

# Critical-Playful Speculations with Cameras in the Home

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## ABSTRACT

Smart home cameras present new challenges for understanding behaviors and relationships surrounding always-on, domestic recording systems. We designed a series of discursive activities involving 16 individuals from ten households for six weeks in their everyday settings. These activities functioned as speculative probes—prompting participants to reflect on themes of privacy and power through filming with cameras in their households. Our research design foregrounded critical-playful enactments that allowed participants to speculate potentials for relationships with cameras in the home beyond everyday use. We present four key dynamics with participants and home cameras by examining their relationships to: the camera’s eye, filming, their data, and camera’s societal contexts. We contribute discussions about the mundane, information privacy, and post-hoc reflection with one’s camera footage. Overall, our findings reveal the camera as a strange, yet banal entity in the home—interrogating how participants compose and handle their own and others’ video data.

## CCS CONCEPTS

• **Human-centered computing**; • **Interaction design**; • **Empirical studies in interaction design**;

## KEYWORDS

Design research, Internet of Things, smart cameras, home, speculation, enactments, personal data, privacy, domestic technology

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## 1 INTRODUCTION

As a form of Internet of Things (IoT) technology, smart home cameras are one of the many sensors proliferating into the domestic space. For many users, home cameras promise protection and a sense of security against the unknown (e.g., porch pirates, burglaries). Beyond crime prevention, smart home cameras are also increasingly used for novel and emergent applications, such as capturing serendipitous or funny moments [11], monitoring children and pets [3, 38], or for nostalgic methods of communicating with family and friends [2]. However, smart cameras are also a potential source of misuse, with corresponding stories of hackers and data leaks [10, 66, 97]. Moreover, home security cameras have the potential to produce harm toward marginalized communities through police partnerships and facial recognition technology [53].

With the rise of consumer home security cameras such as Amazon Ring and Google Nest’s lineup, cameras in the home allow the average technology user to engage in everyday acts of recording and surveillance in and around their house. Recently, Ring’s home security camera drone has raised questions of broadening domestic surveillance [107]. Such cameras are one example of “porous boundaries” in the home [22], inviting outside entities (police departments, hackers) to peer into the inner workings of our private environments. Pierce et al. [83] discuss how smart cameras incidentally affect non-primary or indirect users and uses [4], which includes differentially vulnerable individuals in and around the home (such as children, older adults, survivors of domestic abuse, disabled persons, domestic workers and neighbors).

Thus, a simultaneous paradox exists between the use of cameras for play and care, and their use for protection, security, and as evidence-generating technologies. This paradox occurs as the camera acts a producer of video footage through its pervasive data capture and sensing capabilities—depending on one’s categorical vision [40], this data can be identified as evidence, or can simply represent mundane or even meaningful moments in the home. To the smart camera, nonetheless, these fine distinctions do not matter; these are simply coded as data.

Our research teases apart the various valenced behaviors, existing power dynamics, and points of friction surrounding home cameras. Doing so, we studied the data-rich environment of cameras in the home—as well as the lives and experiences of our participants—through a series of speculative activities and critical and discursive design frameworks [100]. As discursive design is a way of asking questions, facilitating dialogue, and generating discourse through designed objects, experiences, and environments, we chose to employ this approach to guide new potentials for critiquing everyday smart technology.

In this study, we invited a total of 16 individuals from ten different households across the US to reflect on the role of recording in domestic scenarios through six weeks of discursive activities with cameras in the home. Inspired by the Asynchronous Remote Communities (ARC) method [67], speculative enactments [27], and critical play [28], we paired individuals in cohort groups to discuss their experiences with engaging with the weekly activities, prompting discussions about surveillance and pervasive computing in domestic scenarios.

Overall, our critical-playful activities served multiple purposes: they enabled us to discover the existing, imaginary, and enacted potentials of home cameras with both users and non-users of security cameras; they nudged participants to create and occupy more uncomfortable environments and modes of being with cameras in the home; and they pushed participants to consciously attend to and consider filming and video footage. As such, our research asks: *How do people live with and imagine cameras in the home? Moreover, when everyday cameras are rendered strange, and when filming is more intentional (through human-mediated modes of capture rather than autonomous filming) what can we learn from the relationships that emerge?*

Drawing from our series of discursive research activities, we aim to improve the understanding of the smart camera in human-computer interaction (HCI) research through analyzing individuals' video filming experiences in domestic environments. In the following sections, we present an investigation across diverse cohort groups over the cumulative period of a year. Our findings uncover participant relationships to the camera's eye, filming, their data, and the camera's societal contexts. Through qualitative accounts of participants' activities and reflections with cameras in the home, we unpack various social dynamics with filming, awareness of personal data flows, and perceptions of the smart camera—including concerns about its ethical tensions. Alongside methodological take-aways, we conclude by offering important discussions of underlying power dynamics in the smart camera, and its role as a collector of mundane, yet highly detailed home footage. As a result, we contribute: (1) critical reflections and possibilities for new modes of using, reflecting, and experimenting with home cameras, and (2) generative insights to inform future HCI research and critical work surrounding IoT, information privacy, and new media and technology.

## 2 RELATED WORK

This study builds on longstanding research into how people interact with technologies in the home [91, 93, 96]. Our study was

also informed by design research inquiries that investigate the entanglements and boundaries between public and private spaces with IoT technologies in the home [19, 20, 23, 31, 44, 56]. More specifically, this study focuses on the ways in which people develop relationships with cameras in their homes as participants within and designers of everyday IoT systems. Prior studies in HCI have also investigated the role of IoT surveillance systems as a means of predictive and reparative maintenance [29, 64]. Surveillance studies scholars continue to remind us that these systems have been developed over time with particular attention to marginalized individuals [9] and emerge from a long history of surveillance in public scenarios through media technologies such as closed-circuit television (CCTV) [41]. Here, we present an overview of prior work related to cameras in the home, data literacy, and home IoT.

### 2.1 Cameras in the Home

HCI presents a wide variety of prior investigations with cameras in the home and self-surveillance [20, 78, 81, 87]. Many works have examined the production of data through forms of always-on technologies using the camera [18, 46, 47, 90]. Moreover, Heshmat et al. [46] and Helmes et al. [45] explicitly analyze how cameras function in the home through capturing everyday, spontaneous moments with videos in the home. Others have examined cameras in the context of the smart home, especially in respect to gendered gaze of IoT devices [49, 85]. Strengers et al. [95] identify gendered opportunities and challenges for home IoT systems—detailing the potential to enable feminine expression through smart objects, while acknowledging security risks for women in intimate partner violence settings [32, 63]. Other aesthetic design research inquiries, like Gaver's Video Window [34] and Drift Table [35], have stretched the applications of the camera as a technology for expanding environments and capturing information beyond its traditional use as a record-generating media technology.

As smart home cameras move from being research prototypes to everyday systems, available in thousands of different consumer products, researchers must examine people's lived experiences with these devices. HCI and sociotechnical scholars have examined the roles of emergent technologies in the home through frameworks such as surveillance capitalism [111], creepiness [79, 81, 109] and surveillance as a service [105]. For example, Pierce's design-led inquiry of smart home cameras illuminates "creepy" behaviors of such cameras through the propensity for user data leakage and its relation to surveillance capitalism [81]. Pierce further discusses the inscription of power dynamics in smart home cameras with primary and non-primary users, illustrating the potential surveillance of non-primary users through algorithmic and regulatory means. Likewise, West discusses how Amazon devices, like the Ring doorbell, provide Surveillance as a Service (SaaS) to their consumers [105]. These projects and related inquiries have responded to the evolving technologies of the smart home by experimenting with the lived experiences between people and things [6].

To advance our understanding of these sociotechnical relationships, we focus on observing people's interactions with cameras in their homes. Smart cameras are extending surveillance systems into private, domestic scenarios by building upon infrastructures of security cameras and their preceding technologies outside of

the home. Notably, surveillance scholars have discussed the role of closed-circuit television (CCTV) footage and its link to larger security databases and algorithmic governance [42, 75]. Our research extends these design inquiries and theoretical contributions about security cameras by investigating the everyday lived experience of using, interacting, and playing with cameras in the home through critical-yet-playful approaches.

## 2.2 Data Literacy and Home IoT

As a form of home IoT, smart cameras intersect with important conversations about IoT data. To contextualize our investigation with smart home cameras, we turn to the growing body of literature surrounding data literacy and critiques of home IoT technology and the data produced via IoT systems. Aspirations of tech modernism illustrate a connected and more convenient home accompanied by visions of pervasive sensors promising a useful automation of the home [58, 88, 104]. Responding to these idealist visions, several critiques of the smart home and ubiquitous computing have emerged in the form of ‘manifestos’, outlining revolutionary futures and new narratives of responsibility for IoT designers and researchers [33, 84, 89]. Such critiques expose the opaque data infrastructures and underscored privacy risks with new IoT developments—especially in the private environment of the home.

As “many IoT experiences will be invisible to people” [101], such forms of increased but invisible ubiquitous computing possess the potential for manipulation. Data literacy is necessary to understand and expose potential privacy and security vulnerabilities emergent with invisible infrastructures of pervasive computing systems [70, 80]. Researchers have put forth increasing obligations to data literacy, unpacking and reflecting on peoples’ understanding and interpretations of home IoT data [36, 57, 86]. HCI researchers have investigated many of these issues with other IoT and smart sensors in the home [60, 62, 110], from empirical investigations about network and privacy ambiguities [16, 72] and critical, speculative perspectives regarding unpredictability and agency [82, 99]. As one example of a focused deployment of sensing technologies, Choe et al. [17] deployed sensor proxies to participant households to examine their lived experiences and privacy boundaries with the devices. Using a similar approach, we investigate individuals’ privacy boundaries with cameras in the home over six weeks. Aligned with concerns for data literacy in home IoT systems, we extend these considerations in the context with the smart home camera.

## 3 METHODS

To investigate existing and potential relationships with cameras in the home, we designed a series of activities inspired by critical and speculative perspectives in HCI and design research. These activities are grounded in traditions that emphasize the speculative and experimental nature of seemingly everyday interactions with technologies through use of clever inversions and counternarratives. Specifically, we draw on discursive design [26, 100] as a method for imagining possible and alternative futures with smart cameras.

Our research approach is inspired by Mary Flanagan’s concept of critical play from radical game design, which explores how alternative games can engage social critique [28]. While we are not creating a game, our study relies on playful activities for critical

reflection. These critical-playful activities are also informed by Elsdén et al.’s speculative enactments [27], a discursive method for making speculation consequential to participants by acting through speculative scenarios. Though our approach differs slightly in that our activities are situated in participants’ everyday settings, participants ‘enacted’ different activity probes in the form of creative instructions [24] to engage reflection through practice. Finally, we draw inspiration from Wakkary et al.’s material speculation [103], which presents how material artifacts can inspire critical exploration by presenting counterfactual realities in situated, everyday environments. We extend material exploration by appropriating the camera to create counterfactual situations by deploying it in the context of our critical-playful activities.

