

# Caring About Sharing: Couples' Practices in Single User Device Access

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## ABSTRACT

Most devices today are developed adhering to a one-user paradigm. Yet within households, couples are often sharing devices and accounts. In this paper we take an in-depth look at sharing practices and preferences of cohabiting couples, and discuss the nuances of existing practices surrounding accounts and devices. We present a qualitative interview and diary study with ten couples, consisting of 20 individual interviews, and individual 8-day diaries. Dichotomous access models do not reflect the sharing practices of our couples; in which intent, access, and utilization all characterized sharing behaviors. We present a detailed description of the intentional and unintentional sharing practices our participants used in their day to day interactions and discuss the different challenges that particularly one type of content pose in terms of issues of privacy. We discuss implications for accounts and devices based on the ways in which content was shared and hidden among collocated couples. We provide a structured account of these sharing practices to inform the design of multi-user settings within future technologies.

## Keywords

Groupware; social software; sharing of devices; mobile computing practices.

## 1. INTRODUCTION

In recent years, personal devices have become more and more sophisticated and essentially contain similar content to a desktop computer or laptop, including personal communication, online social networking and the ability to search the broader Internet. In essence we have reached the stage predicted by Mark Weiser in which tabs, pads and displays are available to most people in the developed world. But one part of Weiser's prediction has yet to come true: the readily sharing of pad sized devices between for example colleagues and family members. In 1991 Weiser envisioned: "Pads are intended to be "scrap computers" (analogous to scrap paper) that can be grabbed and used anywhere; they have no individualized identity and importance." [[29] p. 99] Yet, the majority of personal devices today are developed according to a one-user paradigm. Even most tablets (e.g. iPads) have adopted the

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phone's user interface and access model where, after initial opening, every single app is readily available (with some exceptions due to type of app and personal settings). However, today many personal devices *are* shared, if not explicitly (i.e. two people only have one phone), then at least ad hoc [20]. From the early mobile phones to iPads and smartphones, particularly close ties and cohabiting couples are using each other's devices and content through shared passwords on a regularly basis [2], [16]. A spectrum exists between the fully personal and fully shared, and we know that even for devices that are usually seen as 'personal' such as smartphones, ownership and access are not limited to the individual [2], [16]. Some services offer different profiles, such as Netflix, in order to support multiple individuals in a household, others are explicitly minded towards no sharing. However, not all account models reflect the intricacies of people's social context, nor the shared tasks that people have to fulfill together [17]. People do not use access models the way in which they were designed, nor should they have to [16].

In this paper we address the sharing of computing technology, particularly elements of personal devices and content that is normally perceived private, either through password protection or broader social context. We look particularly at sharing between cohabiting couples because they represent one of the closest, yet equal dyad of relationships (as opposed to for example child-parent relationships that include a set of socially and biologically construed power dynamics). The dynamics of cohabitating couples is relevant because couples spend considerable amounts of time together, have common household goals to achieve, and potentially purchase and use technology together. Couples navigate both the promotion of intimacy through sharing of private information, as well as the maintenance of individual personal boundaries. As a couple, individuals also create shared boundaries on access to and disclosure of personal information to others outside of the two partners [6].

We distinguish our work by examining how the pervasiveness of mobile and interoperable technologies is reflected in the daily technology uses and habits of co-habiting couples. We aim to expand the design space for shared devices by focusing on why and how couples share single devices and applications. We provide a framework of different types of sharing of devices and content. While "sharing" can be a convoluted term, we specifically use it in this research as a notion to describe how couples provided and received access to personal devices and content through physical sharing, password sharing or other processes. More detailed insight

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\*The majority of this work was performed while at Yahoo.

into these practices can provide implications for designing better personal technologies focused on individuals' unique habits, goals, and values. We also discuss how this work leads to implications for

the design of accounts based on these classes of practices as well as content type. Through a qualitative study of 10 cohabiting couples, our work provides the following contributions:

- We examine how couples share and receive access to each other's personal devices and their content. Our findings reveal that sharing practices were characterized not only by having or not having access, but also by intent and utilization. We structure these practices into four categories: intentional sharing, explicitly not sharing, unintentional access and unintentionally inhibiting access, providing examples in which these activities occur.
- We define three types of shared content, and assess how these content types can be appropriate and sensitive to share. This helps to highlight personal and shared values that ought to be considered in future technology designs.

