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# The Playful Potential of Digital Commensality: Learning from Spontaneous Playful Remote Dining Practices

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With one-person households being increasingly common and Covid-19 lockdown policies forcing people to stay home, remote dining has become common practice for many, who take it as an opportunity to connect with others in times of loneliness. Sharing meals online, also known as digital commensality, is a rich form of interaction, where people leverage technology to achieve a sense of connectedness and belonging while eating. In this paper, we look at digital commensality and we explore its inherent playful potential with the aim to inspire the design of engaging technologies that can support, enhance and augment this form of interaction. For this, we used a situated play design approach to document and analyze the behavior of 36 people (including pairs of friends and strangers) sharing meals online. Our analysis surfaced a set of play potentials of remote dining – i.e., playful things people already do and enjoy spontaneously while sharing meals online. We present those play potentials as inspirational material: they can motivate and enrich the design of future digital commensality technologies by responding to people's desire for playful and social interaction with, through, and around food.

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

Additional Key Words and Phrases: HFI, Commensality, Computer Mediated Communication, Games/Play, Empirical study, Interaction Design, Digital Commensality, Human Food Interaction, Augmented Reality, Commensality, Playfulness.

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## 1 INTRODUCTION

Commensality refers to the social interactions associated to the act of eating together [46]. Sharing a meal with someone was shown to foster positive emotions, to increase everyday happiness, well-being [52, 75], to strengthen the sense of community and togetherness, making people more engaged with each other [23, 53]. However, despite these beneficial outcomes of commensality, social dining practices are constantly changing because of busy lifestyles, more people living alone, increasing divorce rates and disruptive events such as being required to socially distance due to Covid-19 [25, 36, 39, 45, 85]. Thus, many of the single-person households may be missing out on the benefits of commensality and experience instead negative health consequences in terms of food consumption [73], depressed mood and loss of social connectivity, this leading to a decreased feeling of well-being [18, 74]. One possible solution to this challenge could be to enable remote commensality by making use of digital technologies that bridge social distance [55]. Previous research in human-food interaction (HFI) has looked into different ways to leverage the power of technology for making eating-related activities more social and more enjoyable [27, 57]. One of the proposed approaches capitalizes on the strong social connotations of play and shows the potential of a ludic behavior for a more positive impact on diners (see [9, 11, 31, 48, 56, 79]). However, as emphasized in a systematic review on playful HFI [6], there is a need for more research at the intersection between food, technology and play. Inspired by existing works at the intersection of play and HFI (e.g., [33, 57]) and considering that play is a fundamental human need [14, 71, 72] that contributes to the well-being of individuals and groups [42], aids self expression, creativity, learning, and fosters social connectedness [44, 65], we argue that technologies for remote eating should also afford playful food behaviors, which are central to many, culturally diverse food traditions.

With this paper, we aim to inspire the design of remote dining experiences that respond to the "playful cravings" of users. To begin to shed light on this under-explored design space, we asked ourselves:

(1) What kinds of playful things do people already do while sharing a meal remotely over video-conferencing platforms?
(2) How could those existing, spontaneous manifestations of playful engagement be capitalized as design inspiration?

To answer these questions, we used a Situated Play Design approach to document and analyze the spontaneous behavior of people (both friends and strangers) sharing meals online while using video conferencing tools. Our analysis surfaced several play potentials [12]–i.e. ,contextually meaningful playful behaviors people spontaneously engaged in during remote dining. Our list of play potentials has *generative* rather than *validative* value [34]. That is, they are not meant to offer a solid, comprehensive understanding of all the possible desirable forms of playful engagement within remote dining scenarios, or their potential impact on people's experience of digital commensality; rather, they provide contextual, design-oriented inspiration for designers interested in developing technologies and experiences that enable ways of remote dining that are playful and socio-emotionally rich. As design-oriented intermediate-level knowledge [51], our play potentials are transitional and incomplete, and their value lies in their contextual richness and their possibility to inspire designers and help them empathize with real people's practices and desires. Our work thus aligns with a longstanding tradition of design- and arts-inspired approaches to HCI [30, 34]. Our approach has been successfully used in other areas of HCI, in and beyond the scope of food practices, e.g., in the aforementioned exploration of the playful potential of food culture and traditions [11], in playful drones research [62], in accessible technology design [24], or in urban technology innovation [1].

## 2 RELATED WORK

### 2.1 From commensality to digital commensality

Food and eating play a fundamental role in our lives, providing our body with the nutrients necessary for survival. However, eating is more than introducing food in our bodies - from a very young age, humans learn to associate food with soothing and understand that offering food can be a way to show empathy for an other's distress [37]. Sharing food can foster positive emotions and increase everyday happiness and well-being [52, 75]. Furthermore, commensal food practices can help to establish social relationships [19, 60], create a sense of bonding between co-diners [28], trigger an increased sense of community and togetherness, and make people more engaged with each other [23, 53]. Who are we eating with seems to play an important role, as people can feel an urge to leave a good impression when eating with people they are not familiar with [40, 64, 76]. The commensal experience itself consists of different dimensions including an interaction dimension (e.g., interactions over time at the dinner table), a symbolic dimension (related to the meaning of food and food settings), a normative dimension (relating to standards and etiquette) and a material dimension (e.g., cooking and eating utensils) [35, 46]. These dimensions and food-related rituals are by no means static but can differ between cultures and change over time [46, 77]. Such rituals and traditions can also contain playful elements that can facilitate the engagement with the food and social bond among diners [11]. However, societal and technological changes have transformed the way food is purchased, prepared and consumed [28, 29]. The use of digital technology as part of solo or shared meals, referred to as *digital commensality* and *computational commensality* [61, 69], has attracted increased research interest [26, 43, 50, 58, 81, 82]. In this area, there are various instantiations of digital technology-based systems that offer various kinds of digital commensality: 1) Mukbang – eating while watching a jockey broadcasting their meal over the internet; 2) artificial dining assistants and 3) tele-dining – allowing distant diners to share a meal [15, 38, 59, 68, 69] and/or try to enhance aspects of commensality (e.g., use elements of play to enhance the impression of social presence) [10, 17, 20, 83]. Our focus in this paper is on the area of tele-dining, where recent research conducted by Ceccaldi et al. [15] suggests that, when commensality takes place online, a similar sense of connectedness and belonging, which characterizes sharing meals in the same physical location, is present and brings people together. Our primary interest in this paper lies in enabling human-human memorable remote eating sessions that include playful elements [15, 69].

### 2.2 Playful eating

Both eating and playing have strong social connotations[1] [68]. The synergies between play and eating have been explored by many chefs around the world [5], as well as by food designers and researchers [84]. The social connotations around eating and play are not only present in fine dining but are also deeply integrated into people's everyday life. Countless examples of playful rituals with and around food, which can date back millennia, have become relevant parts of different cultures [77]. For example, *Kattabos* is an ancient Greek drinking game that involved trying to fling wine lees (i.e., yeast deposits at the bottom of a wine bottle) from a cup at a target that was placed in the middle of the room [67]. Playful food interaction can be an essential part of a society and include rituals involving distinct steps that take into account the normative and symbolic meaning of a food item [77]. For example, the *East Frisian Tea Culture* is part of the German Unesco "Nationwide Inventory of Intangible Cultural Heritage"[2]. The tea ceremony requires putting a sugar rock (so-called Kluntje) into a cup onto which the hot tea is poured causing a characteristic cracking sound. In a second step, cream is added at the edge of the cup using a special flat spoon.

[1] https://theconversation.com/gaming-fosters-social-connection-at-a-time-of-physical-distance-135809
[2] https://www.unesco.de/en/east-frisian-tea-culture

The cream is supposed to slowly rise to the top forming cloud-like structures (so-called Wulkje). The tea itself is not stirred but drunk so the different layers offer a diverse drinking experience. Such kinds of playful eating rituals, which are seamlessly embedded in culture, have been explored before in Human Computer Interaction (HCI) as sources of design inspiration for increasingly playful food technology [11]. The use of interactive technologies to enrich a playful social eating experience is not new. *You better eat to survive* [8] - a virtual reality game that uses eating as a way to facilitate social game play - is one example that aims to build trust by creating dependencies around cooperative eating activities. Similarly, *Arm-A-Dine* is an augmented eating system where players collaborate through feeding actions while wearing robotic arms [54]. Sound was linked to eating in a playful social gustosonic experience (*WeScream!*, *Singing Carrot* and *Sonic Straws*) where users generated musical melodies while eating or drinking [78–80]. The authors found that playful social gustosonic experiences support coordinated eating and drinking actions, contribute to self-expression, increase the awareness of relatedness and enrich the overall eating and drinking experience.

These and other systems presented in the literature (see [9, 31, 48, 56]) suggest that playful approaches, especially the ones based on Augmented Reality (AR) and projections, enrich eating experiences. While the potential of playful eating experiences is mostly explored from a functionality-focused perspective, works on supporting social bonding around remote food practices are less common, as illustrated by *HFI Lit Review App*[3] - a data visualization tool that enables researchers to identify trends in the human food interaction research landscape [4].