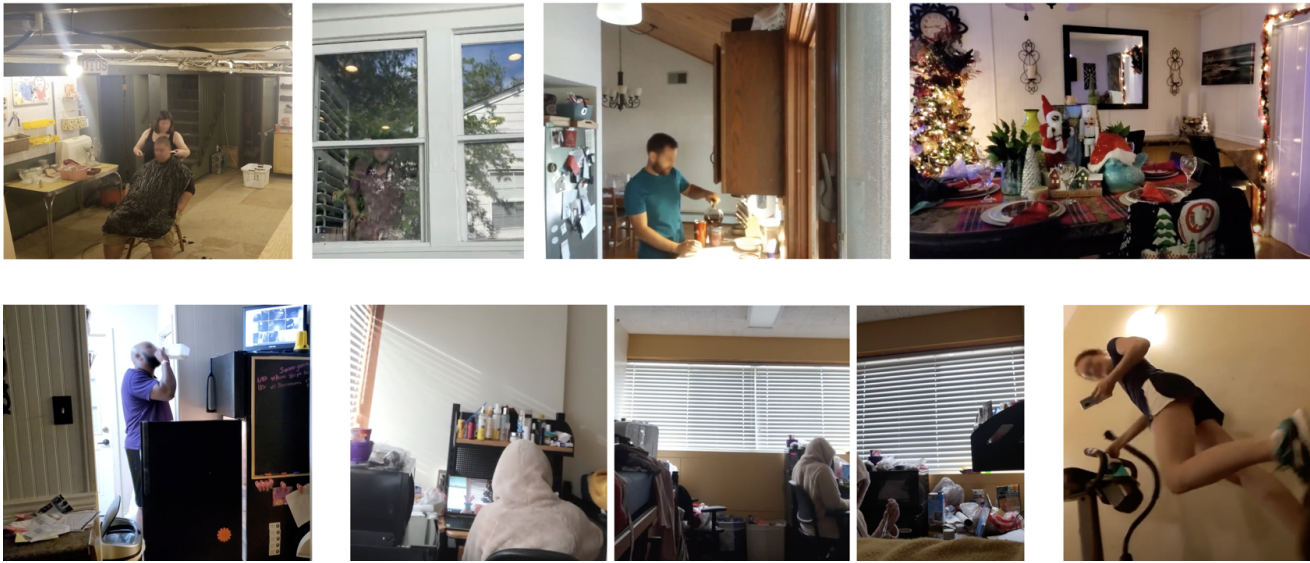
As such, our study foregrounds six discursive activities to evoke discussion about living with cameras in the home. In these activities (Table 1), participants played with various camera recording devices in their household per the creative prompts administered by the research team. We followed the Asynchronous Remote Communities (ARC) method [67]—a research method to conduct long-term remote research through facilitating online discussion and peer support via a technological platform [65, 73]. In our study, individuals discussed their weekly activities with another paired household through online, private messaging groups (“cohorts”) facilitated by the research team. These asynchronous cohorts inspired participant engagement over multiple weeks of the study, enabled individuals to participate in the study around their existing schedules, and provided camaraderie and connection that furthered discussions about smart cameras with other individuals in the study across different demographics, locations, and attitudes.

### 3.1 Preliminary experiments to inform the design of activities

To explore different avenues and perspectives about living with cameras in the home, Tan (the first author) conducted a two-week series of self-experiments with exploratory camera-based activities in her home. Some of these activities included: setting up a camera outside of the home to film Tan within her home through a window, filming and directing a housemate to do tasks around the home through voice, or live-broadcasting Tan and her housemates cooking a meal on the television. These preliminary investigations were motivated by themes from relevant literature in which we identified the camera as a sensor [83] and data producer [1], and as representations of companies and individuals [61]. Based on these preliminary explorations, the research team refined activities for study participants, discovering if certain interactions sparked fruitful discussion or were awkward in practice when engaging other household members.

### 3.2 Participants

We recruited geographically distributed individuals living in the US. Before participating in the study, participants first filled out a short screener survey disseminated through researchers’ social networks, various online community forums (e.g., subreddits dedicated to Google Nest or Ring cameras), and Craigslist. We recruited 16 participants from ten different households, who represented a range of experiences in terms of race and socioeconomic class and



**Figure 1: Examples of different videos participants submitted for each week's activity. From top, left to right: Timelapse (Week 2); Looking Out, Looking In (Week 3); Invisible, in the Group Scenario (Week 4); Invisible, in the Individual Scenario (Week 4). From bottom, left to right: Neighbors (Week 5); Perspective, middle three images (Week 6, Individual Scenario); and Watching the Watcher (Week 6, Group Scenario).**

included (1) those who do and do not own smart home cameras, and (2) individuals either living alone or in shared households with other adults. Of these 16 individuals, two dropped out partway through the study, and one household (Kylie and Daniel) completed all but the last week of activities.

We conducted this study with two subsets of households: with 12 people from six different households, living in shared living situations (in a *Group Scenario*), and with four people living alone (in an *Individual Scenario*). Six of these 16 individuals did not own a smart home camera. We matched participants in each scenario into a total of five different Slack cohorts. We made these matches based on similar demographics and their attitudes toward cameras in the home to encourage more familiarity and openness within each cohort. A closer breakdown of cohorts, households, and devices is listed in Table 1

### 3.3 Study Design

We conducted a two-month long study consisting of three phases: Phase 1 (Pre-Study Interview, Home Tour), Phase 2 (Kickoff Meeting & Weekly Activities), and Phase 3 (Exit Interview). All phases were conducted remotely due to coronavirus and the geographic distribution of our participants. These activities were also staggered from July 2020 to March 2021 with different participants, flexibly adjusting deadlines for activities in response to participants' needs and historical events during this time.

**Phase 1** consisted of a pre-study interview with questions about participant experiences with cameras in their home. We also conducted a virtual home tour with one representative individual of the household to assess the location of camera devices in their home, if they had any. After this, each household was paired in a private

Slack group with another household who would complete the study activities concurrently.

**Phase 2** consisted of six weekly camera-based enactments around the house, and participants were compensated \$20 per household for each activity. While these activities could be performed with a simple phone camera or webcam, many activities were related to the experience of smart home cameras. These activities were designed to probe the qualities of timelessness, total capture, voyeurism, and participatory surveillance inherent to smart home recording technology.

Initially, we designed these activities for participants in shared living situations (indicated as the *Group Scenario*). After gathering responses to our study interest survey from individuals living alone and seeing that they expressed different needs and experiences from respondents living with others, we decided to modify our study to include participants living alone. Thus, we modified some activities from the *Group Scenarios* to be appropriate for people living alone (indicated as the *Individual Scenario*). We provide a description of the activities in Table 2, and examples of videos participants submitted for each activity in Figure 1

To begin this phase, we initially conducted a short “kickoff meeting” through Zoom for the households to introduce themselves with one another before engaging in the activities. Later, for Cohorts D and E, we facilitated online introductions through the Slack group instead of arranging a synchronous Zoom kickoff meeting to better accommodate participant schedules. Each week, participants were required to complete the activity and its corresponding reflection questions (Appendix A), as well as post in a discussion thread in their private Slack group about their experience with the activity. Participants contributed to the Slack discussions by commenting on weekly, researcher-led prompts to describe their overall

**Table 1: Participants and Cohort Breakdown**

Participant pseudonym	Cohort	Location (Population description) <sup>a</sup>	Home type	Rent or own	Gender self-description	Ethnicity self-description	Ages	Household Income	Cameras owned
Justin and Hannah	A	Mid-size metro area	House	Own	Male; Female	White	24; 22	\$50-100k	Phone camera, Webcam, Wyze Cam
Luke and Emily	A	Large metro area	House	Own	Male; Female	White	31; 32	\$50-100k	Phone camera, Webcam, Wyze Cam
Sadie and Nathan	B	Large metro area	Apartment, then house	Rent (Apartment), Own (House)	Female; Male	White; Hispanic	34; 28	\$100-150k	Phone camera, Webcam, Smart fridge cameras <sup>b</sup>
Owen and Christine	B	Large metro area	House	Own	Male; Female	White	37; 38	\$50-100k	Phone camera, Webcam, 3 Amazon CloudCams, TP-Link Kasa Cam <sup>c</sup>
Kylie and Daniel	C	Large metro area	Apartment	Rent	Female; Male	Multiracial; White	24; 25	>\$150k	Phone camera, Webcam
Maya and Ricardo	C	Large metro area	Apartment	Rent	Female; Male	West Indian; Hispanic or Latino	25; 26	\$10-50k; \$50-100k	Phone camera, Webcam, Furbo dog camera
Marcus	D	Small metro area, then large metro area	House	Own	Male	African American	32	\$50-100k	Phone camera, Webcam, Yoluke home security
Elizabeth <sup>d</sup>	D	Large metro area	House	n/a	Female	White	40	\$100-150k	Phone camera, Webcam, Google Nest Cam, WyzeCams
Jordyn <sup>e</sup>	E, then D	Small metro area	Residence hall, single dorm room	n/a, work for housing	Female	Black American	22	Prefer not to share	Phone camera, Webcam
Caroline <sup>d</sup>	E	Large metro area	Apartment	Rent	Female	Caucasian	29	\$10-50k	Phone camera, Webcam

<sup>a</sup> We refer to the USDA 2013 Rural-Urban Continuum codes (last updated in 2020) that classify between metropolitan (metro) areas, non-metro areas, and rural areas [112]. The Rural-Urban Continuum codes distinguish between metro areas in counties of 1 mil. population or more (what we label here as a 'large' metro area), metro areas in counties of 250,000 to 1 mil. (a 'mid-size' metro area), and metro areas of fewer than 250,000 (what we have defined as a 'small' metro area).<sup>b</sup> Midway through the study, Sadie and Nathan moved into a home in which the previous owner had already installed a smart fridge with cameras.<sup>c</sup> In a screener survey, Christine had stated that they owned Amazon Ring cameras; while interacting with the household, we learned these were actually Amazon Cloud Cams.<sup>d</sup> Elizabeth and Caroline were unable to complete the study and dropped out after completing activities for Weeks 2 and 1, respectively.<sup>e</sup> After Caroline dropped out of the study, we moved Jordyn to Cohort D with Marcus.

impressions about the activity with their paired household. These exchanges allowed participants to see others' experiences with the study through continuing conversations about their activities with peers on Slack, which was especially helpful for participants living alone. Overall, the Slack group provided a place for participants

to receive activity announcements and instructions, engage with others about this experience, and to keep on track with the study.