## 2. RELATED WORK

### 2.1 Couples' closeness and boundaries

Couples present an interesting group to study as aspects of collocation and closeness influence daily behaviors and routines. The dynamics in couples are complex, and partners in a couple influence each others' affect and behavior in both mundane and profound ways [10]. They are both an identifiable unit, as well as two individuals with their own preferences. By definition, they share physical spaces, and reach intimacy by sharing their experiences. When apart, couples appear to miss being able to share presence, mood, environment, daily events and activities, in lightweight, playful, pleasant ways [19]. Couples' closeness means they may be more open to certain types of sharing. For example, perceived closeness was found to be the main predictor for willingness to share location [30]. At the same time, they have to manage the dialectic of both closeness and personal space, through simultaneously sharing and maintaining boundaries [6]. Preferences for interpersonal communication are not necessarily stable, and depend on the perceived state of the relationship. For example, research has found that couples distance themselves from each other in conflict situations through technology [9, 20].

Through a better understanding of these behaviors, research has helped to expand the design space for communication and coordination technologies, as couples can require a unique set of design requirements beyond those for individuals or other, less intimate groups. For example, Branham et al.'s work has examined unique ways in which technology can support couples, specifically examining the use of diary sharing to support intimacy [3]. Research within the CHI and CSCW communities have provided new ways to allow long-distance couples to feel closer and share more aspects of their distant lives [1], [19], [23].

In this paper, we focus on cohabiting couples, and extend earlier work on for example in-home technology. Grinter et al. explored the impact of increased technology in the home, and how designers could better align designs to couples' needs [11]. This work revealed that technologies such as recommendation systems, which are designed for individual use, led to new tensions among couples. A recent Pew study also found that technologies can cause issues between couples, mainly due to partners being distracted by their phone (25%) or spending too much time with technology or on the internet (8%). Additionally, 4% of couples reported being upset at something their partner had done online [18]. Helsper and Whitty point out that there is little research on everyday, low-level surveillance on a significant other's online activities in non-abusive relationships [12]. In a large-scale UK-representative survey they were surprised to find that a third of the survey respondents

reported actually checking up on a partner's online activity without their partner knowing. Monitoring activities included reading their emails, SMS, instant messaging logs, checking browser history, using monitoring software or even pretending to be another person. Rather than focusing on 'checking up' and potentially problematic online behaviors, we here more qualitatively explore how couples together managed access to devices in the household and each other's accounts.

We extend prior research by examining sharing of devices between collocated couples. By understanding existing access behaviors, we may be able to better align designs of personal devices with user preferences, thus avoiding conflicts instigated by technology access models. As the ubiquity of personal computing has increased, we aim to explore sharing behaviors of these new technologies, and specifically examine the discrepancies between sharing behaviors. Our work expands on this existing knowledge by demonstrating how understanding sharing through couples' intent and utilization of shared access can help future technologies better support the unique needs of collocated couples.

### 2.2 Sharing, Accounts and Information

A wider body of existing research on shared devices, and shared systems or artifacts, such as calendars [27], exists. Providing partners with access to online accounts appears a relatively widespread behavior. In 2006, Bryant and Campbell found that students were most likely to share passwords with spouses or parents with 13.79% reporting that they do so [5]. Beyond students, a US-representative Pew study found that most couples have separate emails and social media accounts, and that while only a small number share accounts and calendars, a majority of 67% of internet users in a committed relationship had shared passwords to online accounts with their partner [17]. In another survey with 162 participants, one third of the participants reported sharing email account passwords and a quarter shared Facebook passwords with others, again primarily with close friends and romantic partners [15]. Regarding their partners, respondents reported sharing passwords to personal email accounts (17.3%), Facebook (15.4%), cellphones (12.3%), computers (11.7%), and Amazon (11.7%). Some participants also suggested partners would know them well enough to be able to guess their passwords anyway, something we return to in our data.

A pertinent example of the practicalities that necessitate shared access to accounts, or at least the information contained therein, is provided by Lampinen [16], studying multi-person households who host visitors in their shared home through couchsurfing.org. Couchsurfing accounts however, are not designed with multiple people in mind. Lampinen found difficulties with presenting multiple people in a profile designed for one person, managing shared and individual reputations as couch surfer hosts and guests in others' households. They also found intricate coordination to negotiate access to the shared domestic space. One person may for example be in charge of communicating with potential visitors via the Couchsurfing account, but information about the visitors has to be shared with other household members to make a communal decision and coordinate their potential visit. While this Couchsurfing context may appear a case of small business rather than familial coordination, it illustrates the importance of consideration of others' presence beyond just the couples and 'traditional familial unit'.

