for these activities appears bound up in the ways that it contributes to shared concerns of the family. As an illustration, we observed in the video recordings that the family 1 mother used her mobile phone to send a text message during mealtime, in spite of the established family rule of not using mobile phones during mealtimes. Just preceding the message, the family had been discussing their activities for the following day. The daughter mentioned that her friend would pick her up for school. The mother, being unaware of this arrangement, felt she needed to confirm this with the friend’s mother, so sent a quick text to that effect. Importantly here, in spite of the general rule pertaining to mobile phone use at the dinner table, the actions of the mother were not called to account by other family members. The context of actions were understood by all in this regard and so treated as unproblematic. Family 4, 5, and 6 also reported similar events.

**4.3.3. Attention towards Technology.** Analyzing our video data, we were surprised how a very large television screen with notably loud volume can blend into the environment during the family mealtime and remain apparently unobtrusive during the mealtime conversations. Television (or video streaming, family 4) continued running during fam-

ily mealtimes of all our participants, yet participants did not constantly attend to it. They often talked amongst themselves about completely unrelated topics, ate their meals, made fun of each other, seemingly unaware of the very presence of the television in that context, as also noted by Barkhuus and Brown [2009].

*“It is just the television tends to go on as people come home, but not necessarily sitting and watch it, just again have it in the background and be watching as you do something . . .” (Father, family 1)*

Participants watched television intermittently while doing other things or having conversations. During dinnertime, all family members talked amongst themselves, while keeping an eye on the reality show running on television and eating simultaneously. What is important here is that the family was able to eat their meal, and have a conversation while watching television. Thus television in this context (time, day, choice of program, etc.) was not seen to be demanding the continuous and complete attention of the viewers. The reality show was something that could be more casually monitored for noteworthy events and commented upon or brought to the attention of the family as a whole.

Not all technologies could achieve this feat. When asked why family 1 imposed restrictions on mobile phones use by their children during mealtimes, their reply was,

*“If someone is on a page of social media they are not participating in the family discussion and that’s why I would sort of go, no (you can’t use your mobile phone at dinnertime).” (Mother, family 1)*

*“And those kids. You can talk to them and there is just no response because they are just concentrating on that thing, so...” (Father, family 1)*

*“They don’t hear.” (Mother, family 1)*

*“You gotta yell, GIRLS.” (Father, family 1)*

The imposition of restrictions on technology use is not related to an inherent property of a specific technology, rather it refers to the users perceived level of engagement with technology vis-à-vis family. Family 4 reported an instance with the father watching cricket matches on television:

*“If he [husband] watches something like cricket, he actually forgets everything.” (Wife, family 4)*

*“So test cricket is good, like nothing much happens. But I was watching T20 matches. It’s like either you should watch, or you should eat.” (Husband, family 4)*

**4.3.4. Balancing Togetherness and Technology Consumption.** In certain instances, we saw various tensions arise in the context of technology use that were perhaps at odds with idealized conceptions of commensality and family togetherness. These tensions arose from the choices of content accessible via these shared technologies and the discrepancies in content preferences across different family members. The issue here is not simply one in which disharmony among family members arises from disagreeing about the use of shared resources in the dining space. Rather, we see ways in which behavior is configured to enable a harmonious co-existence of preferences.

An example here can be found in the video recordings of family 1 (Figure 2) where the father preferred to watch the news or sport instead of reality shows. His wife and children would watch reality shows on the kitchen television, while he would watch his preferred program in the lounge. When the meal was ready, everyone gathered in the kitchen, but he kept the television on in the lounge room with low volume and would lean back in his chair to watch it behind the backs of his children. Of significance here is the balancing of family needs and personal needs with the father demonstrating a



Fig. 2: Father in family 1 having a discreet look at the other television (published with permission).

respectful orientation to the institution of family mealtime by not removing himself entirely from the space being shared. A number of interesting features are apparent here. First, the use of multiple devices enables certain points of conflict around shared resources to be managed more gracefully. But there is still work to be done here for togetherness and participation to be enacted. While the respective video streams of the two televisions do not interfere with each other, the audio aspects of the content would potentially be in conflict. Of note, then, is that the father keeps the volume of the sport low on his television to enable the more audio-dependent reality TV content to be heard by the children. Next the discrete and intermittent leaning back to view the other television also shows a certain ongoing commitment to the primary togetherness of the family during mealtime.