Finally, **Phase 3** consisted of an exit interview alone with each participant, after having completed the weekly activities. Participants were individually compensated \$20 for this interview.

**Table 2: Activities and Descriptions**

Activity Title <sup>a</sup>	Description
<b>Week 1:</b> Data Mapping	Draw a "data map", an illustration of where your data goes and who has access to it when you film videos for this study through your phone camera, webcam, or smart home camera.
<b>Week 2:</b> Timelapse	Film a 30-minute timelapse video in your home.
<b>Week 3:</b> Looking out, Looking in	Film from the outside of your home, looking in through a window or open doorway. Then, film from the inside of your home, looking outside. <b>Group Scenario:</b> Film your partner in each scenario. Each partner should switch "roles" with filming and being filmed (the person filming from the outside looking in, should not be the same person filming from the inside looking out). <b>Individual Scenario:</b> Set up a camera to film yourself in both scenarios.
<b>Week 4:</b> Invisible	<b>Group Scenario:</b> Film your partner covertly for up to 5 minutes. (This message was disseminated individually to one household member who elected to be the "filmer" for the week). <b>Individual Scenario:</b> Film "invisible" moments around the home. This includes micro-movements or interactions around the house, such as wall shadows, nature or pets, feet from bystanders, for example.
<b>Week 5:</b> Neighbors	<b>Group Scenario:</b> In the style of Amazon Ring's Neighbors app, create a (fake) social media post about a "small crime" or a pet peeve that your partner does. Your post should include either a short video clip and description or a photo with text describing the incident. <b>Individual Scenario:</b> Create a Neighbors post about something you do that you think may be a pet peeve to some, or that may annoy others if you were living with housemates.
<b>Week 6:</b> Watching the Watcher (Group), Perspective (Individual)	<b>Group Scenario:</b> In the spirit of sousveillance and viral videos, set up your camera to "film back" at another camera. For example, you might set up a camera to film another perspective of a webcam or Zoom call, or have you and your partner film each other at the same time. <b>Individual Scenario:</b> Film yourself from different angles—capture three different videos by setting the camera to film yourself from above, below, and at eye-level.

<sup>a</sup> Weeks 1 and 2 used the same prompt for participants in both Group and Individual Scenarios.

### 3.4 Ethical Considerations

In addition to getting approval from our university ethics board, we carefully reviewed additional ethical considerations for this study. Part of our goal with these activities was to foreground participants' mental models of their data by prompting participants to consider data privacy risks with capturing and storing videos for this study. To account for this, the first study activity was a "data mapping" activity in which we asked participants to illustrate where they will store and save their videos in this project. This activity was important to include in the first week of the study, so that participants could think through the ownership of their videos and data when recording and uploading them across multiple devices or on a cloud server in the following weekly activities.

Crafting these enactments allowed us to investigate some of the more problematic or power-laden aspects of this technology through an experimental lens. This was especially apparent in the *Neighbors* or *Watching the Watcher* activities, which directly respond to discourses surrounding labelling and profiling behaviors in a social manner and are informed from Steve Mann's work on sousveillance [68, 69]. Though the *Neighbors* activity specifically is informed by design noir [25] and design fiction [108], we acknowledge the privileged ability to engage in these topics through speculation, as discussed by Whitney et al. [106]. At the same time, these discursive techniques allow us to invoke and interrogate the existing realities of the smart camera by combining more light-hearted

techniques to discuss delicate topics of surveillance, privacy, and data. We imparted specific considerations of care with participants due to this approach (as we detail in the following paragraphs).

In our consent process, we highlighted smart home cameras as one recording option in these activities for participants who already own these devices. However, we did not explicitly encourage their use, as our own concerns about how some camera companies process, store, and use the data led us to want to ensure participants had different options for completing these activities. Participants could choose to record videos with their smart cameras, digital cameras, or cameras in devices like laptops, tablets, and phones. In these videos, and throughout the study, we asked participants to avoid capturing non-consenting individuals on film.

Noting the potential discomfort of recording in the home, we encouraged participants to only share information (in the Slack group, and with the research team) that they were comfortable with sharing and assured them that they could drop out of the study at any time without penalty. We also advised participants in the Group Scenario to create a "safe word" to use with their partner if they were not comfortable filming in an activity scenario. If they were uncomfortable sharing an activity video with us, we gave participants the option to describe what had happened with words instead. However, none of our participants decided to take this option. Despite the situational discomfort with filming that was experienced by some participants, all participants felt comfortable

with the research activities and had given their consent to this process.

### 3.5 Analysis

We analyzed two types of data in this study: the responses to the activity prompts themselves (including the videos as well as participant reflections), and the pre- and post-study interviews. This data contained participant perspectives about engaging in the activities, in addition to their overall considerations about their past experiences and new reflections about smart cameras.

To analyze this data, Tan conducted a small for-credit directed research group with two undergraduates, and two graduate students who then became involved as co-authors (Kinnee and Langseth) [102]. Students in the directed research group and the research team followed a grounded theory method which involved co-creating memos and a codebook to construct key themes for analysis based on data from participant interviews and activities [14, 92, 94]. In the research group, students also annotated and labelled activity videos and home tours with a screenwriting process [50] to improve the accessibility of these videos for coding purposes, as the majority of the activity videos included ambient sounds and no direct dialogue.

Initial themes from this first round of analysis included codes for camera awareness, data interpretation, contradictions in behaviors and opinions, and participants' trusted assumptions with smart home cameras. Refining these four themes, we conducted a second round of analysis to further examine the role of attitudes and behaviors with smart home cameras during and after filming, and how these opinions relate to broader narratives of cameras and recording devices in the home more generally.

## 4 FINDINGS

Through our investigation, we saw how living with and around cameras in the home revealed complex behaviors and dynamics between participants and the camera, each other, and their data. People who owned smart cameras in our study used them for a variety of reasons, most often citing them as a way of maintaining one's security (Elizabeth, Marcus, Justin). However, the convenient novelties that smart cameras provide were especially prominent in some participants' justifications or main uses: such as checking in on pets (Maya and Ricardo, Elizabeth), watching animals in the backyard (Luke), as a memory aid, and for keeping in touch with family members (Owen and Christine, Maya). Others mentioned that low cost was another convenience factor to obtaining their smart home cameras, referencing the price of Wyze cameras at \$20 apiece (Justin and Luke), or purchasing Amazon Cloud Cams through a sale special (Owen).

Our activities foregrounded cameras much more than typical smart security cameras, which are often relegated to the background or seen as banal until something happens [41]. As a result of this new positioning and framing of the camera, participants' relationship with it also changed—revealing unique insights about how people might see themselves through cameras. Below, we present four dynamics that describe how participants interacted with smart cameras and cameras in the home via our activities: conceptualizing their relationship with the camera's eye, their relationship with

filming, their relationship with data, and their relationship with the camera's societal context.

### 4.1 Relationship to the Camera's Eye

This section investigates the self and the camera in the home through examining participant relationships to the camera's eye. While filming and being filmed in the study activities, participants reflected on how they saw themselves on camera. This theme concerns participants' self-referential experiences of watching themselves on camera through engaging in activity probes. Participants were conscious of how they presented themselves on film, which also influenced some of their attitudes toward cameras more generally.

*4.1.1 Self-consciousness and self-regulation: When the camera is visible.* Through filming themselves or others as part of the study activities, many participants reflected on feeling more self-conscious of their behaviors on camera in the first weeks of the study. Participants noted that they became more "introverted" on camera (Justin), and even noticed unconscious habits such as touching one's face and hair (Hannah, Emily, *Timelapse*) or blinking excessively (Luke, *Timelapse*). At times, participants restricted their behaviors due to the camera's presence. Nathan commented on how he was very aware of the camera during the timelapse, which restricted casual moments of closeness with his wife: "I definitely held back at least three butt slaps. . . . due to that uneasy feeling [of being on camera]." Though the timelapse did not capture audio data, it also affected how much participants were willing to talk on camera: "Even though the video was not capturing sound, I wasn't talking [as] much as I normally do" (Christine, *Timelapse*).

In the activity Looking Out, Looking In, we instructed participants to film each other (in the group scenario) or themselves (in the individual scenario) through a physical barrier, such as a glass window or a doorway. In this activity, Nathan was conscious of the camera's presence when his partner, Sadie, captured him watering the plants by the pool in their backyard. Nathan reflected, "[I wanted] to be done with it a bit quickly because I don't like being on camera." At the end of the video, he pretends to jump into the pool (Fig. 2) to "diffuse [an] uncomfortable situation with humor." While he was aware that he was being filmed, by whom, and why, the feeling of being watched in this situation made him uneasy and self-conscious: "I was mostly concerned with not bending over funny, knocking the plants over, or otherwise embarrassing myself."

Here, Nathan responds to the discomfort of being watched by first holding back, and then transitions to playing up the situation for the camera. As the camera and the action of filming thereby create an audience to one's actions, Nathan reflected that he was "concerned with knowing someone is going to be watching this." This setup magnified his behaviors and led Nathan to react with both reservation and humor to this uneasiness.

*4.1.2 Self-consciousness and self-regulation: When the camera is invisible.* In some activities like *Invisible*, participants in the group scenario filmed their partner covertly, hiding the camera and not disclosing to their partner when they would be filming. The participants who were secretly filmed usually did not notice the camera's



**Figure 2: Nathan is seen at the pool’s edge, next to a row of plants, and is holding a watering can. Though he is in the midst of watering these plants, his right leg is raised to simulate the action of jumping into the pool.**

presence, and only realized that they had been on film after it occurred. For participants being filmed, covert filming revealed a duality between how they would act naturally, versus when they knew they were being filmed.

Nathan, who had been hyper-aware of the camera in the *Looking Out, Looking In* activity, was unaware of being filmed by his partner at all for the *Invisible* activity until being shown the video. He scrutinized his behavior when watching the footage, noting his “terrible posture” and criticizing his “slouching,” even though he acknowledged that he was simply focused on an important task. From seeing himself on film and realizing how easy it is to be secretly filmed without noticing, Nathan expressed that he “now has a concrete reason to hate cameras in the home, rather than just general paranoia.”

These examples show how the eye of the camera can pose inherent pressure or power dynamics to how individuals may behave around the camera, as when the camera’s eye is invisible some participants possess different physical responses to its field of capture.