Sharing access to accounts and devices can fulfill both practical and social goals [16], [24]. Understanding these behaviors, and their motivations, can help provide greater insight into users' needs which in turn feeds into technology design. While past research has

shown an overall willingness for couples to share access with one another, we wanted to understand what motivates this willingness, and why couples may choose not to provide access to devices and accounts, and how this manifests in potentially varied practices. When personal information is disclosed to a partner, the sense of ownership over this accessible information shifts from the originating individual to the collective [6]. This involves negotiating how to fulfill such a shared responsibility. It is unclear to which extent this ownership shift also occurs in sharing access to a device and other types of content. We thus also wish to gain insight into the complexities of personal boundaries as they related to shared access practices and technology ownership.

### 2.3 Access to technologies in the home

Prior studies have noted that access models oftentimes do not appear to take into account the intricacies of existing social practices. Stevens and Wulf emphasize that purely technical mechanisms, focused on either rejection or acceptance of access based on a preconfigured mechanism, do not properly take into account the social practices surrounding access control [26]. In 2007, Brush and Inkpen conducted a study of household technology sharing [4]. They found that generally, household technologies employed a profile model to manage access. While the use of individual profiles afforded customization and privacy, this organization hindered convenience and sharing. Thus, families needed to select between using individual profiles, or sharing a single profile and forgoing personalization. Karlson et al. also note in the context of mobile phones that all-or-nothing access models do not support the range of user needs that they observed [15]. As Bell found in her study of cellphone use and ownership in Asia in the 2000's, technology can maintain individual identities, but is shaped by social roles that make ownership a murky concept [2]. Bell for example describes instances of how parents gave children cellphones as they wanted to ensure their safety and could access the phone to activate the phone's location tracking feature. While parent-child relationships are significantly different from adult couples, this example the complexities of device ownership within households.

Research has aimed to bridge the gap between user needs and the available access models. Egelman et al. suggested a new model for home computers that allowed a "compromise between sharing and personalization [9]." In their model, documents and settings are shared by default, and a person can manually make certain items private through a personal profile. Mazurek et al. find that users themselves create access-control mechanisms. They indicate dimensions that appeared to influence these mechanisms, including 1) Distinguishing read from write access, 2) people's (physical or remote) presence, 3) location, e.g. at home or in public. We return and reflect on these points in relation to our data in the discussion.

In this paper we further explore dimensions that influence device and content sharing practices. We derive design implications from the framework presented to help future technologies better meet the needs of collocated couples.

## 3. METHOD

Our aim for this study was to understand how collocated couples share devices, accounts, and digital content with one another in their daily lives. We utilized participant interviews focusing on couples' sharing practices and technology preferences. A follow up diary study was then used to gather specific examples of how participants communicated on a daily basis. The diary study helped to provide context to the interviews by providing actual examples of recent sharing behaviors among couples.

These interviews and diaries collected data for two studies, another one focusing on why couples pick particular communication and messaging services to contact each other while apart [8]. In this paper, we focus on the device and account sharing practices in the household.

We used both communication and coordination use cases in this study. While many communication studies between couples exist within the HCI and CSCW community, these usually focus on communication over a distance. We choose to focus on the communication and collaboration while collocated couples are both together and apart in everyday situations.

### 3.1 Participants

We recruited 10 couples (20 participants) to participate in this study through Craigslist and social media. An initial recruiting survey was used to ensure couples met the requirements of being over 18 years old and living together. The ten participating couples included seven male-female including one transgender participant, two male-male and one female-female. Participants' ages ranged from 19-60 years old and represented a diverse set of careers including students, a professor (outside of a computer science field), a spiritual coach, stay at home parents, a designer, a manager of a small firm, a programmer, and an architect. While all couples lived around the San Francisco Bay area, couples' homes spanned an area of approximately 40 square miles.

The way in which participants had officiated their relationship with their partners varied. Four couples were married, two couples were in a domestic partnership, and four were not married but cohabitating with a significant other. The length of the relationships also ranged, with three being together for less than one year, three together for 1-5 years, one together for 5-10 years, and three together for more than 10 years. Their living situations varied as well. Six of the couples lived by themselves without children or housemates. Two families with children participated. The first family had one child; the other family had two children and a family member living with them. One younger student couple traveled in between a house shared with multiple roommates during the week to their parents on the weekends. One couple lived with another couple as housemates.