## 3 METHOD

### 3.1 Methodology and intended contribution

In this paper, we present an exploration of the playful potential of digital commensality, with the aim to inspire future design work in this space. Inspired by [12, 32, 65], we embrace an open-ended understanding of what playfulness is: *an attitude that can help to re-frame mundane, day-to-day activities into fun and exciting ones.* Through that lens, we shed light on a number of play forms that might help to enrich the experiential texture of remote eating experiences. To that end, we use a Situated Play Design approach [2], which proposes to identify playful things people already do in concrete scenarios and look into their underlying characteristics in order to turn them into inspirational design material—the so-called "play potentials". According to [2], play potentials are existing manifestations of playful engagement that emerge naturally in ordinary, day-to-day scenarios, and that seem to be contextually meaningful and socio-emotionally productive. As such, designers can source them and use them to inspire playful interventions that are contextually grounded. Play potentials can help designers build on play forms that are already meaningful, and enjoyable, in a specific context, and therefore increase the chances that their interventions will adapt well to the idiosyncrasies of the context and activities targeted by the design. They extend existing play theory constructs, e.g., "modes of play" [21] by focusing on play forms observed in people's in-the-wild, spontaneous activity within a targeted design context—they represent contextual playful practices that carry valuable and situated design knowledge. Previous works in HCI have used this approach to highlight inspirational play forms in diverse areas of application, including: HFI [2, 3, 16], drones [62], accessible technology [24], or smart cities [1].

### 3.2 Our data sources

Here, we present the results of a study where we chased play potentials in people's spontaneous practices while sharing a meal online through video conferencing tools. In particular, we looked at

[3]https://www2.ucsc.edu/hfi/index.html

existing datasets from two previous, unpublished, digital commensality studies that were conducted during Covid-19 lockdown by the research team (see Figure 1). We stress here that neither of the two studies was designed to explicitly explore playful behaviors during remote dining. Thus, play that emerged during digital commensality in the resulting datasets (i.e., *strangers dataset* and *friends dataset*) was not part of any explicit instructions for participants to engage in playful behavior. In other words, any playful behavior by participants emerged spontaneously within the context of both studies.

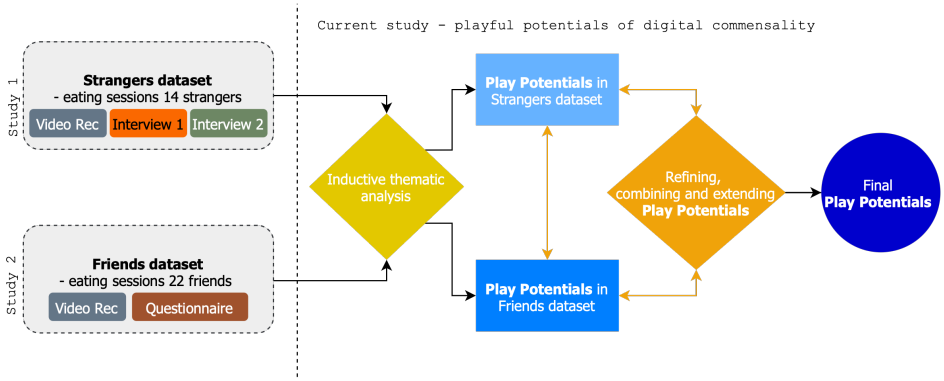



Fig. 1. For this study, we used datasets from two previous, unpublished, digital commensality studies focused on friends and strangers eating remotely - (*strangers dataset* and *friends dataset*). The *strangers dataset* consisted of: 1) analyses of the 28 video recordings of the sessions; 2) one post-eating sessions interview looking into how the act of digital commensality was perceived; 3) one post-video analysis interview focused on the playful elements observed during digital mealtimes. The *friends dataset* consisted of: 1) analyses of video recorded interactions; 2) responses to the digital commensality questionnaire [15]. We used inductive thematic analysis to find play potentials in both datasets and then we performed two rounds of refining our themes. Once we settled on a final set of codes, we analyzed all the data accordingly.

*3.2.1 Strangers dataset.* The first study looked at remote dinning for people in single households with the aim of developing an in-depth understanding of the social dynamics in these digital setups. For this study, we involved 14 solo living participants (11 females and 4 males, aged 22-32 years old, three Europeans, and 13 Middle Eastern), who did not know each other prior to the study. Participants were fully informed about the objective of the study and signed the written informed consent. The study protocol was approved by the Faculty of Sciences Research Ethics Advisory Group at the University of Kent (ref: 0891920).

Participants were randomly assigned to two one-to-one remote eating sessions on Facebook Messenger Rooms - a video chat platform with AR abilities, 360-degree backgrounds and no time limit on calls. We instructed them to eat during the sessions; no other instructions were given related to how they should interact. Remote dinners were recorded, and at the end of both sessions we carried out two semi-structured interviews - one interview investigated how digital commensality was perceived by participants, and the other looked into the playful elements participants naturally engaged in during the remote dinners. Some examples of questions asked during the first semi-structured interviews are: 1) Please tell us your general impression of your remote eating experience. How have you felt during the session? Was there something that stood out?; 2) How are you usually having lunch or dinner? Alone/with someone else? With/without technology? 3) How is today's experience different from your usual meals? How is today's experience different from the times

you share meals with others in the same space? 4) How would you compare the benefits of eating remotely with the benefits as eating with someone in person?; 5) How did the digital technology influence the social aspects of dinning? Give examples. etc. The semi-structured interview centered around play consisted of questions such as: 1) We observed you engaged in X type of behavior (here we described briefly the behavior the person was involved in). Did this type of play have any impact on your gastronomic experience?; 2) Could you think of other types of play you might find appealing in the context of these remote dinners? 3) Do you remember any past dining experience where you had fun? Why did you enjoy it? Do you think some of these elements can be brought in a remote dining experience to make it more enjoyable?, etc. All interviews in the *(strangers dataset)* were transcribed verbatim by two researchers and then corrected by hand against the original recordings. The video recordings of the remote eating sessions were analyzed for verbal and non-verbal behaviors and transcribed. A team of three researchers coded and classified the information into themes to answer the research questions. We occasionally use quotes from the transcribed interviews and images from the videos when needed to provide context and illustration of the findings.

*3.2.2 Friends dataset.* The second study aimed at investigating participants' behavior and opinions on remote commensality through video chat. For this, we asked 22 volunteers (11 pairs of friends) to join a Zoom call and to eat pasta in one remote eating session while they were being recorded. 12 were females and 10 males. Out of 22 participants, 16 were between 18 and 24 years old, 3 between 25 and 29 and 3 were over 55, all European. Upon deciding to take part in the study, participants signed a consent form, agreeing to their video recordings being used for research purposed and to their anonymized or aggregated data being shared. Participants were instructed to talk and act freely without moving the camera. After the eating session, we asked them to fill in the digital commensality questionnaire [15] and to answer a set of open questions related to their experience. The video recordings of the remote eating sessions were analyzed for verbal and non-verbal behaviors and transcribed. Initial codes were assigned based on our guiding research questions regarding 'remote commensality', 'technology', and 'connectedeness'.

### 3.3 Data analysis procedure

| Phase ID | Activity | Duration | N(r) |
|---|---|---|---|
| 1 | Collect raw data (annotated video recordings, transcribed interviews, questionnaires) from both datasets with potential to reveal playful activities participants naturally engaged in during their remote dinners. | 2 days | 2 r for each dataset |
| 2 | Analyze raw data from each of the two datasets by employing an interaction analysis approach [47] to identify spontaneous activities that were perceived as playful. Based on this, we identified initial recurring codes in each dataset. | 10 days | 2 r for each dataset |

| | | | |
|---|---|---|---|
| 3 | Identify common themes describing playful behavior in the two datasets. For this, we analyzed the codes identified for each dataset on a Miro[4] board. Using the Miro board, we conducted remote analysis over Zoom to find recurrent forms of playful behavior–i.e., play potentials that could inspire playful remote dining experiences. We began by exposing ourselves to the data, i.e., we looked at the data on the Miro board to familiarize ourselves with the kinds of remote eating activity it contained. Then, in groups of two-to-three researchers distributed in different Zoom breakout rooms, we used an inductive thematic analysis approach [13] to explore in-depth a sample of the data and begin to identify recurrent forms of emergent playful behavior. We divided the data among all groups so that all datasets were represented in the analysis; groups used the Miro board to document their findings. Then, groups reconvened in the main Zoom room to share their observations of playful activity. In that discussion, we began to identify common themes that could be used as early, tentative play potentials. | 2 hours | 7 r |
| 4 | Revise initial themes based on the clustering of commonalities between data from both datasets through the lens of early findings. | 7 days | 2 r for each dataset |
| 5 | Identify final themes. We began by allowing the larger research team to share their revised lists of themes. We visualized the themes on the Miro board and allowed all participants to become familiar with them. Following, we worked on combining and extending them into a unified, comprehensive list of play potentials. For this, according to our data sets, we clustered them into six higher-level categories of playful experiences people seemed to enjoy while sharing a meal remotely. Each of those play potentials was concretized by a number of different ways in which it manifested in our data, i.e., specific things people did in order to live those higher-level experiences. | 2 hours | 7 r |
| 6 | Analyze interaction. We performed a thorough analysis of both datasets to identify inspirational examples of people's activity that served as best illustrations of the play potentials in our list. We divided the six play potentials into two pairs of researchers (three categories each), and when a first round was completed, we exchanged them. Based on this, we collected a set of examples for each theme from both datasets. | 15 days | 4 r |

[4]For the unfamiliar reader, Miro is an online tool for collaborative visual mapping of concepts and ideas. It allows remote collaborative work on multimedia elements such as text, graphics, photos, or videos. Our Miro board can be accessed here: anonymized for review

| | | | |
|---|---|---|---|
| 7 | Finalize analysis. An additional pair of researchers who contributed to the in the first phases of the analysis consolidated the findings in a third-wave analysis round. | 5 days | 2 r |

Table 1. Data analysis procedure. Here we describe in detail the stages of our analysis and their outcomes, their duration and the number of researchers N(r) that were involved in each phase.