**4.1.3 Shifting degrees of camera awareness: When the camera becomes both visible and invisible.** While participants experienced an increased level of self-consciousness or awareness of how they appear on camera, many participants became more comfortable being filmed over time and throughout the course of the study. Participants vacillated in their awareness of the camera, at times becoming either hyper-aware of the eye of the camera or desensitized to its presence. In the *Looking Out, Looking In* activity, Justin filmed Hannah from inside their home while she fended off mosquitoes outside. Hannah discussed how her attention shifted between focusing on the camera, to the summer heat and swatting away bugs

around her. Further, she reflected on the fickle gradient of going in and out of awareness of the camera more generally throughout the study:

I would go in and out of being aware of the camera so many times, like I would forget about it. And then I would remember again and then forget about it. And then remember again. So I think that was interesting. It’s not like a conscious awareness. . . It’s kind of like it goes through phases. –Hannah, *Exit Interview*

As these activities foregrounded the camera’s eye, they allowed participants to interact with it with varying and transient degrees of visibility and invisibility. These interactions with the camera’s eye thus reveal complex relations between oneself and others, such as power exchanges, self-scrutiny, and even desensitization.

## 4.2 Relationship to Filming

In this section, we build upon participants’ relationships to the camera’s eye as we unpack participants’ relationships with filming, dissecting what factors and sensitivities they considered at the moment of capture. Because this attribute is often forgotten or not present in smart cameras, our activities placed participants in situations where they had to think purposefully about such moments of capture and filming.

While making videos for the study, participants considered how their image may be perceived as future records. This was represented through participants’ sensitivities around framing the camera and making decisions of what will end up on video. Participants were active curators of their videos, deciding when and what to film as they managed what they were doing on camera. However, as



participants composed aspects of what they chose to film, they also discussed and revealed moments that escaped their control—from discussing different technical capabilities of smart cameras that could contribute to a loss of control, or by unintentionally revealing different contextual cues to their home environment through ambient sounds.

**4.2.1 Varying Levels of Sensitivity with Active versus Passive Filming.** The design of our study activities required participants to choose when and how to film, as they considered their intent behind what they captured on camera. This influenced how participants experienced themselves as filmmakers, as well as their feelings towards the camera as a recording device.

Participants referred to their intentional filming in our activities as “active” filming, characterized by feelings of agency or conscious control over the camera. They described experiencing these deliberate choices to film specific moments, people, and activities as more intrusive, and even dominating or aggressive, than setting up a passive camera. Owen stated, “Smart cameras feel passively intrusive on our lives, while someone filming through the window feels deliberately intrusive” (*Looking Out, Looking In*).

Filmmers engaged in active filming often felt uncomfortable compared to circumstances of passive filming. Justin reflected on this during his experience filming his wife, Hannah, from the inside of his house through a glass window during *Looking Out, Looking In*. Feeling like a “voyeur,” Justin was uncomfortable with filming from behind a wall and window, noting the separation between him and his wife: “I was definitely blushing a lot and my face was getting flushed” (*Exit Interview*). Although Justin and Hannah treated other instances of hidden or covert filming with a competitive playful approach (“[it was] like a game”, a way to “plot revenge”, or “get back at each other”), they later became uncomfortable with actively filming each other (i.e., holding and being behind their phone camera). They instead preferred more passive instances of filming (e.g., using their smart camera for the activity or setting their phone camera on a ledge or mount for covert filming purposes). Nathan also echoed similar feelings of voyeurism with active filming. Since he completed *Looking Out, Looking In* at night, Nathan expressed feeling “extra creepy” and wondered how the action of actively filming his wife at night from the outside might appear to his neighbors. While these participants did not have a Pan, Tilt, Zoom (PTZ) camera in their home, their heightened sensitivities to particular household surveillance—and opting instead for others—signaled uncertainties and asymmetries in lived experiences with smart home cameras.

The degrees of sensitivity, voyeurism, and playfulness that participants experienced varied with the levels of engagement required for the study task, as well as camera placement and directionality (whether they were filming from the inside or outside). While some participants made connections between their experiences with these activities to their feelings about having smart cameras in the home (expressed by Nathan and Daniel in *Invisible*), others did not see a direct connection between the two. For some, the active filming in the activities felt distinct from the passive filming done by smart home cameras; these participants did not draw reflections from the activities to smart home cameras. Luke described this difference between active and passive recording with phone cameras and smart home cameras as one of “intentionality,” mentioning the

different and more expansive levels of what might be appropriate to capture on video due to security camera’s fixed locations:

If I’m recording something on my phone, I made a conscious choice. That’s different from security cameras. . . in a fixed location, essentially, always recording. So there’s not that intentionality, which means that, I think in some ways it’s okay to record more things. Like the camera on the front of the house right now. You can see cars that drive past in the corner of the video. And I think that’s okay because I’m not intentionally recording [that]... It’s just an incidental side effect of the positioning of the camera, because I wanted to capture our driveway and front steps. —Luke, *Exit Interview*

Relating these experiences to smart home cameras that are fixed in place, participants distinguished between these different forms of filming [“You don’t really think about a smart home camera actively recording you” —Hannah, *Timelapse*]. One participant, Maya, identified PTZ cameras as a “middle ground” between active and passive filming. She described recording with PTZ cameras as similar to recording with one’s phone, especially if the user is able to directly control its movements.

I recorded on my phone, so it didn’t quite translate to smart home cameras since I was deliberately following the subject. But I suppose there are home cameras that can pan, tilt, and zoom, so that might actually be similar. I wouldn’t be comfortable with someone directly controlling a PTZ camera to watch me like that if I wasn’t expecting it. —Maya, *Looking Out, Looking In*

As PTZ cameras function as an intermediary between fixed-in-place and mobile cameras, they expand the boundaries of the camera’s periphery. Likewise, considerations of the “bounding box” of the camera parallel our observations with participants’ curatorial decisions when deciding what to capture on and off camera, explained in the following subsection.

**4.2.2 Making curatorial decisions when filming.** Participants weighed different aspects of how to manage recording their home environments in these activities, conscious of curating their behaviors on camera. They coordinated decisions with themselves and other household members on whether to record in their home, deciding about camera placement, and whether to delete or share content with the research team.

Some participants curated their filming decisions around temporal considerations. Deciding when situations might be appropriate to record was something that Maya heavily considered during the *Invisible* activity, as she attempted to covertly film Ricardo while he was working. She described starting and stopping the recording multiple times: Ricardo, an academic advisor, worked from home during the pandemic, and Maya did not want to include any private Zoom conversations between him and his mentees on film. Kylie also considered this during *Invisible*. She considered filming Daniel while he was folding clothes in the bedroom, but upon reflection, thought that might have been too intimate to capture (“[it] felt like a potential invasion”).



**Figure 3: The camera rests on a dining table where Owen sits, reaching a spoon into a baby food cup and motioning off camera to feed his child. The camera is angled away from this action, so only the lower half of Owen’s face and most of the table is visible. Various artifacts such as food wrappers, containers, and a pacifier are scattered on the table.**

These curatorial decisions also differed by considerations of content and who might have access to their footage. For some participants, decisions about what might be appropriate to record differed between videos for the study versus what is overall appropriate to capture on their smart cameras. These sensitivities differed between sharing content with the research team, social media, and the cloud. One household, Owen and Christine, decided to keep their child from being recorded on videos for the study. While this was partly due to our age guidelines, it was also consistent with the couple’s desire to maintain their infant’s digital privacy. Christine discussed their decision to refrain from sharing photos of their child on Facebook until he is old enough to consent and framed this as a “political decision.” She further expressed not having control over her data as she was uncertain of how it might be managed or potentially sold on Facebook. However, Christine elaborated that this concern did not extend to their use of smart cameras or cloud recordings (from Google Photos to Amazon cloud storage).

In their activity videos, participants’ relationships with sharing their recorded footage also led to intentional composition and framing choices: maintaining privacy by leaving entities out of frame, making sure information was left out of the video through use of perspective, and tidying up rooms before completing the activity. In one video (*Watching the Watcher*), Owen motions to his child off-screen, spoon feeding his child breakfast. A pacifier and baby food wrapper can also be seen on the table (Fig. 3). Though the infant’s presence is implied through Owen’s actions and the artifacts in the video, the camera is angled in such a way that the focus is on Owen, and the baby is never shown. Here, curatorial recording decisions allowed participants to selectively display information. In some

cases, however, the angle of the camera also revealed or implied other contextual information about the video, leaving potential for interpretation. In this case, that a baby is part of this household.

**4.2.3 Considering curation and its limits.** As camera videos contain different contextual clues about one’s environment, they can also expose how curation may be limited in scope. Participants additionally considered how their videos contained multiple traces of footage, from controlling different angles of the camera or reflecting on how audio conversations may be captured on the recording as well.

In the activity *Perspective*, participants filmed themselves from multiple vantage points: from above, below, and at eye-level. Considering what a stranger might learn about herself with these different perspectives, Jordyn wrote, “For every film piece, I took control of what version of [myself] you could see. . . I think at least you do not get the full story of who I am truly. You only receive a snippet of what I decided to let you see.” Jordyn’s quote emphasizes that recordings can showcase a different “version” of a person based on location of camera and angle and can thus reveal carefully selected parts of an incomplete story. In the *Timelapse* activity, Jordyn also chose to film herself in a way where parts of her body were obscured in the video: by wearing a sweatshirt with the hood up, angling away from the camera, and only capturing her body from above the elbow. Due to this “partial video”, she commented that this framing would not make her feel embarrassed if someone were to uncover her footage in the future.

Sometimes this curated video framing was unintentional, and it was often combined with other forms of data (like sound) that

presented a snapshot of their environment through the felt or implied presence of people, actions, and things from outside the video frame. The videos included snippets of conversations about wedding memories (Owen and Christine, *Invisible*), background music from speakers from afar (Christine, *Looking Out, Looking In*), the sound of a crying baby (Owen and Christine, *Neighbors*), or a cat breathing into the camera's microphone (Emily, *Looking Out, Looking In*). Different camera angles and visual cues in videos also illuminated contextual information about participants and their environment. When Christine attempts to film Owen through a glass window (*Looking Out, Looking In*), her own reflection can be seen in the window—while cameras may be pointed at others, one's surroundings in and around the camera can reflect information about even the filmer themselves. However, participants did not comment on these various streams of personal information that existed outside the purview of their videos. This illuminates how cameras in the home collect and record alternate data forms that offer different contextual clues to a video, often surpassing user awareness.

### 4.3 Relationship to Data

Building from participants' relationship to filming, this section discusses participants' relationships with data as it pertains to managing access and conceiving data as a material possession. This was seen through participants' actions of saving video data as keepsakes and by outlining their understanding of who might have access to their data, including forms of personal metadata attached to their videos. As such, underlying themes of ownership and agency were apparent when participants referred to the physical representations of their data as objects. Overall, participants referred to data in tangible forms, discussing the infrastructural and archival materialities of their data.