We can also see such value tensions apparent during mealtime in family 2. In their meal, the mother and father were watching the television while their young daughter wanted to watch an animated movie on her tablet device. The challenge here was again the sound of both devices which have to compete for the same airspace. While the parents found the sound of both devices annoying, what was interesting was that the parents chose to tolerate rather than ask the child to wear headphones. They explained the reason here was that wearing headphones would create distance between them, they chose to tolerate the noise rather than jeopardize the opportunity to interact.

Parents impose restrictions on technology uses arising from the situated and dynamic context of the family. For example, the father in family 6 described when technology use could cause familial conflict, and how they managed this.

*“We (parents) are having a conversation, and the kids are paying attention to the TV, that’s fine. But if we are speaking (to them) and they are ignoring us, and the TV gets priority over people, that is not on. So that’s when we would stop the TV or reprimand the children, or both.” (Father, family 6)*

Here the restriction on television watching was imposed in situ, contrary to the accepted practices of that particular family. This emphasizes the delicate balance that family members often have to maintain regarding technology use at dinnertime.

4.3.5. *Special Technologies for Special Occasions.* Restrictions on technology use were more relaxed for short snacks before dinner or for takeaway meals.



Fig. 3: A snapshot of the children in family 5 using mobile phone during weekday mealtime (published with permission).

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

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. The father in family 2 stated that *“There is no doubt, good food encourages conversation”*. The implication is that technology would dampen conversation and therefor undermine the experience of enjoying good food.

Technology practices changed according to the occasion of the meal. An example of this can be seen in family 5 who had a weekly tradition of preparing a special lasagna for a weekend meal. Special status was accorded to this meal both in the preparation of the lasagna (which was different from weekday lasagna) and in terms of the behavioral expectations. In the context of the busy weekday routines, family mealtimes were more pragmatic in the ways that they needed to be integrated into the weekday schedule. During these weekday meals, family 5 demonstrated less concern with the children using their mobile phones at mealtime (Figure 3). However, during the weekend Lasagna meal, 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. 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:

*“[For special occasions] there will be a lot of variety food, there also will be a decoration.” (Husband, family 4)*

*“I think because of the variety we are not much getting into technology because it would be very hard to focus on the phone” (Wife, family 4)*

*“If its special occasion then it would be more like dialogue. So we will be speaking more on the topic.” (Husband, family 4)*

*“Yeah, if it’s special, we would prefer to talk rather than to see something [in the laptop].” (Wife, family 4)*

Technology use (and non-use) then is bound up in the broader social context of the meal – at times being an accepted and part of everyday living while at others their practices become implicated in social acts – showing respect and gratitude for the

efforts made in preparing a meal and showing respect for the specialness of family being that is being attached to that routine tradition.

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, a person might choose to watch a special film for a 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 color 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.

During special occasions, or when there were guests in the family, our participants used to listen music rather than television programs to entertain and create the ambience to support the social gathering. All of our participants (except family 2 and 5, who said they usually celebrate special occasions with guests in restaurants) described the role of music during occasional family parties.