Using the two datasets as a point of departure, we set out to explore the types of playful practices both friends and strangers engaged in when eating remotely. Our analysis was divided in activities described in Table 1.

In the next section, we present the outcomes of our analysis: six types of playful experiences participants seem to enjoy while sharing a meal remotely, a set of concrete interactions they can do to access those experiences (i.e., play potentials), and a collection of instances of real activity from our data sets that exemplify those play potentials. We note here that thematic analysis used to analyze the datasets does not involve quantifying codes and themes as it is commonly done in qualitative analysis approaches such as content analysis. We report on codes and themes that we observed across the two data sets.

## 4 THE PLAYFUL POTENTIAL OF DIGITAL COMMENSALITY

Observing the participants' spontaneous activity while sharing meals online revealed interesting ways in which people enjoy leveraging the affordances of the remote dining scenario to act playfully. To illustrate these play potentials of digital commensality and inspire designers to use them as design material, we ground them in concrete examples of our participants' interactions with each other through and around food. Each of the subsections below presents one of the six play potentials we identified in our study (see Table 2). For each, we illustrate different manifestations it took in our dataset.

### 4.1 "The food we eat, the stories we tell": sharing and enacting stories as a playful catalyzer

Our study revealed five ways in which storytelling might playfully enrich a digital commensality experience: (1) describing one's food and food preparation; (2) discussing personal non-food preferences; (3) gossiping; (4) using digital affordances to trigger or enhance storytelling; and (5) using non-digital means (e.g., gestures) to achieve a performative story augmentation.

The first type of playful interactions we observed revolves around participants using the meal as an opportunity to share stories. The digital environment in which the meals took place operated as a bridge, connecting co-diners and stimulating moments of social dialogue. We observed different ways in which participants engaged in storytelling, which we think have inherent playful potential. First, all participants (both friends and strangers dyads - for the remaining of the study we will use ***S*** *to refer to participants in the strangers dataset and* ***F*** *for participants in the friends dataset*) talked about the food they had prepared as an ice-breaker activity, commenting on its taste and anticipating the enjoyment of eating it – see one of these interactions in Figure 2. We note here that this type of remark was always followed by laughter, which signals participants manifesting a sense of playful intimacy.

Describing their respective meals and their preparation led to various playful situations (e.g., diners enjoyed laughing at each other's unsuccessful food preparation attempts). This is exemplified by a conversation between F17 and F18 where participants start laughing when F17 comments about their food "[it's] good, I am eating like... glue!". Other topics brought up around the (virtual)



Fig. 2. Participants S1 and S2 showing and talking about their food as an 'ice-breaker' activity. This prompts discussions about their hobbies (i.e., watching animes)

table were non food-related: participants discussed events, culture, suggested touristic places in their countries, and opened up about their struggles. Gossip was also part of these conversations with co-diners sharing stories about friends, colleagues, teachers or politics. Figure 3 illustrates an episode where F1 reveals details about an upcoming date to F2; the atmosphere is relaxed and participants seem to be enjoying themselves.

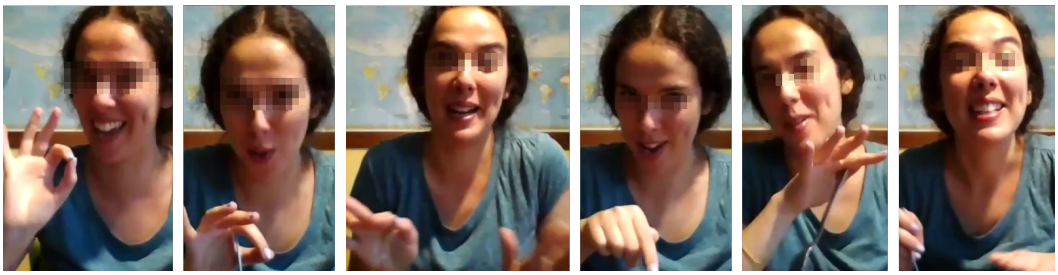


Fig. 3. F2 telling F1 about her upcoming date using gestures to augment certain parts of her story.

In some instances, technology acted as a trigger for story-sharing. Participants leveraged the affordances of the digital interface to choose conversation subjects or augment their stories. For instance, while eating together S7 and S10 used different AR filters as a starting point for stories that became the social glue for their interaction – an AR filter with daisies reminded S10 about her favorite movie – *You've got mail* and this prompted a heated discussion with S7, who also liked the movie. The discussion continued with participants experimenting with other AR filters and sharing stories triggered by them (see Figure 4). When the available technology did not allow for certain desired playful effects, participants used gestures or objects in their proximity to support their discussion. Overall, participants found benefits resulting from their communication around the virtual table – "well, this type of communication, after all... is agreeable, it seems that we are like eating in the same place" (F21); "Instead of facing the TV (while eating), I face a person." (F14).

When asked about their opinion regarding the potential of digital technology to support playful remote dining experiences, many participants emphasized the importance of conversations and sharing stories: "It would be nice to have something that organizes our discussion and makes it more relevant to the food itself and common interests" (S1); "I think that a cool idea would be [..]



Fig. 4. Different AR filters prompted S7 and S10 to exchange various stories about their hobbies, holidays, favorite movies. Technology served as creative trigger for playful stories, which catalysed their interaction.

having some AI that could suggest a topic based on our interests and the topics that we've talked about." (S12).

### 4.2 "Doing things together": shared action as a platform for remote food-centric play

In our study, we observed that participants engaged in different playful activities that functioned not only as accessories to their meals, but also as an enhancer of their social connection with their co-dinner. Accordingly, they: (1) played games centered around their meal; (2) simulated physical touch and interaction; and (3) took selfies as reminders of the experience.

Digital commensality experiences are by no means all talk and no action. We observed that participants often engaged in different types of activities parallel to the eating act. Those were particularly playful when co-performed by both participants in a session. Some of these activities included participants engaging in guessing games (e.g., "guess my age"), singing Karaoke or playing with digital food *planning* activities - for example, F1 and F2 used their shared meal time to choose a mutual friend's birthday gift. Interestingly, we also observed both friends and strangers who took part in our study engaging in *physical* activities, where they tried to simulate an embodied experience by virtual interaction with their co-diner. For instance, when S3 offered S6 an anniversary digital cake, S6 blew the virtual candles on top of it (see Figure 8c). Similarly, S1 used an AR filter that enabled her to simulate she is grilling burgers; she then pretended to taste them and to offer them to S2. When inquired about this behavior in the interview, S1 mentioned "Feeding someone else (virtually) creates this feeling that you are really with that person." Straightening this idea, F21 and F22 noted "it is a pity that we do not have wine, otherwise we could make a toast!"

Technology played once again an important part in the remote dinners, supporting playful aspects of activities participants engaged in. Among the *digital* activities we observed in our study, the most popular ones include taking selfies together (i.e., to keep as memory of the eating sessions) or playing AR games. Three pairs of strangers spent 5-10 minutes experimenting with AR games. This enabled them to experience feelings of fun: "this is funny, I look stupid *laughs*" (S5); "Let's play the tennis game again, it's fun!" (S14) – see Figure 5, where we illustrate some of these digital moments. These activities appeared to facilitate group creativity and collaboration, enhancing participants' abilities to socialize: "Having this meal while communicating with people, made me feel some enjoyment because of the interaction tools. They helped us a lot to build [...] very good communication, it was funny and I had a good moment at that time" (S14).

During the post-dinner interviews, participants in our study were enthused about the opportunities brought by digital commensality. They mentioned an interest in taking part in challenges and competitions centered around food (e.g., eating spicy/sour food, speaking while stuffing their



Fig. 5. Participants in our study enjoyed being engaged in various AR games (i.e., playing tennis, singing to a virtual cat).

mouth with food, eating faster or having a timer for describing their dish). Several participants specified they would like to have tools that allowed food rating: "I work as a food blogger so I would like tools to rate the food by adding emojis, leave our reviews about restaurants." (S5), while others saw potential in co-creating something with their co-diner by engaging in drawing-based activities: "We can do an activity together - like painting together the same drawing" (S11); "I would draw a word or something on his plate" (S7).

### 4.3 "Eating and the senses": appropriating the digital medium multisensorially

Friends and strangers in our study created a shared sensory atmosphere enveloping the digital space, dominated predominantly by (1) customized combinations of visual, olfactory, gustatory, auditory, and touch cues. For example, participants (2) showed their meals to each other; (3) discussed ingredients of their meals; (4) indicated the texture of the food by touching and squashing it; (5) shared music; and (6) used interjections to describe the taste.