**4.3.1 Thinking about data as a material possession.** As participants discussed ownership over their footage, they referred to video data of themselves and others in a way that highlighted its materiality through possession. Participants described their video data as something they have agency and ownership of while discussing whether they would sell to individuals and various entities, or how they kept certain videos caught by the smart camera as a possession or keepsake.

When we hypothetically asked participants how they felt about selling their videos from the study to different audiences (such as smart home camera companies, the government, their family, neighbors, or the research team), we received mixed responses. While all participants said that they would be fine with selling their videos to the research team, several wanted to know why other audiences might want their footage prior to selling their videos. In particular, Nathan felt protective of the video footage that included his wife, expressing this reaction as "macho bullshit":

This is probably to some like, 'macho bullshit' coming out. . . I may be okay selling some videos of myself, [but] I would be much more uncomfortable if my wife was in them. That is partly because I can't make a decision for somebody else, and partly me feeling like I am protecting somebody, which sort of [refers to this] 'macho bullshit.' —Nathan, *Exit Interview*

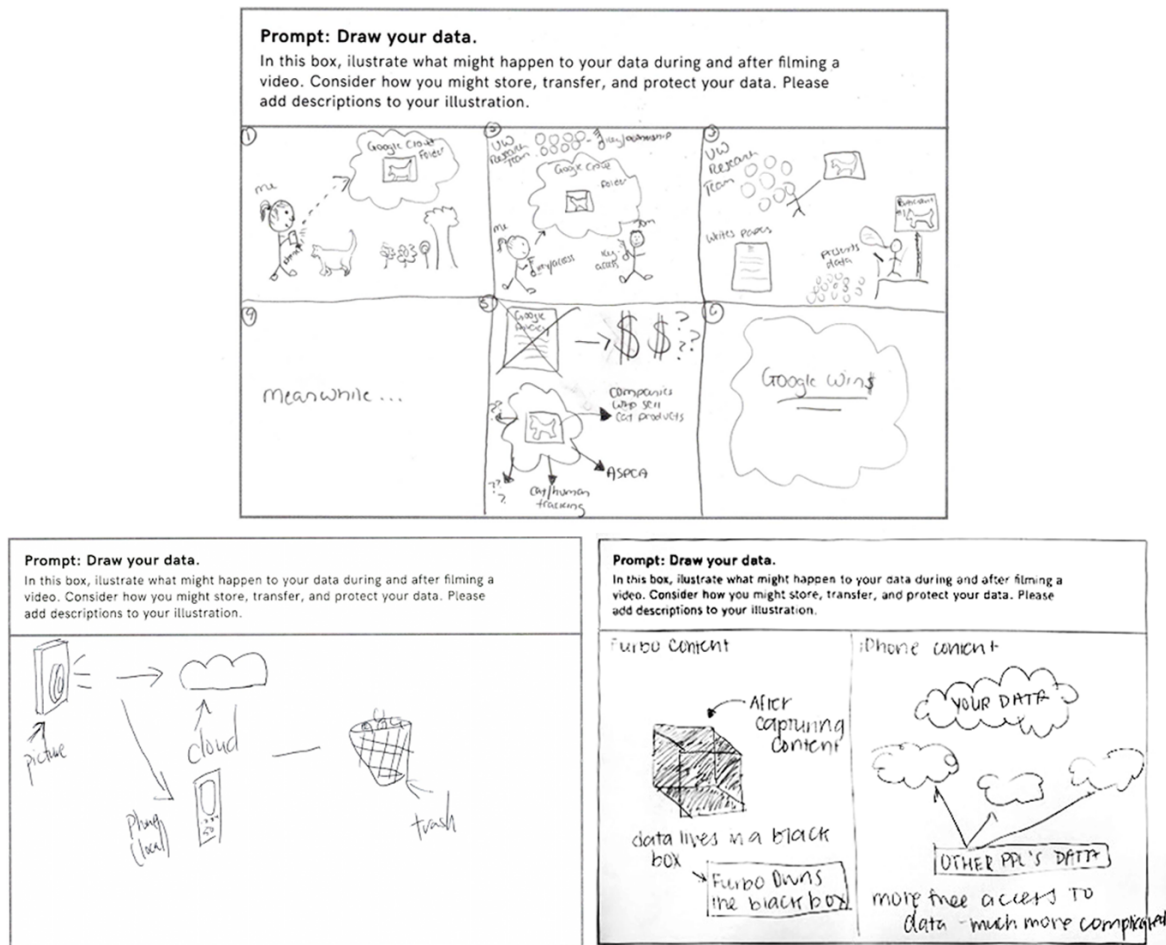
Participants described other examples of how video data might function as possessions when discussing funny or special moments caught on camera as tangible keepsakes, or even family heirlooms. Prior to the study, some participants saved incidental footage of non-primary individuals because they had thought the video was amusing. Justin and Hannah recalled saving a video that they had caught of a delivery driver eating his lunch in their driveway as a funny memory. Emily described a time when her husband, Luke, built a bicycle obstacle course for the neighborhood kids to play with, and their Wyze camera had captured footage when one familiar kid fell from his bike. The child was not hurt, but the couple thought the event was surprising and humorous that they had saved the video.

One moment stood out for Christine and Owen, when their Amazon CloudCam incidentally captured the moment when Christine discovered that she was pregnant, after previously having difficulty conceiving. Though this smart camera recording was accidental, they saved and shared this moment with their family members. In addition, Christine and Owen's *Timelapse* captured playful, routine intimacies when they recorded Christine giving Owen a haircut in their garage and creatively overlaid vaudeville-type music onto the video. In the exit interview, they clarified that the action of cutting each other's hair was not because of the pandemic (and lack of access to barbershops), but that they established this as a routine early on in their marriage. Before this activity, they had never recorded or captured these moments on camera. When asked what they would do with their videos at the end of the study, Christine said that she would keep their timelapse to show to their family.

By saving routine events as digital mementos, participants regarded everyday video data as special. In turn, we see how mundane data becomes objects for preservation, where videos of meaningful conversations, neighborhood events, or even package deliveries can become technology heirlooms.

**4.3.2 Understanding who has access to their data.** Participants discussed how they managed access to their data from their partners or spouses, and how they thought through the exchange and flow of data from the research team, smart home camera companies, and the cloud. When considering the flow of their data with smart home camera companies and the cloud, participants expressed feelings of dispossession with their data. Most participants possessed ad-hoc mental models of where their data goes, where it belongs, and how it is stored (especially in conjunction with the cloud). They discussed these data uncertainties during the *Data Mapping* exercise, as they drew a visual representation of where their videos were stored and who might have access to them.

Participants had varied perspectives on this and considered a wide range of possibilities. Responses showed data flowing through places such as the technology companies that create the cameras servers, internet service providers, and the cloud. Some data maps illustrated the staff at the tech companies as having access to the data, and one included the research team (Emily). Justin's data map, for example, represented "all the hands that touch [their] data" such as the Wyze staff and servers, where "[he is] sure that some videos are used for quality control." In contrast to her husband Justin, Hannah's data map did not include this, mentioning in her Slack discussion post that she believed that this process of storing and



**Figure 4: Top, then Left to Right: Three data map drawings containing one storyboard (Emily), one rendering of an IoT network (Marcus), and one black box and cloud rendering (Maya).** Emily’s storyboard shows her recording videos of her cat, sending the videos to the research team, and then speculating that her videos might eventually be accessed by companies who sell cat products. The last panel states, “Google Win\$”, insinuating that Google has sold her data. Marcus’s rendering depicts an image of the cloud as a general storage place after taking pictures or videos with his smart home camera. Lastly, Maya’s data map depicts the smart camera company as a “black box” where her data is stored, and contrasts this with her iPhone data, which she depicts as existing in the cloud along with other peoples’ data.

maintaining data at Wyze is “automated.” Even within the same household, participants possessed opposing opinions of who might have access to their data. Comparing her data map to that of her husband, Luke’s, Emily stated:

I didn’t even think about the service provider, and what they might be doing with the data! I just pictured my data, and drew it as going into a void somewhere, to be used by known and unknown parties. I think I’ve come to terms with the idea that someone out there is probably making money off of my data. —Emily, *Data Mapping (via Slack discussion)*

We discuss this more in Section 4.4, *Relationship with the Societal Context of Cameras*. However, Emily’s characterization of her data as going “into a void” was consistent with how some participants

alluded to “the cloud” as a pervasive but placeless, groundless, and omnipresent entity. We observe this with Justin and Hannah’s contrasting assumptions of how the smart home camera company might manage their data, or how Jordyn was overall unsure of what to make of the contents in her data map (“I am not sure what is going on”). Many did not specify what “the cloud” is (or where it is, who has access to it, etc.). Participants commented on their uncertainties with smart home technology, just as Nathan described in his initial interview: “I think [about the] old joke... ‘Everybody who knows enough about computers makes sure that they have absolutely no smart devices in their home’... I know how to use [a smart device]. I’m not necessarily sure I know how to protect it.”

Despite these expressions of uncertainty with managing access to their data, participants did not believe that mapping out their data flows would change their overall behavior (Hannah, Christine,

Maya, Ricardo, Emily). For some, this was because the exercise exposed potential gaps in their knowledge with their data flows. Several participants did mention measures that they take to protect their data, and for some, the prompt inspired them to consider where their data was going and how they planned to account for this when filming the enactments. Nathan commented that this process will lead him to verify that “none of his settings are set to ‘back up automatically’” when dealing with sensitive information, and to never photograph or upload those materials “without a dedicated workflow,” Emily password protects their data to protect against hackers, and Maya avoids recording or sharing anything “overly sensitive.”

Some participants expressed how putting their trust in their spouse to add the appropriate data protections is enough. Christine, Emily, and Hannah mentioned that their husbands sometimes monitored the smart camera more than them, but this was not a concern due to the amount of trust in their relationships. Overall, these data maps illuminated participants’ assumptions about information privacy and how they manage this (through individual protections or offloading this responsibility to their spouse).

#### 4.4 Relationship with Societal Context of Cameras

As the study progressed, participants made connections to how they relate to cameras within societal contexts. In this section, we discuss participant attitudes surrounding social and interpersonal norms around recording in general, and how they navigate their complex relationship with smart camera companies through varied perspectives on convenience, novelty, boosterism, and skepticism. Participants also revealed tensions in this complex relationship as they discussed how community surveillance apps associated with smart home cameras reveal themes of whiteness, privacy, and consent. As a result, we coin the term “the conspiracy of the mundane” to represent the ways in which the activities captured on camera may be interpreted, or misinterpreted, and how participants navigate this based on their identity and beliefs about smart cameras and data.