*“During dinner, we listen to music, if we have got friends over; either from the CD player, or we have the music channel in the TV” (Mother, family 6)*

**4.3.6. Technology as distractor.** While the distracting role of technology has come under particular scrutiny in relation to family mealtimes, the predominant distraction narrative is one in which it takes away from the performance of family. In our own fieldwork we see a number of alternate facets to the ways that distracting functions of technology played out in the lived experiences of everyday family mealtimes. For example, a key challenge faced at mealtimes, in particular for parents with younger children, concerns the social organization of satiety (e.g., Laurier and Wiggins 2011). That is, there is a pragmatic concern for parents in ensuring that their children finish their meal to ensure they are suitably nourished. Such a concern was apparent in the video recordings of mealtimes in family 2. They discussed episodes in which they would try to get their young child to finish their meal. Here when the child’s attention is focused solely on the meal, then the parents experience difficulties persuading the child to finish. The parents, then used technology as a way to distract the child from the food with a view to achieving meal completion and satiety. In one particular episode the mother discussed the realization that technology could be distracting in a positive way when she showed the daughter some new iTunes application. The application distracted the daughter from the immediate sensory elements of the food so that she would be more inclined to eat and finish the meal.

*“I never realized [name of her child] gets so engrossed in technology. I can shovel a whole plate of food into her and she doesn’t even realize it. Even Brussel sprouts.” (Mother, family 2)*

A further example of the ways in which distraction is more actively used in the management of the meal can be seen in the behaviors of family 5. Here, the children had

been constantly fighting at mealtimes to the point where it was becoming problematic. In response to this the mother had been forced to sit in between the son and the elder daughter in order to mitigate the problems arising from bickering at the dinner table (Figure 1(e)). What she then found was that watching television during the mealtime turned out to distract the children from their squabbling and from each other. In this respect the mother felt that mealtimes had become much more relaxed as it avoided the likelihood of any conflict arising:

*“If we actually sat there [kitchen] and ate together, it would always end up in [name of child] and [name of child] fighting. So we found it sort of more relaxing to watch television, because there is no fighting.” (Mother, family 5)*

We also observed technology increasing the consumption of food. Families often remained at the dinner table long after completing their main meal, waiting for a particular television program to finish. Sometimes they kept eating casually, picking small items from their plates (video recordings of family 1, 2, 4, 5, and 6). Their interest appeared to be in watching the television rather than eating and the food complemented the technology. For these families, technologies such as television programs help shape the duration of commensality by, for example, extending the amount of time the family sits together.

*“If it is really good and like we eat a lot yogurt and ice cream sometimes as a dessert afterwards. So if we are eating and continuing the meal, we watch one more episode, and eat more.” (Father, family 4)*

We do not necessarily argue that such distractions are required or should be encouraged, but recognize this as an example of how the technologies during mealtimes are influencing the interaction between the people and with the food they consume. Such findings offer a complex array of opportunities, and it is therefore becoming essential to consider design for technology to be used during mealtimes seriously.

## 5. DISCUSSION AND DESIGN IMPLICATIONS

Clearly, the uptake of new personal information and communication technologies is having an impact on mealtime commensality. While technologies such as television have historically come under criticism for their potential to inhibit familial conversation, our research suggests a more complex scenario is emerging. The act of coming together at mealtimes and the opportunities this presents for the enactment of family routines and expression of family values remains important. Indeed, our research highlights that the social norms associated with devices at mealtimes is core to understanding technology integration into family mealtimes. The findings make three essential contributions to our understanding of technology use at mealtime:

- (1) The use of ICTs can have both positive and negative impacts on the social interactions during family mealtimes. Despite such concerns about possible detrimental effects, mobile and networked devices are increasingly available and being used during mealtimes. It is hence important to recognize this presence, understand the family practices around such usage, and consider the design of such devices (e.g., reconfigure personal devices as a collective resource, as discussed later) so that they enhance commensality. Adopting this new orientation to technology usage at mealtimes can lead to novel approaches to design for commensality.
- (2) The spatial interplay between people, furniture and technologies plays a crucial role in understanding and negotiating the commensal experience. We extend the contribution of Hupfeld and Rodden [2012] in this regard, who discussed the spatiality and impact of dinner table artifacts in the family mealtime context, but