Throughout our study we observed that participants attempted to overcome the limitation of not being co-located by crafting their own multisensory experiences, where they could share visual, audio, olfactory and gustatory cues. Smell and taste were partially conveyed through visual cues as eating sessions usually started with co-diners pointing their cameras towards the food (see Figure 6 for illustration), with *both strangers and friends* displaying beautiful dishes, created with attention to plating.

Unsurprisingly, *smell, taste, and texture* turned out to be important components in the interactions initiated by participants who often detailed the ingredients of their meals: "I made an Austrian meal. [...] It is with potatoes, mushrooms, and cheese." (S5); "My dessert is with honey and cheese. It's delicious!" (S6); "I am eating gingerbread biscuits" (S10); S7 showed her food (i.e., rice and fish) and exclaimed "My room smells like fish!"". Directly or indirectly, *touch* was also involved in augmenting the digital eating experience, as participants used cutlery, ate with their hands, made funny gestures, played with food or tried to pass digital food to their co-diners. This did not only seem to influence the enjoyment of the food, but also enhanced the interaction between participants. Co-diners in our study used sounds from their interaction with food (e.g., crunching, smacking, exclaiming "yummy!") and music to influence their digital commensality experience. By employing different combinations of senses, participants maintained a multisensory social connection despite physical distance. Interestingly, all participants were unanimous in their desire to merge their digital multisensory spaces, imagining various scenarios that could enable this. Sharing the same




Fig. 6. Participants attempt to create a shared multisensory space. They try to convey information about the food texture by squashing it in front of the camera, inform about the smell of their space by showing a fragrance candle or show their food to the camera.

food – by cooking the same recipes, or benefiting from *sensory kits* (i.e., boxes with food, candles, table accessories that can be delivered to co-diners), which can be thematic or mysterious, thus inviting participants to be playful during the discovery act – was a popular idea throughout the study. Other scenarios involved more sophisticated uses of technologies for augmenting the eating experience – for example sharing digitally the taste and smell of the meal (F5, F15, F16), sharing a playlist that can prompt people eating together to guess a song or to perform Karaoke, sharing and interacting in a virtual environment, using robotic arms and sensors/actuators to turn remote eating into a more tactile experience (F15) or using a 3D food scanner. Designing visually appealing interactions around commensality was highlighted in post-eating sessions by both strangers – who expressed interests in using AR filters for enhancing the appearance of food – and friends "To ensure a greater illusion of being together, it might be interesting to have the opportunity to visualize (for example from above) what my friend is eating" (F18).

### 4.4 "Disrupting (old) social norms": digital interactions that afford playful estrangement

Conventional norms around mealtime were challenged during the remote eating sessions, with participants: (1) making loud gustatory sounds; (2) eating in an exaggerated manner; (3) crafting unconventional eating spaces; (4) wearing informal clothes (e.g., pajamas).

Unlike shared meals with a more rigid structure (e.g., banquets, dinner parties), our study provided the context of a fluid social form that was maintained, shifted or changed by participants through their interactions and appearance. Our observations indicate that digital commensality provided participants with an opportunity to challenge the cultural norms around eating and to engage in a ludic – rather than etiquette – embodiment of table manners. Participants used a variety of "norm-breaking" strategies to "break the ice", make their co-diners laugh, and re-start the conversation after moments of silence (e.g., slurping noodles, eating the sauce that remains on the plate after finishing the meal). This happened *in both data sets*, independent of the level of familiarity between the participants and shows that the digital space contributes to a shift in social norms.

We remarked that participants in both stranger and friend dyads took a playful and casual approach for their self representation that does not necessarily fit with norms around traditional commensality: "I feel more relaxed if I am virtually meeting with someone because if you are going to go out with someone, it is all the hassle that you have to dress up something nice, you have to look nice because you will not be alone with this guy. So this starts to build up and you will start to feel stressed and not feeling relaxed." (S12) This state of comfort became the staging for greater intimacy among co-diners. This intimacy was further supported by the fact that during the sessions



Fig. 7. Participants disrupting commensal social norms by slurping, playing, eating with their hands, sharing their workspace

participants selected non-normative locations to have their dinner(e.g, bedroom, home office, the interior of a car), into public commensal settings, thus enabling a greater degree of flexibility about the formal norms of hospitality. Co-diners became guests and hosts at the same time, and the requirements about bodily control, manners and regulated appetites faded. For example, the dinner between S7 and S8 (illustrated in Figure 7) depicts a scenario where the two participants choose an informal setting, did not pay particular attention to the table arrangement, slurped their noodles loudly, ate with their hands and used funny AR filters.

### 4.5 "Customize everything": customizing the digital medium and the self for an enhanced eating experience

Throughout the study, participants engaged or expressed an interest in experimenting with the customization of various aspects of their eating experience such as their environments, appearance or celebrations. Our study shows the importance of an "artful" uniqueness embedded in social interactions around food, where participants applied and envisaged various customization strategies in various celebratory scenarios, such as customizing (1) their self-representation; (2) the physical settings where commensality happens and the framing of the shots; (3) the digital medium for celebratory events that create moments of uniqueness and connectedness.

To set the scene for the digital dinners, participants were observed *customizing their physical locations and the framing of the shots*. By moving the camera to reveal different elements of their households (e.g., shelves, posters, pets) and by bringing objects into view of the camera (e.g., candle, chopsticks, vaccination certificates, etc.) to support their interaction, strangers and friends were "inviting" their co-diner to their physical space, using technology to bridge their respective eating environments. We observed that when commensality happened in a personal space, it led to a form of *implicit* self-disclosure, where our participants revealed aspects of their lifestyle and personality, visually, through the streaming of their personal living space to their eating partner. Such self-disclosure, albeit not explicitly expressed, helped provide conversation intimacy and engaged participants in playful behavior. When participants chose to reveal different elements from their households, their co-diners reacted with enthusiasm and in some cases, enacted interactions with these extended commensality spaces. One scenario to illustrate this is presented in Figure 8a, where S2 introduces her parrot to their co-diner, who starts talking to the bird as if they were in the same space.

The use of AR made it easy for participants in the strangers dyads to *customize their appearance*. Participants showed varied preferences for the real-time camera filters, which allowed them to visually "reinvent" themselves by playing virtual dress-up. Overall, the playful creative effects enabled by AR technology were perceived as beneficial for overcoming social awkwardness and enhancing the overall experience "They add a lot, they cover the face and enhance the appearance."



(a) Customized physical locations – S7 waving to a parrot located in S2's environment



(b) Customized self-representations produced enjoyment and improved positive affect for S3 and S10



(c) Customized rituals

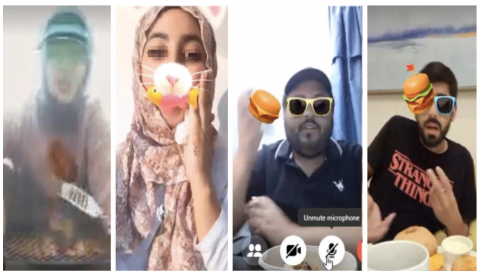
Fig. 8. Co-creating a joyful eating experience through customization

(S2 and S9); "They helped me feel more relaxed and less serious. It just felt they broke the ice more." (S1); "They enable me to be anyone I want." (S7). An example scenario presented in Figure 8b illustrates S3 and S10 using AR filters that matched their outfits. In the post-session interview, S3 mentioned this interaction had a positive effect on her experience, serving as an important social function "[My co-diner] commented on how the filter matched my clothes and it was nice."

Finally, we observed how effortlessly six of our participants used AR as a celebratory technology and staged impromptu graduation celebrations, birthday parties with virtual cakes, happy birthday songs, and "blowing out" digital candles – see Figure 8c. This led to an increase of conversation intimacy and to a fast connection between the participants, mediated by the relaxed and informal atmosphere.

Participants showed interest in playing a more active and creative role in choosing how to present themselves to others. Some mentioned they would like to customize different aspects of existing AR filters by designing aesthetics that speak to them and reflect their culture. Interestingly, two strangers were also open to allow others to alter their appearance as exemplified by a quote of S12: "you can give control to the other participants to apply filters to you. And you will be surprised with what they choose for you. Right? So it's good to start interesting, humorous kind of conversations". Participants' comments highlight that digital commensality afforded through AR filters is likely to have a high hedonic connotation, commanding a playful, enjoyable experience. All strangers and most friends expressed an interest in further enhancing the sense of co-presence and co-awareness during remote commensality by using technology to simulate co-location: "Maybe we can choose to be in the same place, sharing. Maybe being in a boat, maybe sitting in a place and viewing a nice scenery, maybe at the beach, maybe inside the car." (S11). Other suggested to tie such environments to the food being eaten: "I would like having different digital rooms [...] divided by the type of dish or the cuisine we are going to eat" (S2); "For example, I have decided to eat Italian food. So I will choose someone for example, from Italy to eat with, at the same time, I would like to have background of Venice, and wearing Italian hats and maybe even having Italian music in the background." (S1). To meaningfully join and celebrate a variety of events, the richness of customization options was a popular request: "In the future we will celebrate virtually especially when we can't get everyone in the birthday. It would be very nice to use customized filters for all kind of parties, like baby showers or weddings."(S5); "If you have a birthday, you can have a special dinner with the person and with some of the pictures, memories, maybe some videos, because

it's much easier to dine virtually. I think the virtual experience is very similar to the actual eating experience." (S13). Moreover, participants showed interests in attending other types of celebratory events (e.g., releasing a movie, watching live sport events) in the remote digital setup and spoke with enthusiasm about the possibility of recreating movie sets and choose how their food should be visualized by their co-diner: "even the food could be inspired from the movie - get me food that looks like the butterbeer from Harry Potter".