As in many qualitative studies, this sample is not meant to be representative of the population, but rather meant to gain insight into a diversity of practices.

### 3.2 Participant Interviews

We conducted 20 semi-structured interviews to gain an initial understanding of their technology sharing behaviors and motivations for communicating throughout the day. Interviews lasted 1.5-2 hours, and took place at participants' homes or at the researchers' office. The couples were paid \$75 per couple as compensation for their time. Interviews resulted in roughly ~1500 minutes of transcribed data to be analyzed; excluded were rapport-building or chats less relevant to our research or sections where interviewees, for example, during home visits had to tend to tasks or children.

The interviews consisted of three sections. First, for interviews that took place in participants' homes, we used a home tour to get an inventory of the technology owned by participants, and to see where the technology was kept. For office interviews, participants were asked to sketch their homes, indicating where they kept technology they owned. This included listing the communication and Internet-connected devices, and identifying who, from their perspective, owned each device. This initial sketching exercise

proved useful as both an icebreaker and allowing us to learn about participants' home environments.

For the second part of the interview, participants were provided with two blank daily calendars. Participants were asked to talk aloud as they filled out one of the calendars with a description of a typical workday, and one with a description of a typical non-work day. For this activity we specifically asked participants to discuss when they used technology and when they communicated with their partner. This activity allowed us to understand how participants use technology outside of the home, and how couples communicate with one another.

The final part component of the interview consisted of a semi-structured interview guided by the information that participants shared in the previous activities. Questions focused on personal technology uses, technology sharing behaviors, information sharing, and privacy preferences.

All participants were interviewed individually so that we could gain insight into their personal technology and privacy preferences. This allowed us to gather individual perspectives on the couples' practices, and allowed the researchers to better understand the context as a whole by combining information from each individual afterwards.

### 3.3 Diary Study

Upon completion of the interviews, participants were asked to participate in an 8-day diary study that looked at their communication and coordination with their partner. Participants were asked to individually answer a short set of questions each day about a specific time they used technology to communicate with their partner. Questions focused on the motivation for the communication, the channels used to communicate, the information shared, and the success and challenges of the communication.

After a general question about the day's communication modes (e.g. text, just face-to-face), the diary consisted of two sections. First the diary asked "Did you and your partner use technology to coordinate an activity together today?". This section included five questions focused on the coordination goal, tools, devices and applications used, the perceived success of coordinating the activity, difficulties, and potential improvements for the tools used. Participants could skip these all in case they could not recall a specific coordination instance that day. In the second section of the diary, all participants were then asked to describe another instance where they communicated with their partner, and the following aspects with similar questions to those above (now in 8 fields): who and what prompted the interaction, tools used, perceived success and potential difficulties. Participants were also asked to share screenshots or pictures if they felt comfortable doing so.

All of the ten original couples agreed to participate in the diary study, with 19/20 participants submitting diary entries. Participants were compensated \$10 for each diary entry. Participants received 8 individual email reminders to fill out the diary. Participants were provided with longer (~1.5 weeks) to fill out the maximum of 8 daily entries when they wished to overcome time constraints and missed reminders. We received 125 entries and 62 screenshots during the study, with each participant contributing 3-8 entries (median = 7 entries, mean = 6.2 entries). Diaries could contain multiple examples of communication instances. In total, 65 coordination cases were shared with us and over a 100 communication entries. 28 additional emails were sent in with 62 screenshots or photos.

## 3.4 Data Analysis

Upon completion of the data collection, two researchers analyzed the data. We used an iterative inductive analysis to code over 500 items, and develop theme concepts until full agreement was reached between the researchers. These individual items of analysis were exact, full quotes from participants, which came from the first 10 interviews. We then used the other interviews and the diary study entries for theme validation. The full interviews were used in this stage to find supporting or non-supporting evidence.

Through inductive coding we developed a number of themes related to the sharing of devices and accounts that highlighted access, intent, and utilization as important characterizations. The themes structure we present in this paper organizes the various sharing behaviors used among our participants.

## 4. RESULTS

Through our conversations with participants, we found that couples employed a number of techniques for balancing the desire to share technology while also maintaining privacy. One issue of sharing devices is that by sharing a device, the majority of the content on the device becomes available. It is therefore difficult to distinguish between sharing a device and its content, personalized to the owner. Yet, a device can still be used to access personal or public content by a borrower through logging in to an app or a web browser, or simply using the web browser. We therefore present results for both device (and thereby content) and account sharing interlinked and tease out this distinction in more detail in the discussion. We present our results in terms of device and content access sharing in relation to *intentional sharing practices*, *explicitly not sharing*, *unintentional access* and *unintentionally inhibiting access*.