- didn't consider mobile-networked devices in their analysis. Indeed, some technologies are fixed (e.g., television, land phone) and families arrange themselves and their technologies to create a satisfying experience. However mobile and networked devices are placed so as not to obstruct the mealtime utensils, but remain available when necessary. We recommend that future developments should recognize these arrangements and be designed accordingly to target one or more of the four orientations we proposed (Section 4.2).
- (3) The transition of technologies between ambient and focal attention has significant impact on its acceptability in the mealtime context. In general, family members are not permanently focused on the technology but on the enjoyment of the meal. We believe this is an essential feature of a successful technology aimed to be used during mealtimes. Mealtime technologies should support a smooth transition between being ambient and being focal when necessary. Barkhuus and Brown [2009] discussed backgroundness in television watching practices in the family, but here we extend their findings to new mobile and networked devices.

Viewed from the perspective of commensality, family mealtime is typically considered an almost sacrosanct time and space for social interaction. Hence any technology used in this context is typically regarded with concern as it can diminish or even displace social interaction [Fulkerson et al. 2008; Stroebele and De Castro 2004]. Personal technologies like mobile phones are of particular concern, because they can isolate and exclude individuals from the shared experience of a meal [Bell and Kaye 2002]. Despite such concerns, mobile and networked devices are increasingly available and being used during mealtimes. Our finding offers evidence about how families manage their presence and usage, and what might this mean for HCI researchers and for future technological advancements. We now discuss the findings and explore how they can be utilized to sensitize interaction designers and other technologists to some of the challenges and opportunities involved in designing new technologies to support commensality at family mealtimes.

### 5.1. Personal and Shared Technologies Vs. Personal and Shared Acts

At the heart of the practices of commensality lie a set of core social, cultural, and family values. These values and family relations get played out in many ways through engagement with the socio-material context of the mealtime setting, which is increasingly permeated by a range of technological offerings. While many of the technologies present at the mealtime do have a certain potential to distract family members from engaging with others and thereby threatening the very essence sought after in commensality, it is clear that such pernicious effects are somewhat overstated. What was apparent in the fieldwork is that technology was also implicated with particular concerns for family relations. Television, for example, is a shared resource that can be viewed and listened to by all members of the family at the same time. While there may be points of conflict around content that sometimes need resolving, television content ultimately provided a set of shared resources through which social engagement among family members could be enacted. Important here is not just the status of this as a resource for the enactment of family relations. Rather it is that attitudes towards technological practice at mealtime become contingent upon the acts performed with them being aligned with the socially enacted values of commensality. This was particularly apparent when considering the use of personal devices at the dining table. When devices such as mobile phones were used to draw individuals away from any performance for family relations, their use was typically frowned upon (Section 4.3.3). But when the same technologies were opened up for shared interest, scrutiny, and com-

mentary, through which various facets of family relationship could be enacted (Section 4.3.2), then their use was held less to account.

A design consequence of this argument is the possibility of transforming personal devices (e.g., smartphones and tablet devices) and data (e.g., photos, music, social media posts) into shared resources that support commensality. For example, this could be done by combining the displays and speakers of heterogeneous personal devices to create a larger display whose content and access is negotiated amongst the family. This way we can exploit our everyday dwelling with these devices and offer a design to bring them together to respond to the context of collocated interaction in shared environments.

Recent works have focused on such social use of personal devices. It has been noted that people naturally use technology in shared ways, even with devices designed for individual users [Rogers et al. 2009]. Yuill et al. [2013] demonstrated the social interactions and associated enjoyment of drawing through sharing one tablet device among a group of children. How such combined displays augment the social experience and commensality of family mealtimes remains a question for future research.