(a) S1, S2, S13, S14 perform with AR food



(b) S2, S9 and S4 stepping into various characters

Fig. 9. Performative interactions during digital commensality

### 4.6 "Performative eating": where commensality is made playful through enactment

In our study, digital commensality supported uni- and bidirectional on-camera performances in various ways: (1) impersonating characters; (2) interacting with digital props; (3) imagining events; and (4) engaging in creative activities.

The practice of eating together while apart inspired *both strangers and friends* to co-construct involvement through performing. In our datasets, this performance happened mostly bidirectionally – often participants leveraged the digital space to perform for each other and used technology to step into various characters or to illustrate situations while eating. For example, S9 and S2 played the roles of an Italian chef, a cat and Elvis Presley as illustrated in Figure 9b. Although the platform used by friends in our study did not have AR features, performing was present as one of the commensal activities. For instance when F9 and F10 started playing an imaginary game where they pretended to be in the fanciest restaurant in the world where they meet their favorite chef. They jokingly argued on which area of the world has the best food and therefore, where the best restaurant would be.

Participants further engaged in playful performances, using digital content as physical props. In the context of the eating sessions, co-diners interacted with digital models of food (e.g., grilling and eating digital burgers - see Figure 9a left), performing for digital pets resting on their heads, eating and throwing digital food from one to another - Figure 9a right. Changing the background during the conversation, helped one of the participants convey more vividly information about her future plans - when S7 asked S10 about her post-pandemic plans, she chose a beach background and started pretending she was enjoying the sun. Interestingly, digital commensality created a space where co-diners can perform, where food becomes secondary, serving more as a prop, together with the digital content provided by AR.

The option of being able to engage in improvised performance while eating was often mentioned as a plus by strangers in our study. Participants repeatedly expressed interest in having the possibility to alter their voice to impersonate a character (e.g., the Queen of the United Kingdom) or to have access to a variety of digital props and backgrounds.

Table 2. Summary of the play potentials observed during our study of people's digital commensality practices, including: the list of six play potentials (left); a short description of their main qualities (center); and a set of ways in which each of the play potentials manifested in our dataset (right).

| Play potentials | Description | Manifestations |
|---|---|---|
| The stories we tell | Narrative interactions in digital commensality dinnertime conversations | (1) describing one's food preparation; (2) discussing non-food personal preferences; (3) gossiping; (4) using digital affordances to enhance storytelling; (5) using non-digital means (e.g., gestures) to achieve a performative story augmentation |
| Doing things together | Activities performed collectively, parallel to the eating act | (1) playing games prompted or not by technology; (2) simulating physical touch; (3) taking selfies as a reminder of the experience |
| Eating and the senses | Digital commensality - taste, smell and touch added | (1) customized combinations of visual, olfactory, gustatory, auditory, and touch cues; (2) showing meals; (3) describing ingredients; (4) indicating the texture of the food with non-digital means; (5) sharing music; (6) using verbal interjections to describe taste |
| Disrupting (old) social norms | Digital commensality as ludic social form | (1) making loud gustatory sounds; (2) devouring in an exaggerated manner; (3) employing unconventional eating spaces; (4) displaying informal clothes (e.g., pajamas); (5) playing while eating |
| Customize everything | Customization of the digital persona and eating setting to enhance the festive dimension of a meal | (1) customizing self-representation; (2) customizing physical locations and framing of the shots; (3) customizing celebratory meals and rituals |
| Performative eating | Where commensality is made playful through enactment | (1) impersonating characters; (2) interacting with digital props; (3) imagining events; (4) engaging in creative activities |

## 5 DISCUSSION

### 5.1 A situated play design approach to digital commensality

Existing research in food-technology design suggests that, in ordinary life practices (such as eating together with others), technology should build on existing experiences that are contextually grounded, rather than introduce new, superfluous experiences [56]. Existing works in playful HFI have begun to investigate those kinds of contextual, bottom-up forms of food-play, for example, Altarriba Bertran et al.'s extraction of play potentials from food culture and traditions [11]. Here we contribute to this growing body of works with an exploration targeting the specific scenario of remote eating, with the aim of opening up exciting opportunities for designing playful interventions in this space.

The spontaneous, playful practices we observed in our study (summarized in Table 2) illustrate ways in which people are able to find joy in remote eating and suggest playfulness could be what people long for when sharing a meal online. Consequently, we argue that our list of play potentials can inspire the design of digital commensality services and experiences that cater to people's need for social interaction and fun. Importantly, the six play potentials we are featuring here are contextually sensitive and inherently bottom-up – rather than being motivated by theory or by our expertise in playful interaction design, they emerged from the unconstrained actions of a diverse pool of research participants. We see that as an important and necessary move in playful HFI, a

move that will better reflect the messy, contextual nature of food practices [22]. Next, we address our research questions by reflecting on our findings.

### 5.2 Playful digital commensality

Despite the generative, bottom-up, and contextual nature of our work, we have observed certain connections between our play potentials and phenomena that have previously been studied from a more validating angle [15]. For example, although physically impossible due to the digital technology mediation, participants still enacted food sharing practices in a playful way (e.g., by "virtually" feeding each other). Such practices are indeed found to be a hallmark of commensality starting from a young age [37], and the sharing of food is associated with positive mood and well-being [52, 75]. Research also shows that eating together can make people more engaged with each other [23, 53], for example, by talking about the food that is being consumed or by reminiscing. These behaviors were readily apparent in our datasets and play potentials in this space revolved around, for example, joking about failed cooking attempts, or playful banter between friends.

Including such elements in digital commensality setups could benefit eating scenarios where people can be inclined to leave a good impression, for example, when eating with strangers [40, 64, 76]. Our play potentials highlight that in this process, play helps to establish a common ground with strangers. Taken more broadly, commensality is typically described as a multi-dimensional concept that consists of interactional, symbolic, normative, and material dimensions [35, 46]. These dimensions were also observed in our datasets and play potentials were identified for each – for example, in using the remote commensality setting to break the norms around food or sharing food as well as non-food related stories. In addition to this, we observed play elements that usually characterize the experience of Mukbang, such as showing the food, highlighting the multisensory food experience, disrupting the food-related norms, and inserting elements of storytelling [41]. Research on this form of quasi-commensal experience has demonstrated how this kind of interaction, although unidirectional, is capable of creating a sense of belonging. Eating in a performative way, as mukbangers do, creates the illusion of commensality, especially for people who live alone and long for a feeling of togetherness [7, 41].

### 5.3 How might our play potentials inspire increasingly playful digital commensality designs?

We suggest that the play potentials we observed in the context of digital commensality can be used as seeds to ideate technologies for remote eating (we provide a set of inspirational examples for this in Figure 10). With this, we point designers towards types of interactions that are likely to enable diners to find joy in the act of sharing a meal online.

According to our observations, a joyful and playful digital commensality experience can leverage technology for storytelling and communication – for instance recommending topics for conversations based on what people tell each other, or on their facial expressions. Storytelling with the actual food could tie in to participants' desire for cultural sharing as well as their propensity for play. In these scenarios recognition of actual food or what is said during conversations does not need to be accurate since misinterpretations by the system could enhance playfulness (e.g., a system mis-recognizing someone's simple food for a fancy dinner). Alternatively, simple story prompts such as those found in "conversation cards" could also help here. Playful elements (e.g., card games like *Dixit* or *Cards Against Humanity*) could help further enliven the food related storytelling.

Remote commensality technology design could also take into account how doing things together enhances the eating experience by creating a sense of belonging and togetherness. Sharing activities might enable diners to perceive the physical distance reduced. This could be as simple as providing games to be played during the interaction or as complicated as allowing diners to prepare the food

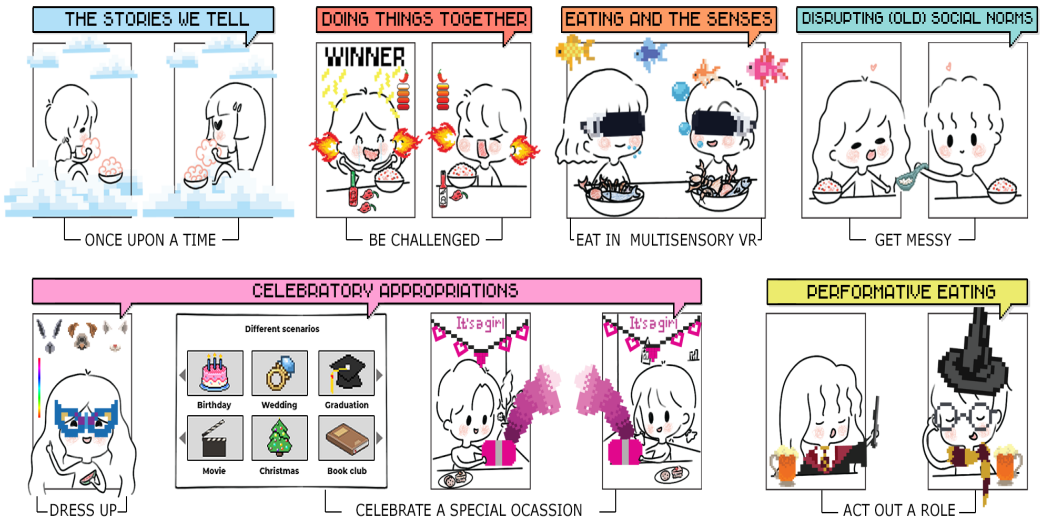



Fig. 10. Visual summary of the six play potentials of digital commensality we identified in our study. For each play potential, we provide an inspirational example of how it may give rise to interesting, novel forms of digital commensality experiences.

together through 3D printed ingredients. The "goal" of playing a game, for example, could already help people break the stigma of eating alone or give them a context and motivation to eat together with a stranger online. Research shows that people typically want to make a good impression when eating with strangers [40], but our observations show that playful behaviors still emerge and being playful can be a way to break the ice.