### 4.1 Intentional Sharing

Sharing devices and accounts were common among couples. Half of our participants provided examples of deliberate sharing practices. Often, these activities were motivated by a practical need, such as coordinating household tasks including grocery shopping or running other errands.

Several couples discussed using a shared calendar to communicate individual schedules and coordinate events. Using both personal and shared calendars was a common strategy among couples. For example, as one participant shared:

*"We have a joint Google calendar... That has been really awesome because we can both insert things into the Google Calendar. Pink is me but green is us." – P6*

Note sharing was also common among several couples as a way to share task and grocery lists. Applications such as Evernote allowed couples to specifically share the notes and lists relevant to both partners. In addition to calendars and notes, media accounts that did not contain personal information were frequently shared. These accounts included music accounts and newspaper subscriptions. For example, one participant shared that he and his partner use their own laptops for entertainment but will use the TV to "*stream Internet radios*" - P13

When inquiring into when participants would use their partners' devices and accounts, we found that a practical need was the main motivation. For example, as one participant discussed, the couple's two young children were taken care of mostly by the wife, who thus had little time to deal with her email account. He had in effect become responsible for ensuring her email got taken care of, replying to non-spam emails from her account, and sometimes printed out emails for her in case she needed to take care of an issue herself so she did not necessarily have to log in.

*"I go through all these files and one of the email accounts is her email account. She doesn't always have time to go through it and a lot of times it's just junk or spam... I'll go through and clear out the emails for her"* – P6

This behaviors could be seen as monitoring the other partner, similar to those discussed Helsper and Whitty [12] However, in this case, this particular practice actually served a more practical reason than monitoring. The husband read his wife's emails in order to help alleviate some of her daily responsibilities as she took care of their two young children.

#### 4.1.1 Creating Shared Accounts

Only two couples had consolidated their accounts or made joint accounts for the specific purpose of sharing content (which was often watched together). One participant described how she had combined her and her partner's Netflix accounts:

*"We both had Netflix accounts streaming with 1 DVD so we said okay. Let's move to one Netflix account with 1 DVD and I said let's set up a Gmail alias because I know how to make Gmail aliases forward to our email addresses."* –P12

This did not mean they added individual profiles in Netflix. For them the ease of just sharing one profile trumped individual Netflix recommendations. Another couple created a shared Facebook account; however both participants indicated that the account was used infrequently and only one partner was responsible for keeping the account 'up to date'. The different circumstances that caused couples to share devices and account information was mainly focused on maximizing the value of the service to each of the partners when it made the most sense for their individual situation, or in service to their practical needs.

#### 4.1.2 Respect for Partner's Private life

We found that although many couple's shared accounts, access did not signify usage. Often partners reported having access to both devices and accounts of their significant other but opted not use this access. This behavior was motivated by a desire to show respect of their partner's privacy and the absence of a practical need. This motivation was clearly expressed by one of our participants who said:

*there's really nothing to hide at the same time... you want to share but you also want to keep something back."* – P12

Some participants also indicated that while they know each other's passwords, they wish to respect each other's privacy. For example, one couple knew each other's email password but chose not to use them:

*"I do not log into his email address... we can check emails for each other. We don't usually do that. Yeah, that's a little bit of privacy that we respect each other."* – P17

Thus, when a practical need was not present, participants often discussed that they chose not to use their partners' devices or accounts. As participant said:

*"We have to have some kind of space and boundaries. Like personal conversations with friends"* – P5

It was expressed as a desire to respect the other's privacy that motivated participants not to use each other's personal technology. While these motivations help to explain sharing when access is intentionally shared, some participants also described an interesting sharing behavior in which access was intentionally shared, but the participant would only want the access to be used when both partners were together. Participants discussed with us sharing behaviors in which they felt comfortable with their partners' accessing their devices and accounts only when they were both present. One participant discussed this supervised access with regards to sharing bank information:

*"If I came here and open up the door or something and she's looking at [my bank information] I would be like, kind of, probably pissed off actually. It would make sense to me. But like, if I was looking at it already and she came over, then I don't care."* – P10