## 5.2. Backgrounding of Technologies

Of interest was that certain forms of technologies could be backgrounded, allowing casual monitoring and viewing. Others have written about this in terms of technologies that become ‘unremarkable’ [Tolmie et al. 2002], i.e., when technologies become part of a routine and hence blend into the domestic environment. Consistent with Barkhuus and Brown [2009], we also observed how some technologies (e.g., television, music, etc.) appeared to blend into the background and at other times were brought into the foreground (i.e., focus of interest). Our observations also showed that such ‘unremarkableness’ was not a static property of a particular technology but rather an emerging property of a particular mealtime context. The same technology and device (e.g., television) can be considered unobtrusive in one instance (with family 1 watching a reality show, Section 4.3.3), but can also become very ‘remarkable’ or obtrusive in another (family 4 watching cricket, Section 4.3.3 or children in family 6 were too much into the TV watching, Section 4.3.4). We want to argue that this interchangeability of being into focus of interest and move out from it is an important and desired capability of technologies used in the mealtime context. When we discuss commensality in family meals, the shared experience of eating together becomes what matter most; both the meal and the technology are ingredients of this ‘experience’. Our study shows that when technologies, even shared ones, hinder the experience of togetherness in the family, it is not generally accepted. Successful integration of television, music, or other media during family mealtimes highlighted their capacity of seamless transition between foreground and background in terms of attention towards it. Alongside others [Dourish 2004, p. 129], we believe that this transferability is very critical to effective use of technology during mealtimes and hence an important guide for future technological advancements in this context.

But what was also significant were the ways that noteworthy happenings within the media were co-opted as a resource for the very work of importance in the social construction of family relations and togetherness. That is they offered resources for the enactment of family relations through shared humor, comment, or inscriptions with family relevance, similar to the photos shared through the 4Photos digital table centerpiece [O’Hara et al. 2012]. Likewise, technology use such as web based information seeking when done as a response to particular family conversation strands was seen as something that could augment the work of togetherness rather than detract from it (Section 4.3.1). In this particular orientation it was deemed as acceptable practice.

### 5.3. Technology for Special Occasions

Certain technologies were used as a resource for setting scenes and creating ambience during mealtimes (Section 4.3.5). Such creative practices were a way of using technologies to augment special mealtime occasions. Hupfeld and Rodden [2012] discussed how families used special tableware to mark special and mundane family meals. Our findings showed how the selection of technology could play a similar role. For example, watching a special movie with dinner to celebrate an anniversary (family 3), changing the colors of room lighting (family 2), and selecting music to accompany a meal for a birthday party (family 1). The use of these technologies here reflects the significance of particular familial relationships and events, and contributes to commensality.

These observations suggest that novel designs for home environments need to consider how a technology can be reconfigured to support both everyday routine events as well as mark special occasions. Some household furniture (such as many familial dining table) allows users to extend or reconfigure artifacts to support additional members who may be present during special occasions. Personal and mobile devices should allow alternate configurations to support special familial or celebratory events such as intergenerational gatherings, birthdays, Christmas, etc. For example, researchers are exploring how to reconfigure regular surfaces like the dinner table into an interactive gaming surface [Wilson 2005]. Currently very few of the technologies we own in our homes are for use for special occasions only. This is an opportunity for future ICT design during family mealtimes.

### 5.4. Spatial Arrangements of People and Technology

Spatial arrangement and commensality has been of interest for quite some time now. Fischler [2011, p. 534] provided a historical account of how different spatial arrangements of people around the dining table marked hierarchy during commensal eating. Hupfeld and Rodden [2012] examined the spatial arrangement of dinner table artifacts and their implications for social interaction occurring at the table. In this paper, we focus on technological artifacts. We identified four spatial arrangements (Section 4.2) in the dining context: technology orienting towards people (e.g., having the best television in the kitchen), people orienting towards technology (e.g., sitting arrangements at the table), hidden technologies (e.g., mobile phone in the pocket) and displaced technologies (e.g., laptops removed from the dining table before meal starts). These configurations came out of the conscious choices of the family members to ensure best possible experiences for everyone in the family. We note, in this regard, how different aspects of the technology (e.g., stationary television or land-phone vs. mobility in smartphone or laptops) and people (e.g., heights of the members in family 1) influenced the spatial configuration of technology and people in the family mealtime space.