In addition to this, in our datasets, participants often pointed at the impossibility to share touch and smell as the major downsides of their digital commensality experiences. Future designs may need to take these shortcomings into consideration, to provide novel multisensory digital commensality experiences, for example by allowing co-diners to share smell or taste. HCI research projects have started to explore how to design for smell and taste by creating devices that can evoke specific sensory experiences [70] and allow one to share a flavor experience digitally [63]. Moreover, given that the sense of touch functions as a communication channel in the context of remote commensality, digital tactile devices - such as ultrasound haptic displays [66] or pneumo-actuated displays [86] - could further enable co-diners to express their emotions and, as a result, create a physical link and a sense of togetherness [49].

Interestingly, in our study, we observed how commensality can foster forms of interaction that do not seem to follow the same culture-specific etiquette of physical commensality. We believe that future technologies might tap into this to create cross-cultural interactive experiences, leveraging the possibility of technology to bring people from all over the world together. Another key aspect that, in our understanding, can enable rich playful commensal experiences is customization. People, in our study, seemed to value creating their own commensal experience and to appreciate the customization possibilities afforded by the technology. Our participants often reported how simply creating the illusion of being in the same room, for instance through AR, might help them feel as actually together and, hence, improve their commensal experience. Lastly, the digital commensality interactions hereby described point towards a link between playful commensality and the possibility to perform, to the point of food being a mere prop in the performance. A technology that affords

engaging in a fun performance is, we believe, a technology that fully exploits the playful potential of a commensal experience.

In a world where solo dining is increasingly common, future technologies could not only provide digital commensality experiences that ease the feeling of loneliness, but could also pave the way towards new forms of engaging, fun and playful interactions around the (virtual) dining table. However, foreseeing the future of the technology-commensality relationship is far from easy. First and foremost, should remote eating technologies be designed *adhoc*, with the aim of supporting commensality, or should they be an improvement of technologies that already exist, to become more "commensality-friendly"? Video-chat applications, such as Skype, Zoom or Meet, (i.e., the ones we exploited in our study) were not designed to be used specifically for remote dining and will probably still be used for their main purpose of making video-calls. Moreover, with future technologies designers will have to face the challenge of understanding whether digital commensality should point towards replicating offline commensality, for example, providing multisensory experiences, creating the illusion of co-presence, or whether they should have higher goals and be aimed at providing totally new experiences and new ways of (virtually) being together. Can technology design ultimately provide artificial commensal companions? Can it create new food experiences that do not yet exist? Only time will tell what future remote eating technologies will look like. Nonetheless, we hope the inherent play potentials of digital commensality we observed in our dataset and illustrated in this paper can inspire designers to start exploring them.

### 5.4 Limitations of our contribution

A few limitations of the present study deserve mentioning. First, the datasets that were used for the present study do not fully reflect naturally occurring remote dining situations. Although participants were not explicitly instructed to engage in playful behaviors and thus these behaviors emerged spontaneously, it cannot be said that the play behaviors that were exhibited would also occur outside of the scope of the datasets' studies. The context of a scientific study is a specific one that may differ from, for example, a context in which two friends decided themselves to eat together online. Therefore, some care has to be taken with the interpretation of our observations outside of the settings to which the observations relate.

Related to the previous limitation, we also want to make a point concerning generalizability. We reiterate that our play potentials have generative value and represent design-oriented intermediate-level knowledge. As such, they should not be taken as generalizable 'categories' that describe playful behavior in (digital) commensality, outside of the situated practices that were part of the setting of the datasets that fueled the present research. In line with this, we also highlight that the settings present in the datasets put further limitations on generalizability of the findings. For one, our participants only present a narrow slice of the cultural variety that exists both in play behaviors and in commensality (see, for example [3]). Different play potentials might surface in interactions between people from cultures and age groups not covered by our datasets. Note, however, that these limitations do not necessarily take away from the play potentials' value as inspirational material for designers.

It also needs to be said that the novelty of the situation and the technologies present in the situation could very well have played a part in the unfolding of playful interactions observed in our datasets. While all participants were familiar with video conferencing tools, some of the AR features present in the *strangers* dataset were new to them, and eating together online was also a novelty for most participants. We can thus not make any claims about how the play potentials highlighted in this paper would develop over an extended period of time. Designers working with our play potentials would thus do well to keep in mind that they might need to cater to changing needs and preferences for play in digital commensality settings.

## 6 CONCLUSIONS

In this paper, we presented a design-oriented exploration of the playful potential of digital commensality. Specifically, we explored the playful opportunities and behaviors that emerge as people use technology to facilitate social eating experiences. We used the Situated Play Design approach [12] to engage a series of research participants in the activity of remote dining and bring to the surface a series of playful and social experiences they spontaneously seemed to enjoy. Following work on commensality and digital commensality, our aim was to provide inspiration for designers interested in developing digital commensality systems based on situated, and richly contextualized, interaction. To this end, we analyzed two datasets covering various aspects of the interactions between 36 people sharing a meal online. Our analyses of the data resulted in the identification of six play potentials, which are defined here as playful things people already do and enjoy, spontaneously, while sharing meals online. We observed how people 1) share and enact stories as playful catalysts for the interaction, 2) engage in shared actions that serve as a platform for further food-play behaviors, 3) appropriate the digital medium with a focus on the multi-sensory aspects it affords, 4) use technology to disrupt social norms and engage in playful estrangements, 5) use the technology for customization to enhance the festive elements of a shared meal, and 6) engage in performative eating where commensality is made playful through enactment. We present the six play potentials and their specific manifestations in our datasets as inspirational material for designers. Our hope is that the situatedness of the play potentials and manifestations will help designers conceive of playful digital commensality interventions that respond to people's innate desires for play and social interactions with, through, and around food.

## REFERENCES


[1] Ferran Altarriba Bertran, Jared Duval, Laura Bisbe Armengol, Ivy Chen, Victor Dong, Binaisha Dastoor, Adrià Altarriba Bertran, and Katherine Isbister. 2021. A Catalog of Speculative Playful Urban Technology Ideas: Exploring the Playful Potential of Smart Cities. In *Academic Mindtrek 2021* (Tampere/Virtual) *(Mindtrek '21)*. Association for Computing Machinery, New York, NY, USA, 12 pages. https://doi.org/10.1145/3464327.3464374

[2] Ferran Altarriba Bertran, Jared Duval, Katherine Isbister, Danielle Wilde, Elena Márquez Segura, Oscar Garcia Pañella, and Laia Badal León. 2019. Chasing Play Potentials in Food Culture to Inspire Technology Design. In *Extended Abstracts of the Annual Symposium on Computer-Human Interaction in Play Companion Extended Abstracts* (Barcelona, Spain) *(CHI PLAY '19 Extended Abstracts)*. Association for Computing Machinery, New York, NY, USA, 829–834. https://doi.org/10.1145/3341215.3349586

[3] Ferran Altarriba Bertran, Jared Duval, Elena Márquez Segura, Laia Turmo Vidal, Yoram Chisik, Marina Juanet Casulleras, Oscar Garcia Pañella, Katherine Isbister, and Danielle Wilde. 2020. *Chasing Play Potentials in Food Culture: Learning from Traditions to Inspire Future Human-Food Interaction Design.* Association for Computing Machinery, New York, NY, USA, 979–991. https://doi.org/10.1145/3357236.3395575

[4] Ferran Altarriba Bertran, Samvid Jhaveri, Rosa Lutz, Katherine Isbister, and Danielle Wilde. 2019. Making sense of human-food interaction. In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems*. 1–13.

[5] Ferran Altarriba Bertran and Danielle Wilde. 2018. Playing with food: reconfiguring the gastronomic experience through play. In *Experiencing Food, Designing Dialogues*. CRC Press, 3–6.

[6] Ferran Altarriba Bertran, Danielle Wilde, Ernő Berezvay, and Katherine Isbister. 2019. Playful human-food interaction research: State of the art and future directions. In *Proceedings of the Annual Symposium on Computer-Human Interaction in Play*. 225–237.

[7] Laurensia Anjani, Terrance Mok, Anthony Tang, Lora Oehlberg, and Wooi Boon Goh. 2020. Why do people watch others eat food? An Empirical Study on the Motivations and Practices of Mukbang Viewers. In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems*. 1–13.