*4.4.1 Considering norms around recording in general.* Participants commented on their perspectives on filming and recording as a socialized norm. In the *Invisible* activity, Sadie recorded Nathan as he was working on his computer. He reflected on how “awkward” it might have been had he been watching a television show with nudity and brought up the show *Game of Thrones* as an example. Nathan stated, “I feel like there are a subset of things we will readily admit to and discuss doing, but having a recording of it somehow seems far more compromising.” Discussing what areas of the house might be appropriate to place a smart home camera, Daniel did not want cameras in his living room for fear of having his private opinions recorded “for time eternal,” and feared being “cancelled” if those conversations were to be shared “20 years from now” (*Initial Interview*).

These activities also sparked discussions on recording in public and private spaces, and how social norms of legality and consent may translate to cameras in the home. When Hannah filmed Justin disc golfing in their yard without his knowledge, Justin reflected, “private places shouldn’t be filmed without consent. Public places

are fair game, but not private places” (*Invisible*). Similarly, Marcus believed that being recorded in public should “[not only be] accepted, but [also] expected, citing that “there are no limitations in technology [to not record you]” even if someone did not want to be recorded (*Exit Interview*). While Marcus acknowledged that it might be unfair for someone to be recorded unbeknownst to them, he said, “to a certain extent, it has to be allowed,” stating “legally and lawfully,” others have the right to record in public.

Some participants took this a step further, mentioning that in this day and age, people should expect to be recorded wherever they are (Christine and Nathan), and that if “you’re going to do something stupid, you need to be prepared for everyone to see that” (Christine, *Exit Interview*). Nathan pointed out that, as recording in public is normalized, actively trying to resist it now makes you a suspect. This also translated to how participants acknowledged recording in private spaces, as smart home cameras blur the lines between public and private. For example, Hannah stated that privacy within the home is conditional on the type of actions that someone was doing at the time (*Exit Interview*); while some areas may be fair game for recording, she would not want to record in an office space while someone was handling confidential material. Ricardo further discussed norms around recording with other guests around his house:

We’ve had people over before and like, I don’t really give them a heads up... Some [of our friends] have asked about it . . . but I never feel the need to tell someone like, “Hey, just so you know, there’s an Alexa right there. There’s a Furbo over there. My phone is probably recording you.” I think of it as just another object that’s there at the time, especially when we’re not really looking at [our dog]. It really is just kind of an object that we don’t try to pay attention to. — Ricardo, *Exit Interview*

Ricardo’s perspective suggests that expectations around what is public or private is relational to ownership. While the home may be considered a private environment in a general sense, the owner of the home ultimately has control over whether there are cameras present, and what areas will or will not be captured on tape. Further, the idea of authority and ownership also extends to the act of filming itself: Justin described how he and his wife swapped power dynamics when treating instances of hidden filming as a game: “The person who is filming is in the power role, they hold the power. . . [so] having a camera [is] almost like a dominating role.” (*Exit Interview*)

When considering the use of cameras in the home, a space traditionally considered to be private, participants speculated on “what could go wrong” if someone had access to their cameras. Participants often addressed the possibility for their data to be hacked, and that this may likely be occurring to some degree already—even referencing Big Brother, the FBI, or the NSA (Justin, *Exit Interview*). Hannah noted, “I’ve accepted the fact that someone probably has my data and is using it for something that I’m not aware of.” Throughout the study, many participants commented on how their everyday activities lacked excitement and felt that it would not matter if anyone else were to view the footage since there was nothing being filmed that would be of interest or compromising.

For example, while Christine considered the potential for hackers to get a hold of their data, she commented, “I figured nothing’s going on in our house” (*Initial Interview*). To Christine, her daily activities could not be taken out of context or viewed in any other way than banal. This is the first instance where we see the conspiracy of the mundane. While participants recognize the potential for their data to be hacked, or accessed in an unexpected way, they are pacified by the belief that what is being captured is mundane and un-open to misinterpretation. This perspective contributes to participant feelings of indifference about the potential for harm, should another entity gain or possess access to their camera data.

Lastly, we consider how participants discussed normalized metaphors for the camera. Specifically, participants related the camera to a weapon to justify its use, and to acknowledge it as a volatile object that is capable of both protection and harm. In his exit interview, Marcus expressed that everyone should have a camera in the home for prevention and protection. He further related this perspective to his beliefs on gun ownership, stating that guns may help deter and protect oneself against crime in their home (*Exit Interview*).

This metaphor also extended to not only consider the camera itself, but its potential for recording. When discussing incidents as seen on social media where two people are filming at each other, Justin commented, “People use recording as a weapon nowadays.” He further elaborated on how this may translate to always-on cameras, especially regarding surveillance in work environments, “if people are always being watched under cameras, it’s almost like, ‘Hey, you better not mess up. I’m watching you. I’m always watching your every move.’” Furthermore, Jordyn expanded on the racialized threat of smart home cameras. When discussing the Neighbors by Ring app (where people share “suspicious” videos captured by their Ring device, and where Ring shares crime, police, and fire reports), she related the experience of filming with cameras as a weapon to call out unfamiliar or suspicious activity: “It just feels like it could be a weapon... as a Black person, I cannot see myself being comfortable using that app because I feel like it would be used against me.” As cameras become more common both in public and in private, the ways in which they are used have been interpreted as a weapon—one that either serves as a method of protection, or one that is wielded against others in a hostile manner.

#### 4.4.2 Navigating relationships with smart home camera companies.

Drawing from the context of the activities and their recording practices, participants discussed their relationship with smart home camera companies through themes of trust and boosterism. In some instances, participants have trust in these entities to provide security and protect their digital data (expressed by Justin, Hannah, and Owen), and show boosterism in their relationships with the entities. In their exit interviews, Justin and Luke both commented that they have sent video data footage to Wyze in order to improve their facial and object recognition features, and Justin mentioned that the videos he had sent were not of himself but of other passersby.

On the other hand, many participants possessed feelings of ambivalence towards the power that technology companies have. Sadie commented, “There’s so much money in selling our data... so that just feels really crappy that... we technically agree to let it be sold, it’s not like we really have a lot of options” (*Initial Interview*).

Participants further reflected that what happens to their data is ultimately out of their control as it “is impossible to avoid in our ever-connected society” (Emily, *Timelapse*).

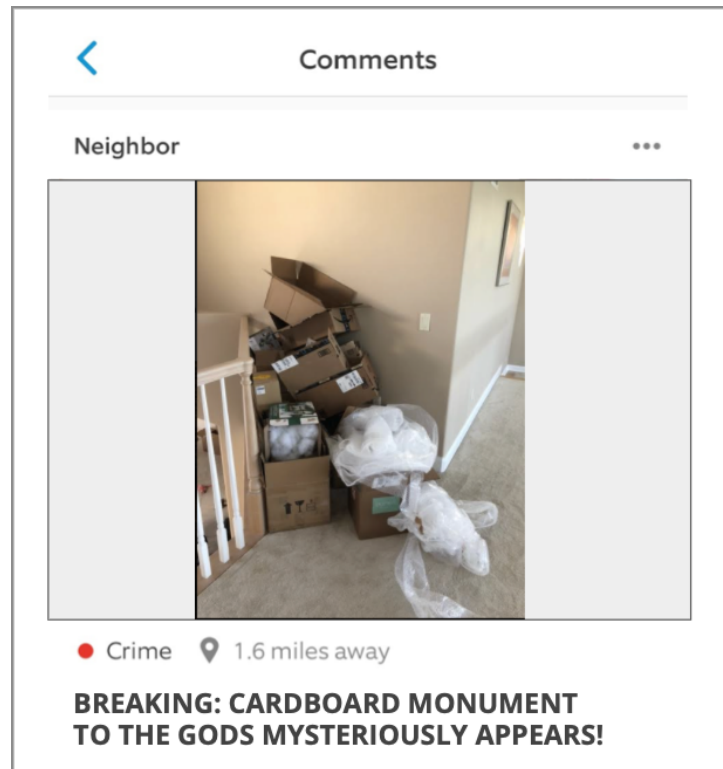
Some discussed their lack of control over personal data as a tradeoff for the convenience and positive aspects of smart devices. Christine stated, “[Smart home cameras and speakers are] so convenient to use that, like you’re giving up your privacy I guess to use that. And hope that they don’t misuse it” (*Exit Interview*). Participants ultimately felt that these conveniences were a worthwhile tradeoff and had come to terms with the potential for misuse: “I’ve come to terms with it. I don’t have anything to hide, so if Google wants to look at all my houseplants and cat photos, so be it” (Emily, *Timelapse*).

Similar to the prior section, participants reconciled these feelings of ambivalence, and their willingness to trade access to their data for convenience, with the idea that they lead relatively mundane lives. Therefore, it did not matter if someone were to view their video footage. These reflections, as well as participants’ considerations of what could potentially go wrong, demonstrate varied opinions between readily accepting that technology companies are actively accessing their data, and skepticism that it is being readily exploited, but that there is potential for it to be stolen by hackers. This builds upon the conspiracy of the mundane, demonstrating how participants are willing to welcome technology into the home that is seen as providing a service, despite the potential loss of privacy. Many participants who use smart home cameras validated the perceived benefit of this trade off by concluding that they do not have anything incriminating to show, so they were willing to continue using the technology.

**4.4.3 Creating conspiracies from mundane events.** Despite establishing these norms and justifying that their everyday activities could not be seen outside of a banal context, participants also engaged in the possibility of dramatizing these banal events to extreme conspiracies. Within the Neighbors application, these mundane conspiracies often function as an extension of whiteness and policing. This was replicated in the *Neighbors* activity, where participants engaged in crafting “small crime scenarios, and created a fake post in the style of the Neighbors app. Participants mentioned having fun capturing videos of their partner or themselves committing a small crime. Encouraged by the framing of the activity instructions, participants took a humorous approach to this.

Participants called themselves or their partner out for silly things, and crafted dramatic responses that were a satirical take on what might be seen on a real neighborhood watch app. When Nathan captured a recording of Sadie sprinkling Italian seasoning “all over the kitchen” while eating pizza, he warned others not to let her near their kitchen. He commented, “Hide your kids, hide your wife. This is so scary!”, a reference to Antoine Dodson, whose news feature became a viral meme [28]. In another instance, Daniel posted about Kylie leaving a pile of boxes in the hallway (Fig. 5), saying “A cardboard monument to the gods mysteriously appears!” These posts reframe habits that may be seen as annoying to their partner as criminal behavior that needs to be shared as a way to protect others.