It is therefore important to recognize how particular technologies enable or constrain particular spatial configurations among family members during mealtimes. Televisions for example may demand a particular orientation of the family and may dominate other features of the spatio-material environment whereas mobile and wireless devices (e.g., remote control) may offer greater latitude in terms of their spatial demands. In this way, technologies can have particular consequences for mealtime proxemics [Hall 1963], for socio-spatial orientations [Fogtman et al. 2011], and how the moral order is manifested at mealtime. It opens up the opportunity to investigate how the newer technologies shifts socio-spatial relations, for example, by comparing the presence of screens in the middle of the table [O'Hara et al. 2012] vs. at the end of the table (e.g., television), or along with each dinner participant (e.g., ambient tablecloth for each diner [Wei et al. 2011], using the mobile phone to remotely control music rather than getting up from the table). Understanding these arrangements can provide opportuni-

ties for the design of personal devices. For example, designers can either target technologies that have a prominent place already around the dinner table, or for families to reorient their technology to allow shared access. Otherwise, apps designed for mobile phones may be hidden during a meal and only be accessible before or afterwards. DinnerTimePlus [2014] is an example of such kind, which allows parents to control the smartphone usage of their children during different times of the day, specifically mealtime and bedtime.

### 5.5. Technology for Reminiscence and Distraction during Mealtime

Our findings show how technology can support both reminiscing and distraction during the family mealtime. Reminiscing was evident when families used technology to draw connections between past events and present media usage. For example, family 1 related an actual event of their daughter running after their car, which was triggered by a scene from the television (Section 4.3.1). Other researchers have shown that mealtime technologies can support reminiscing during family mealtimes [O'Hara et al. 2012]. Also Grimes and Harper [2008, p. 6] suggest that showing mealtime related photographs can support and evoke discussions. However reminiscence need not be have a literal association to mealtime stimuli. Technology at mealtimes can extend reminiscence beyond the time and place of the mealtime. Our study shows that mealtime conversations can be provoked and supported by technological content not related to the meal itself but can be drawn from diverse events from our everyday life.

In this regard it might be useful to consider how technologies can support different sort of memories [Sellen and Whittaker 2010], namely reminiscence, remembrance, recollection, retrieval, and reflection. One might aim to design to support one or more of these aspects with mealtime technologies. Also a variety of digital items can be used to provoke and support such memories, including but not limited to photo, video, music, social media post, news headlines, etc.

Finally, it is worth noting that distraction was in itself not always at odds with the social conduct of the family mealtime. Where appropriate, technology was used deliberately to distract, as we saw in the strategic efforts to encourage child satiety or maintain family harmony (Section 4.3.6). In contrast to concerns that television viewing during dinner is associated with unhealthy eating, our findings highlight how even technology responses such as distraction are not inherently and consistently problematic but rather are features that are oriented to with a view to familial concerns.

### 5.6. Limitations

While appropriate to the exploratory nature of our work, we acknowledge the limitations of our small participant set and study settings. Family mealtime practices and attitudes towards technology usage vary between different households, as well as across socio-economic and cultural contexts. Also, by interviewing all the family members together, we could have missed opportunities for parents and children to speak separately, which may have raised issues about the influence of parental authority and power imbalance between generations.

## 6. CONCLUSION

This paper has reported on the role of new technologies on familial commensality. We have taken a qualitative approach to closely examine and understand how a small number of families, who typically allow and utilize everyday technologies at mealtimes, negotiate and manage this use. We offer an analysis in terms of commensality and provide a rich picture of the family norms, interactions, limitations, and exceptions around it. We have explored current practices around the personal and shared devices and analyzed how they support familial conversation, provide relaxation, achieve sati-

ety, and enable celebration, albeit not without occasional tension. The use of technology at family mealtime has traditionally been seen as working against the moral foundations of commensality. While aspects of these arguments remain apparent in our own observations, we also see important ways in which technologies can be meaningfully integrated into the social space of family mealtimes and thereby contribute to commensality.

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