[8] Peter Arnold, Rohit Ashok Khot, and Florian'Floyd' Mueller. 2018. " You Better Eat to Survive" Exploring Cooperative Eating in Virtual Reality Games. In *Proceedings of the Twelfth International Conference on Tangible, Embedded, and Embodied Interaction*. 398–408.

[9] Eshita Sri Arza, Harshitha Kurra, Rohit Ashok Khot, and Florian'Floyd' Mueller. 2018. Feed the Food Monsters! Helping Co-diners Chew their Food Better with Augmented Reality. In *Proceedings of the 2018 Annual Symposium on Computer-Human Interaction in Play Companion Extended Abstracts*. 391–397.

[10] Pollie Barden, Rob Comber, David Green, Daniel Jackson, Cassim Ladha, Tom Bartindale, Nick Bryan-Kinns, Tony Stockman, and Patrick Olivier. 2012. Telematic dinner party: designing for togetherness through play and performance. In *Proceedings of the Designing Interactive Systems Conference*. 38–47.

[11] Ferran Altarriba Bertran, Jared Duval, Elena Márquez Segura, Laia Turmo Vidal, Yoram Chisik, Marina Juanet Casulleras, Oscar Garcia Pañella, Katherine Isbister, and Danielle Wilde. 2020. Chasing play potentials in food culture: Learning from traditions to inspire future human-food interaction design. In *2020 ACM Conference on Designing Interactive Systems, DIS 2020*. Association for Computing Machinery, 979–991.

[12] Ferran Altarriba Bertran, Elena Márquez Segura, Jared Duval, and Katherine Isbister. 2019. Chasing Play Potentials: Towards an Increasingly Situated and Emergent Approach to Everyday Play Design.. In *Conference on Designing Interactive Systems*. 1265–1277.

[13] Virginia Braun and Victoria Clarke. 2012. Thematic analysis. (2012).

[14] Roger Caillois. 2001. *Man, play, and games*. University of Illinois press.

[15] Eleonora Ceccaldi, Gijs Huisman, Gualtiero Volpe, and Maurizio Mancini. 2020. Guess who's coming to dinner? Surveying Digital Commensality During Covid-19 Outbreak. In *Companion Publication of the 2020 International Conference on Multimodal Interaction*. 317–321.

[16] Yoram Chisik, Ferran Altarriba Bertran, Marie-Monique Schaper, Elena Márquez Segura, Laia Turmo Vidal, and Danielle Wilde. 2020. Chasing Play Potentials in Food Culture: Embracing Children's Perspectives. In *Proceedings of the 2020 ACM Interaction Design and Children Conference: Extended Abstracts* (London, United Kingdom) *(IDC '20)*. Association for Computing Machinery, New York, NY, USA, 46–53. https://doi.org/10.1145/3397617.3398062

[17] Robert Comber, Pollie Barden, Nick Bryan-Kinns, and Patrick Olivier. 2014. Not sharing sushi: Exploring social presence and connectedness at the telematic dinner party. *Eat, cook, grow: Mixing human-computer interactions with human-food interactions* (2014).

[18] Annalijn I Conklin, Nita G Forouhi, Paul Surtees, Kay-Tee Khaw, Nicholas J Wareham, and Pablo Monsivais. 2014. Social relationships and healthful dietary behaviour: evidence from over-50s in the EPIC cohort, UK. *Social science & medicine* 100 (2014), 167–175.

[19] Giada Danesi. 2018. A cross-cultural approach to eating together: Practices of commensality among French, German and Spanish young adults. *Social Science Information* 57, 1 (2018), 99–120.

[20] Roelof AJ De Vries, Juliet AM Haarman, Emiel C Harmsen, Dirk KJ Heylen, and Hermie J Hermens. 2020. The Sensory Interactive Table: Exploring the Social Space of Eating. In *Proceedings of the 2020 International Conference on Multimodal Interaction*. 689–693.

[21] Sebastian Deterding. 2014. Modes of play: A frame analytic account of video game play. *Doctoral dissertation, Staats-und Universitätsbibliothek Hamburg Carl von Ossietzky* (2014).

[22] Markéta Dolejšová, Hilary Davis, Ferran Altarriba Bertran, and Danielle Wilde. 2020. Feeding the futures of human-food interaction. *interactions* 27, 5 (2020), 34–39.

[23] Robin Ian MacDonald Dunbar. 2017. Breaking bread: the functions of social eating. *Adaptive Human Behavior and Physiology* 3, 3 (2017), 198–211.

[24] Jared Duval, Ferran Altarriba Bertran, Siying Chen, Melissa Chu, Divya Subramonian, Austin Wang, Geoffrey Xiang, Sri Kurniawan, and Katherine Isbister. 2021. *Chasing Play on TikTok from Populations with Disabilities to Inspire Playful and Inclusive Technology Design.* Association for Computing Machinery, New York, NY, USA. https://doi.org/10.1145/3411764.3445303

[25] Eurostat. 2021. Household composition statistics. Available at: https://ec.europa.eu/eurostat/statistics-explained/SEPDF/cache/29071.pdf.

[26] Hasan Shahid Ferdous, Bernd Ploderer, Hilary Davis, Frank Vetere, and Kenton O'hara. 2016. Commensality and the social use of technology during family mealtime. *ACM Transactions on Computer-Human Interaction (TOCHI)* 23, 6 (2016), 1–26.

[27] Hasan Shahid Ferdous, Bernd Ploderer, Hilary Davis, Frank Vetere, Kenton O'Hara, Geremy Farr-Wharton, and Rob Comber. 2016. TableTalk: integrating personal devices and content for commensal experiences at the family dinner table. In *Proceedings of the 2016 ACM international joint conference on pervasive and ubiquitous computing*. 132–143.

[28] Claude Fischler. 2011. Commensality, society and culture. *Social science information* 50, 3-4 (2011), 528–548.

[29] Claude Fischler. 2013. Is sharing meals a thing of the past. *Selective Eating–The Rise, Meaning and Sense of Personal Dietary Requirements* (2013), 15–35.

[30] Christopher Frayling. 1993. *Research in art and design*. Vol. 1. Royal College of Art London.

[31] Sangita Ganesh, Paul Marshall, Yvonne Rogers, and Kenton O'Hara. 2014. FoodWorks: tackling fussy eating by digitally augmenting children's meals. In *Proceedings of the 8th Nordic Conference on Human-Computer Interaction: Fun, Fast, Foundational*. 147–156.

[32] Bill Gaver, Tony Dunne, and Elena Pacenti. 1999. Design: cultural probes. *interactions* 6, 1 (1999), 21–29.

[33] William Gaver. 2002. Designing for homo ludens. *I3 Magazine* 12, June (2002), 2–6.

[34] William Gaver. 2012. What should we expect from research through design?. In *Proceedings of the SIGCHI conference on human factors in computing systems*. 937–946.

[35] Claudia Giacoman. 2016. The dimensions and role of commensality: A theoretical model drawn from the significance of communal eating among adults in Santiago, Chile. *Appetite* 107 (2016), 460–470.

[36] Lee Gordon. 2017. Single-person households will become a major consumption group. Euromonitor International. Available at: https://blog.euromonitor.com/households-2030-singletons/.

[37] Myrte Esther Hamburg, Catrin Finkenauer, and Carlo Schuengel. 2014. Food for love: the role of food offering in empathic emotion regulation. *Frontiers in Psychology* 5 (2014), 32.

[38] Felix Heidrich, Kai Kasugai, Carsten Röcker, Peter Russell, and Martina Ziefle. 2012. RoomXT: advanced video communication for joint dining over a distance. In *2012 6th International Conference on Pervasive Computing Technologies for Healthcare (PervasiveHealth) and Workshops*. IEEE, 211–214.

[39] Emily Heil. 2020. Eating alone, together: Virtual dinner parties are helping people fight isolation. Washington Post. Available at: https://www.washingtonpost.com/news/voraciously/wp/2020/03/21/eating-alone-together-virtual-dinner-parties-are-helping-people-fight-isolation/.

[40] C. Peter Herman. 2015. The social facilitation of eating. A review. *Appetite* 86 (2015), 61–73.

[41] S Hong and S Park. 2018. Internet mukbang (foodcasting) in South Korea. *Young and creative: digital technologies empowering children in everyday life* (2018), 111–125.

[42] Johann Huizinga. 1950. Homo Ludens (English translation).

[43] Núria Nicolau i Torra, Mailin Lemke, and Gijs Huisman. 2022. Solo dining at home in the company of ICT devices. *Frontiers in Computer Science* (2022), 9.

[44] Katherine Isbister. 2016. *How games move us: Emotion by design.* Mit Press.

[45] Sunjoo Jang, Haeyoung Lee, and Seunghye Choi. 2021. Associations among solo dining, self-determined solitude, and depression in South Korean university students: a cross-sectional study. *International Journal of Environmental Research and Public Health* 18, 14 (2021), 7392.

[46] Håkan Jönsson, Maxime Michaud, and Nicklas Neuman. 2021. What Is Commensality? A Critical Discussion of an Expanding Research Field. *International Journal of Environmental Research and Public Health* 18, 12 (2021), 6235.