Despite crafting lively and playful Neighbors mockups, some participants picked up on the critical aspect of highlighting this



**Figure 5: A screenshot of Daniel’s Neighbors post, where Kylie has left a stack of cardboard boxes and large plastic bags in a hallway corner of their house.**

particular use of smart home cameras and adopted a more serious tone in their activity reflections. Justin wrote about the potential for these apps to encourage profiling of “suspicious” people, or making wild accusations without having enough background information, and Christine commented that they can be used to “call out and overreact to other people just going about their business.” When asked to compare or contrast their own identity to that of a watchful neighbor calling out “small crimes”, Jordyn responded that, “As a black female, I find [the Neighbors app] very troublesome, because these kinds of apps would exist in a more predominantly white neighborhood. I would be concerned for my safety.” In the interview, Jordyn further discussed how she adopted an “affluent mindset,” taking part in whiteness, to engage in this activity:

I couldn’t really genuinely see myself using this app or knowing anybody using this app because I couldn’t see this app existing beyond an affluent neighborhood, is why I was like, well, I would have to think of [this activity] through an affluent mindset. And then usually stereotypically the affluent mindset is Karen’s<sup>1</sup> and Gertrude’s and Betty’s and all those people. —Jordyn, Exit Interview

<sup>1</sup>The name “Karen” is in reference to a name for a problematic white woman who often acts out in racist public scenarios [73]. The other names that follow (Gertrude, Betty) also refer to common names of older generations of white women who also exhibit racist behavior.

Nathan showed a similar perspective on the potential for harm, reflecting that “neighbor surveillance on ‘crimes’ was resonant with difficult and problematic political issues” with “out of context picture[s].” Nathan went on to reflect that “neighborhood watch” platforms are “a high-tech substitute for the old lady in the windowsill” and that he “can only imagine it enables racist profiling by those with too much time on their hands.” He further reflected on the Neighbors app and smart home cameras in general:

[The] idea that everybody is under threat, that crime rates are increasing, when it’s the complete opposite. . . over the last 20 years or something like that... All you’re doing is feeding into this hysterical narrative of everyone’s out to get you. And it is very hard to untie the racial issues of this country with those social [narratives]. —Nathan, *Exit Interview*

This shows a progression in the conspiracy of the mundane. As participants reflect on their experience dramatizing the “small crimes” of their partners, they demonstrate the potential for seemingly banal activities to be misinterpreted when viewed from different perspectives or (intentionally or not) without the full context of the situation. The belief that their everyday actions are mundane, and therefore un-incriminating if accessed by hackers or smart home camera companies, allows participants to invite cameras into the home. However, the ways in which data accessed by outside

entities can be misinterpreted or misused is unpredictable and may be potentially dangerous.

## 5 DISCUSSION

Our findings reveal insights on a spectrum of concerns and considerations about people’s relationship with cameras in the home. Designing critical-playful activities to inquire about these relationships allowed us to investigate a range of experiences of people living with cameras in their homes. While these experiences were lived, embodied, and situated in everyday environments, they were also emergent and speculative—the activities allowed us to push participants to consider imaginaries beyond normal home camera use. For example: What might be revealed if we purposely highlighted the role of the filmer? Or what if, instead, we emphasized ‘small crimes’? Through the use of speculative probes, we thus expand what cameras in the home mean to both users and non-users of smart home cameras. We further articulate design and research recommendations from our study through discussing the patterns of ‘the mundane’ as a salient concept throughout our findings, participants’ post-hoc reflections with smart home camera footage, and critical perspectives on new media and agency. Lastly, we conclude with meta-reflections about our research method and overall takeaways.

### 5.1 Mundane Events and the Banal

One emergent finding was the contention between what is truly mundane and the varying interpretations of the seemingly mundane. Mundanity can be commodified, it can be conspiratorial, but it is most of the time not neutral. This expands on recent literature concerning the perceived objectivity of data and IoT records [19, 48] and mundane enchantment as a potential for design [55, 71]. For example, participants cited ways in which mundane events can be commodified through capturing it through video. In our study, we saw how smart camera footage spontaneously captured fond or funny memories. Even our activities captured videos of routine intimacies that may not be previously captured or reflected on, echoing previous research of technology as heirlooms and memory-making machines in the home [46, 78, 90]. This corroborates how routine events may be looked upon nostalgically in retrospect [98], and how having video footage of these routine events (through automated means with smart home cameras, or even manual recordings with our activities) can re-invigorate what this means for memory-making.

But, while participants referred to the mundane as a commodity, they also referenced it in correspondence to a conspiracy (through dramatizing events in the *Neighbors* activity or citing the possibility of hackers or data leaks). While participants admitted that they live banal lives and have ‘nothing to hide’, they speculated how some of their actions may be taken out of context, or even used as ways to profile them through the conspiracy of the mundane. We saw how this intersected with power and privilege as some participants (Nathan, Justin, Jordyn) discussed dynamics of race, class, and gender in smart cameras, and the various forms of policing that cameras enable. Participants recalled their experiences of community surveillance in the *Neighbors* app, reflected on the experience of watching others through the camera (feeling “creepy” or like a

“voyeur,” per Justin and Nathan’s reflections about active filming in *Looking Out, Looking In*), and speculated about what video footage gets protected, by whom, and in what ways (regarding Nathan’s comment of how he would be more protective of who could access video footage of his wife as “macho bullshit”).

These results support Gilliard and Golumbia’s discussion of smart home cameras as luxury surveillance items, and how it contends with different dimensions of privilege [37]. They state, “People who believe they have ‘nothing to hide’ willingly submit to surveillance, pay more for it, and put themselves into a highly privileged category of person.” While smart cameras are in its ethos a luxury surveillance item, many of our participants cited the low cost of Wyze or sale specials for Amazon cameras as reasons for adopting them. Lower-cost options for smart cameras mean that this luxury surveillance technology can be more pervasive and available to broader ranges of people.

As smart home cameras predicate illusions of impartiality and neutrality through their inherent security purposes (concurrent with Hong’s discussions of datafication and objectivity [48]), our discursive exercises illuminate the subjectivity of video footage under different categorical lenses (through framing video histories through smart alerts or on the *Neighbors* app, for example). This extends work by Kurwa [59], who describes how the neighborhood surveillance app Nextdoor builds a racially and economically exclusionary space through creating a digitally gated community. Such infrastructures of inequality are pertinent when considering engagements with smart cameras, and especially in conjunction with neighborhood policing apps [8].

Similar to sociologist Pierre Bourdieu’s concept of habitus [7], which describes how everyday practices are shaped by one’s internalization of their material conditions (such as one’s history, culture, and traditions), we contend that *the everyday is not neutral*. We demonstrate that while everyday events were generally seen as banal or mundane, they also had the propensity to become commodified through having recordings of them. *Security is not neutral*, as identified by participants’ discourse about power dynamics, ownership, and metaphors of the smart camera as a weapon. Contending with inquisitions of race and marginality, these subjective video histories are reminders of how seeing is not neutral; a term that philosopher Judith Butler coins as the “racially saturated field of visibility” in her discussion of the Rodney King trials [12]. We discuss this in respect to different dimensions of marginality in the conspiracy of the mundane. Bridges [8] describes how the *Neighbors* app expands the carceral state but obfuscates the infrastructural elements of these inequalities through normalizing security threats—presenting the Ring camera as a neutral and objective way to maintain one’s security.

These risks and power dynamics are important as they contrast with some participants’ justifications for why the increased prevalence of these devices are okay (pointing out that their lives are banal). Our examples show the mundane as both a commodity and a conspiracy—thereby illustrating the frictional dimensions of users’ interpersonal and societal relationships to the camera within the day-to-day technicalities of operating it. We implore researchers to further unpack these mundane frictions, deconstructing the camera’s inherent political dimensions while also acknowledging its potential for everyday reminiscence and care. Through evaluating



people’s perceptions and experiences with these power dynamics, our findings point to methods for questioning the camera’s setting, positioning, and potential. These shifting tensions of the mundane as both a conspiracy or commodity generate new provocations for everyday interactions with the camera: *Whose perspectives are being foregrounded? Who gets to be behind the camera or interface, both physically and metaphorically (in terms of facilitating data access, or controlling the framing of the narrative to others around this access)?*

## 5.2 Engaging with Camera Footage through Post-Hoc Reflections

While the previous section foregrounded the explicit and implicit power dynamics of the mundane, here, we further reflect on the topic of framing through participants’ reflections of their camera footage. Our activities called for participants to actively review their video footage, which was atypical for many: participants cited that they had not thought about their footage in as much depth or scrutinized themselves on camera in the way that was required of these activities. These post-hoc reflections inspired participants to view themselves as both operators and targets of the camera’s eye, and to discuss data insecurities of who might have access to their footage.

Through interacting with their video footage after filming and being filmed in these activities, participants engaged in forms of self-reflection with their image. This was not usually done with smart cameras, but our speculative activities allowed participants to reflect on their self-awareness and self-presentation on camera [39]. They also considered how they represented themselves in and outside of the camera’s frame, played with different perspectives and vantage points, and made different curatorial decisions of what to include or exclude when filming. As such, an approach oriented toward intentionality and self-reflection can be a powerful tool for designers to foreground privacy implications for smart camera users. For example, as a step beyond activity zones which allow users to limit recording to certain areas, design nudges in a smart camera’s onboarding experience may prompt users to be mindful about their self-presentation and self-awareness, and to further consider what is included in the camera’s frame.

Additionally, while participants were not by any means non-primary camera users, the activities more directly allowed participants to see and position themselves as the target or object of filming through dynamically switching roles as the filmer or filmee each week. As they dissected their appearance while reviewing their footage, participants considered the idea of consent more closely. For example, Owen reflected that cameras need to be more visually conspicuous to non-primary users, and Justin and Hannah discussed how these activities increased their consciousness of privacy around indoor smart cameras (and now unplug them or turn them off when they are at home, only turning them on when they’re away). These reflections are aligned with recent calls for using affirmative consent as a framework for designing sociotechnical systems [52].

From the initial *Data Mapping* exercise, we asked participants to consider how their videos may be stored and accessed by others—something that many acknowledged that they had not thought very deeply about prior to our activities. As participants engaged with

our activities that were informed by contemporary debates surrounding AI and ML technologies [43] within contexts of domestic surveillance and daily life [22, 76], some expressed concerns about hackers and a lack of clarity with their camera data. Others acknowledged that their home camera is a ‘black box,’ and described conflicting mental models of how their data may be accessed at the level of companies, third parties, and cloud storage.

As a result, we contend that reflective enactments are a necessary design opportunity for engaging with and understanding power roles and opaque technical infrastructures of access, longevity, and materiality within smart camera systems. How, for instance, may we draw connections between the various streams of data, footage, and metadata in smart home cameras? What can researchers learn from playfully and critically situating the detached pattern aggregation done by smart camera systems and companies in concert with the rich, vivid, and deeply textured content from user video footage? Future work may investigate these reflective experiences with data and footage as design opportunities, as inspired by prior work using metadata and uncertainty as design material [5, 77].