[47] Brigitte Jordan and Austin Henderson. 1995. Interaction analysis: Foundations and practice. *The journal of the learning sciences* 4, 1 (1995), 39–103.
[48] Yuki Kado, Takanori Kamoda, Yuta Yoshiike, P Ravindra De Silva, and Michio Okada. 2010. Sociable dining table: the effectiveness of a" konkon" interface for reciprocal adaptation. In *2010 5th ACM/IEEE International Conference on Human-Robot Interaction (HRI)*. IEEE, 105–106.
[49] Judit Komaromi Haque. 2016. Synchronized dining tangible mediated communication for remote commensality. (2016).
[50] Mailin Lemke and Hendrik NJ Schifferstein. 2021. The use of ICT devices as part of the solo eating experience. *Appetite* (2021), 105297.
[51] Jonas Löwgren. 2013. Annotated portfolios and other forms of intermediate-level knowledge. *Interactions* 20, 1 (2013), 30–34.
[52] Michael Macht, Jessica Meininger, and Jochen Roth. 2005. The pleasures of eating: A qualitative analysis. *Journal of Happiness Studies* 6, 2 (2005), 137–160.
[53] Johanna Mäkelä. 2009. Meals: the social perspective. In *Meals in Science and Practice*. Elsevier, 37–49.
[54] Yash Dhanpal Mehta, Rohit Ashok Khot, Rakesh Patibanda, and Florian'Floyd' Mueller. 2018. Arm-a-Dine: towards understanding the design of playful embodied eating experiences. In *Proceedings of the 2018 Annual Symposium on Computer-Human Interaction in Play*. 299–313.
[55] Raina M Merchant and Nicole Lurie. 2020. Social media and emergency preparedness in response to novel coronavirus. *Jama* (2020).
[56] Robb Mitchell, Alexandra Papadimitriou, Youran You, and Laurens Boer. 2015. Really eating together: a kinetic table to synchronise social dining experiences. In *Proceedings of the 6th Augmented Human International Conference*. 173–174.
[57] Florian'Floyd' Mueller, Tuomas Kari, Rohit Khot, Zhuying Li, Yan Wang, Yash Mehta, and Peter Arnold. 2018. Towards experiencing eating as a form of play. In *Proceedings of the 2018 Annual Symposium on Computer-Human Interaction in Play Companion Extended Abstracts*. 559–567.
[58] Hye Yeon Nam and Ellen Yi-Luen Do. 2011. Sociable Tabletop Companions at "Dinner Party". In *International Conference on Human-Computer Interaction*. Springer, 459–463.
[59] Mamoun Nawahdah and Tomoo Inoue. 2013. Virtually dining together in time-shifted environment: KIZUNA design. In *Proceedings of the 2013 conference on Computer supported cooperative work*. 779–788.
[60] Eva Neely, Mat Walton, and Christine Stephens. 2014. Young people's food practices and social relationships. A thematic synthesis. *Appetite* 82 (2014), 50–60.
[61] Radoslaw Niewiadomski, Eleonora Ceccaldi, Gijs Huisman, Gualtiero Volpe, and Maurizio Mancini. 2019. Computational Commensality: from theories to computational models for social food preparation and consumption in HCI. *Frontiers in Robotics and AI* 6 (2019), 1–19.
[62] Alexandra Pometko, Ella Dagan, Ferran Altarriba Bertran, and Katherine Isbister. 2021. Drawing From Social Media to Inspire Increasingly Playful and Social Drone Futures. In *Designing Interactive Systems Conference 2021* (Virtual Event, USA) *(DIS '21)*. Association for Computing Machinery, New York, NY, USA, 697–706. https://doi.org/10.1145/3461778.3462020
[63] Nimesha Ranasinghe, Pravar Jain, Shienny Karwita, and Ellen Yi-Luen Do. 2017. Virtual lemonade: Let's teleport your lemonade!. In *Proceedings of the Eleventh International Conference on Tangible, Embedded, and Embodied Interaction*. 183–190.
[64] Sarah-Jeanne Salvy, Denise Jarrin, Rocco Paluch, Numrah Irfan, and Patricia Pliner. 2007. Effects of social influence on eating in couples, friends and strangers. *Appetite* 49, 1 (2007), 92–99.
[65] Miguel Sicart. 2014. *Play matters*. mit Press.
[66] Yatharth Singhal, Haokun Wang, Hyunjae Gil, and Jin Ryong Kim. 2021. Mid-Air Thermo-Tactile Feedback using Ultrasound Haptic Display. In *Proceedings of the 27th ACM Symposium on Virtual Reality Software and Technology*. 1–11.
[67] Brian A Sparkes. 1960. Kottabos: an Athenian after-dinner game. *Archaeology* 13, 3 (1960), 202–207.
[68] Charles Spence. 2017. *Gastrophysics: The new science of eating*. Penguin UK.
[69] Charles Spence, Maurizio Mancini, and Gijs Huisman. 2019. Digital commensality: Eating and drinking in the company of technology. *Frontiers in psychology* 10 (2019), 2252.
[70] Charles Spence, Marianna Obrist, Carlos Velasco, and Nimesha Ranasinghe. 2017. Digitizing the chemical senses: Possibilities & pitfalls. *International Journal of Human-Computer Studies* 107 (2017), 62–74.
[71] Bernard Suits. 2020. *The grasshopper*. University of Toronto Press.
[72] Brian Sutton-Smith. 2009. *The ambiguity of play*. Harvard University Press.
[73] Yukako Tani, Naoki Kondo, Daisuke Takagi, Masashige Saito, Hiroyuki Hikichi, Toshiyuki Ojima, and Katsunori Kondo. 2015. Combined effects of eating alone and living alone on unhealthy dietary behaviors, obesity and underweight in older Japanese adults: Results of the JAGES. *Appetite* 95 (2015), 1–8.

[74] Yukako Tani, Yuri Sasaki, Maho Haseda, Katsunori Kondo, and Naoki Kondo. 2015. Eating alone and depression in older men and women by cohabitation status: the JAGES longitudinal survey. *Age and ageing* 44, 6 (2015), 1019–1026.
[75] Jordan D Troisi, Shira Gabriel, Jaye L Derrick, and Alyssa Geisler. 2015. Threatened belonging and preference for comfort food among the securely attached. *Appetite* 90 (2015), 58–64.
[76] Lenny R Vartanian, C Peter Herman, and Janet Polivy. 2007. Consumption stereotypes and impression management: How you are what you eat. *Appetite* 48, 3 (2007), 265–277.
[77] Margaret Visser. 2015. *The rituals of dinner: The origins, evolution, eccentricities, and meaning of table manners*. Open Road Media.
[78] Yan Wang, Zhuying Li, Robert Jarvis, Rohit Ashok Khot, and Florian'Floyd' Mueller. 2018. The singing carrot: Designing playful experiences with food sounds. In *Proceedings of the 2018 Annual Symposium on Computer-Human Interaction in Play Companion Extended Abstracts*. 669–676.
[79] Yan Wang, Zhuying Li, Robert S Jarvis, Joseph La Delfa, Rohit Ashok Khot, and Florian Floyd Mueller. 2020. WeScream! Toward Understanding the Design of Playful Social Gustosonic Experiences with Ice Cream. In *Proceedings of the 2020 ACM on Designing Interactive Systems Conference*. 951–963.
[80] Yan Wang, Zhuying Li, Rohit Ashok Khot, and Florian'Floyd' Mueller. 2022. Toward Understanding Playful Beverage-based Gustosonic Experiences. *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies* 6, 1 (2022), 1–23.
[81] Philip Weber, Philip Engelbutzeder, and Thomas Ludwig. 2020. "Always on the Table": Revealing Smartphone Usages in everyday Eating Out Situations. In *Proceedings of the 11th Nordic Conference on Human-Computer Interaction: Shaping Experiences, Shaping Society*. 1–13.
[82] Jun Wei, Roshan Lalintha Peiris, Jeffrey Tzu Kwan Valino Koh, Xuan Wang, Yongsoon Choi, Xavier Roman Martinez, Remi Tache, Veronica Halupka, and Adrian David Cheok. 2011. Food Media: exploring interactive entertainment over telepresent dinner. In *Proceedings of the 8th International Conference on Advances in Computer Entertainment Technology*. 1–8.
[83] Jun Wei, Xuan Wang, Roshan Lalintha Peiris, Yongsoon Choi, Xavier Roman Martinez, Remi Tache, Jeffrey Tzu Kwan Valino Koh, Veronica Halupka, and Adrian David Cheok. 2011. CoDine: an interactive multi-sensory system for remote dining. In *Proceedings of the 13th International Conference on Ubiquitous Computing*. 21–30.
[84] Danielle Wilde and Ferran Altarriba Bertran. 2019. Participatory Research through Gastronomy Design: a designerly move towards more playful gastronomy. *International Journal of Food Design* 4, 1 (2019), 3–37.
[85] Luke Yates and Alan Warde. 2017. Eating together and eating alone: meal arrangements in British households. *The British Journal of Sociology* 68, 1 (2017), 97–118.
[86] Bowen Zhang and Misha Sra. 2021. PneuMod: A Modular Haptic Device with Localized Pressure and Thermal Feedback. In *Proceedings of the 27th ACM Symposium on Virtual Reality Software and Technology*. 1–7.

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