## 5.3 Critical Perspectives on New Video Media and Agency

Our activity enactments opened new possibilities for exploring definitions of active and passive recording in the context of participants’ feelings of discomfort and voyeurism while filming. We identify the difference between active and passive filming as dependent on the amount of agency individuals feel that they possess over the camera, paralleling Cheng et al.’s investigations of “passive” or “active” data collection with their designed camera artifact [15]. While this may differ across different types and functionalities of devices (from using a phone camera, to smart home camera, to using the PTZ feature in some smart cameras), this definition of active versus passive recording was also dependent on participants’ actions (such as the difference between setting a phone camera down to record from an angle, versus physically holding the device).

While smart home cameras similarly possess the potential for people to enact rule definitions through automated methods (e.g., setting up activity zones to leave out certain areas of the house or setting the smart camera to only record at night), recording with a phone camera requires people to consider these rules on an ad-hoc basis, at the moment of filming. For instance, some active filming scenarios forced participants to confront the camera’s gendered dynamics, as conveyed by Nathan and Justin in *Looking Out Looking In*. Thus, appropriating the camera and smart camera to film these enactments revealed different norms around active and passive filming. What might be acceptable with a smart home camera versus a phone camera? We contend that this practice helps us critique and complicate accepted norms around recording with smart cameras.

Here, PTZ cameras act as an extension of the boundaries of the camera frame, existing in an intermediary state between active and passive filming. What can we learn as the automated processes of cameras allow for increased motion tracking capabilities? We argue that this further contributes to a loss of privacy, making it more difficult to impart the same levels of agency with cameras in the home as participants demonstrated with their curatorial decisions throughout filming our study activities. These curatorial decisions

illustrate the unique ambiguities cameras in the home have with respect to framing and positioning, despite the pervasive reach of the data aggregation systems within smart cameras that collect and combine audio and visual data with complex data privacy flows. Alongside similar calls for IoT data legibility and privacy [33], we propose that designers must preserve these curatorial ambiguities, and must acknowledge if and when data flows are disrupted during recording (as Nissenbaum dictates with her work on contextual integrity [74]).

These forms of active-passive monitoring (through PTZ cameras, for example) make the spatial boundaries of the camera frame more automated and invisible, while ever more expanding their all-encompassing reach. Such technological capabilities may increase the reach of surveillance and shift norms around what constitutes public and private spaces. Technologies such as Amazon Ring’s smart security drone camera render the home as a public-private intermediary. Conversations with participants about their expectations from recording with smart home cameras suggest that increased surveillance is normalized—especially when participants consider public scenarios referring to “legal” and “lawful” norms, and where they acknowledge that even resisting this surveillance can be suspect. As smart home camera technologies are further developed and deployed, we call on smart camera product designers to assess the surveillant reach of their devices and to preserve (or reinstate) stricter boundary distinctions between public and private spaces within the home.

#### 5.4 Methodological Reflections on Critical-Playful Speculations

Our design inquiry allowed us to create alternative conversations about cameras in the home. These activities forced participants to take part in potentially uncomfortable situations (within their boundaries of consent), to potentially disrupt their use (for smart home camera users), and to extend their discursive thinking about cameras through playful, imaginative, and unfamiliar experiences.

Our research method broadens possibilities for speculating outside participants’ actual experiences and defamiliarizes the role of cameras in the home through creative probes. Our research is uniquely grounded in participant everyday experiences [13, 27], but also speculates possible and new imaginaries for relationships with cameras in the home. This draws outside of the scope of empirical interviews or contextual inquiry studies. While our activities were intentionally detached from participant current practices, they were also situated in their social realities so that these enactments were consequential in nature.

These enactments also allowed the research team to prompt generative reflections throughout the study. We designed the activities to be open-ended but provocative—with the intention of bringing participants in conversation with some of the critical research dialogues surrounding IoT and data, while also learning from their existing and emergent uses and experiences with cameras in the home. This research approach allowed participants to produce generative reflections that went beyond from simply documenting how participants use cameras through observations or interviews. Our method served as an opportunity to honestly confront the weight and power dynamics between researchers and participants—aligned

with research justice rationales following the knowledge exchanges between participants and researchers as co-speculators [21, 30, 51]. As we navigated certain conversations about always-on sensing whilst leaving these themes open to interpretation, the degrees to which we balanced both closeness and distance with our research engagements afforded conscious interactions, reflections, and speculations about the concepts we foregrounded in our study.

Conducting a discursive activities-led study thus requires extensive consideration in assessing how and what dialogues are being foregrounded and enacted through these activities. Applying this method in the context of asynchronous remote communities (ARC) creates a uniquely collective research experience, which may in turn affect participant responses and influence how grounded theory-informed analyses are conducted. In a few cases, participants directly considered the thoughts or perspectives of their other cohort members during Slack discussions (such as acknowledging the differences in how they conceptualized access to their devices during the *Data Mapping* exercise, for example). Yet, since our participants were not heavily engaged with follow-up conversations with their peers on Slack, they reported that their attitudes were not generally affected by their other cohort members.

Consequently, the limitations of this method are implicit in the effort required to create an intentional and long-term investigation that acknowledges the positionality of researcher-participant interactions. This method requires sustained engagements with participants, necessitating a research agenda that is compassionate to participants’ energy and capacity—especially important with conducting this study during the COVID-19 pandemic. Furthermore, our approach is limited to analyzing the sheltered home to scope our research, although domestic scenarios vary on an individual and societal basis. [54] Our work has illustrated the variety of experiences with cameras in the home from those who do and do not own smart home cameras. We encourage future work to build on our critique of norms around recording in the home, and to center the experiences of non-primary users interacting with smart camera technology.

Finally, though this discursive design study falls outside the scope of more traditional studies of the body at work in surveilled environments, we argue that these sorts of rich cultural data (i.e., mediated footage and/or curated scenarios from smart home systems) are necessary to more fully understand how people cohabit with sensing devices. Further explorations in critical-playful enactments are especially valuable for IoT researchers to generate new possibilities for thinking, acting, and being with everyday sensors, while simultaneously making the act of speculation familiar to participants. Overall, these critical-playful enactments provide approachable scenarios for participants to reexamine routine interactions with their devices by positing themselves as intentional collectors, observers, and curators of their own data.

## 6 CONCLUSION

In this paper, we present an investigation of the existing and possible potentials of smart cameras through participants’ long-term engagements with critical-playful activities about cameras in the home. Informed by applied ARC methods and discursive research approaches, we examined the social and interpersonal tensions of

filming in domestic environments by deploying a series of creative prompts to explore different dimensions of the role of cameras in the home. These activity enactments prompted participants to engage in speculation with their own households and online groups by appropriating their existing camera devices as tools for discursive inquiry.

Our findings reveal several layers of dynamics of the relationships between people and cameras in the home, from interacting with and considering the camera's gaze, unpacking participant assumptions with data privacy, and reflecting on the broader societal implications of the smart camera. Considering these insights, we offer generative reflections for working through the frictions and opportunities of living with always-on and invisible devices. We present novel concepts to guide future research directions: reframing the banality of technology in the home as the “conspiracy of the mundane”, and positioning smart cameras as an intermediary between active and passive forms of filming. Doing so, we highlight potential opportunities for designing interactions with smart cameras, such as curatorial considerations and data management. Lastly, we provide methodological reflections on creating a discursive activities-led research approach and impart promising directions for future design-led explorations in IoT and HCI. As everyday surveillance in private spaces becomes increasingly normalized through new forms of pervasive technology like smart cameras, we hope that researchers, designers, and users continue to engage in critical reflections about personal data and power.

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## APPENDIX

### A EXAMPLE OF ACTIVITY AND REFLECTION QUESTIONS

#### A.1 Week 3—Looking Out, Looking In (Individual Scenario):

The prompts this week will focus on how cameras function inside and outside spaces. There will be two prompts, in which you will film from the inside of your home, looking out (Prompt 1); and where you will film from the outside of your home, looking in (Prompt 2). If you are able to use a smart home camera, you might try using it with this activity. This is also a good opportunity to play around with the positioning of the camera as well (filming from above or below).

**Prompt 1:** First, set up the camera on the inside, looking out (i.e. through a door, an eyehole, a window, etc). You should film yourself, things in nature, or your surroundings (but also please make an effort not to capture too many bystanders or strangers on camera).

**Prompt 2:** Now, set up the camera so that you are filming from outside of your house, looking into your home (i.e. through a window or glass pane). The same rules apply here: you can film yourself or your surroundings inside the home.

Afterward, please answer the general reflection questions below.

##### A.1.1 Prompt 1 (Looking Out):

- What happened in the activity?
- For example: When did you do the activity? How did you plan to make this video, and what considerations did you have while making the video? How did you react to the activity?
- What was it like seeing yourself (or others) in this video?
- For example: Did the position or angle of the camera affect how you saw yourself on video? Or, did anything happen in the recording that might have affected how you saw yourself or others?
- In the activity, were you mostly filming yourself, or things around the house?
- Was there anything you liked or disliked about the experience?
- What, if anything, surprised you about using the camera in your home?
- How did you feel about filming and watching yourself (or others/ other things) on film through the door, eyehole, or window?
- How would you feel about filming strangers in the same set up (setting your camera in, looking out)?
- Please reflect on how the physical boundary of the door, eyehole, or window might affect your perception of the video and the act of filming things or someone else outside.

##### A.1.2 Prompt 2 (Looking In):

- What happened in the activity?
- For example: When did you do the activity? How did you plan to make this video, and what considerations did you have while making the video? How did you react to the activity?
- In the activity, were you mostly filming yourself, or things around the house?
- Was there anything you liked or disliked about the experience?
- What, if anything, surprised you about using the camera in your home?
- How did you feel about filming/ watching yourself or others on film in this activity?
  - How did you feel being watched from the outside?
  - How would you feel about filming other strangers in the same set up (setting your camera outside, looking in)?

- How did you decide to put the camera in this place?
- Did the positioning of the camera affect your perception of the video?
- Imagine that a stranger uncovered this video five years from now. Is there anything potentially alarming or embarrassing in the video, or things in the video that could be misinterpreted in any way?
- Imagine that the person being filmed is a total stranger. What message would you leave to them, based on the video you captured?

#### A.1.3 Overall Questions.

- How did your experiences from Prompts 1 and 2 differ?
- How did this experience compare to your prior experiences or knowledge about smart home cameras?
- What are your thoughts about cameras in the home?