As this example illustrates, the notion of supervised access was typically discussed as a way to demonstrate participants' parallel desires to maintain personal privacy while also demonstrating a level of openness with their partners. Many couples that mentioned behaviors categorized as supervised access typically relied on communication and in-the-moment decisions to guide when access was provided. For example, as one participant said:

Access	Activity Examples	Content
Intentional sharing	Sharing passwords, leaving devices unlocked	Media, music, calendars (public content)
Explicitly not sharing	Using separate devices	Search histories, personal conversations (personal content and conversations)
Unintentional access	Accidentally viewing private content	Search histories, personal conversations (personal content and conversations)
Unintentionally inhibiting access	Forgetting to share passwords	Personalized accounts such as Netflix (tailored content)

**Table 1: Intentional and unintentional sharing practices among collocated couples**

*"Really we can get on to each other phone anytime we wanted to... there is no reason to."* – P3

A finer-grained distinction within this category included *using* others' accounts such as Amazon Prime for purchases, but not looking at for example personal purchase history due to considerations that it would be somewhat inappropriate. Participants expressed discomfort with having their partner seeing information based on past content search:

*"I think I would be annoyed if he sees my bookmarks or my search results. Sometimes there are things that you want to be personal but*

*"If you ask to see then sure, there's really nothing to hide."* - P4

As illustrated in the examples above, supervised access allowed participants to provide access and demonstrate trust while also maintaining privacy. This behavior provided a more balanced option between intentionally sharing full access of a device or account, and intentionally maintaining privacy, which we now discuss.

## 4.2 Explicitly Not Sharing

Purposefully not sharing devices, account passwords and content was a common theme across our participants. 10 participants across 8 couples provided examples in which they explicitly did not share some type of personal technology. Some participants discussed how personal technology was one of the few parts of their lives that they chose not to share with their partner:

*"I never use his laptop. He never uses my laptop. We just don't share. That's funny, because we share almost everything else really, but that like our separate spheres." – P1*

We found that desire to maintain privacy was not the only motivator for intentionally withholding access to personal devices and accounts. In addition to maintaining privacy, the social consequences of sharing led some participants to not provide technology access to their partners. For instance, one participant (P1) stated that she would not share her search history with her boyfriend because she was concerned about him judging her. Another participant also commented he would not want to share his search history with his partner because of the potential stress the information would place on his partner:

*"I want a child really bad and he didn't. Now he is kind of for it but before I was looking up all the information about adoption... I was keeping it away from him because I didn't want to pressure him but I wanted the information." – P3*

In addition to privacy and social consequences, a practical need to not share was cited as a reason why participants did not provide access to their personal devices or accounts. For instance, two participants (P19, P3) noted that many of their devices are shared except for their partners' work computers, as the jobs required that the devices not be shared due to security. As with these examples, external factors typically lead to the need for devices to not be shared. Another participant shared a similar example in which he did not have access to his wife's bank account that she used as it was an account used for her father:

*"She has some accounts that are just for her because for example they deal with her dad. We handle some of her dad's finances. So a Bank of America account that she's on but I'm not." – P6*

Across all of the participants, different devices and accounts were kept personal. Participants mentioned search histories, bank accounts, Tumblr accounts, and personal laptops as devices or accounts they chose not to share with their significant other. Thus, we found that while couples express openness in sharing many types of accounts, personal content was often used as a way to maintain one's privacy and personal identity.

In each of these examples, a choice is made of which needs prevail, one's own, the other's, or the needs that relationship maintenance presents.

## 4.3 Unintentional Access

An interesting observation from our discussions with participants is that many participants did not make deliberate decisions about sharing practices. With these unintentional sharing events, sharing access often occurred accidentally, while breaking down privacy occurred because the participant or couple had not considered changing pre-existing access restrictions. While we often found that participants intentionally provided each other with access to one another's devices and accounts, occasionally participants discussed accessing devices or accounts unintentionally, resulting in the accidental sharing of information and content. Unintentional sharing often occurred given the proximity of collocated couples' personal technology, leading to one person accidentally viewing

information on a device or account in which access was not purposefully granted. Five participants (from four couples) shared different moments in which unintentional sharing occurred. For instance, one participant disclosed that unintentional sharing occurred when her boyfriend was passing her cell phone:

*"I've made a promise that I'm not going to adopt a dog before January. A few weeks ago I sent someone a message, a craigslist person asking about a dog and they didn't respond until very early in the morning... and my phone was on his side so he woke up and he gave me my phone and he was like 'what are you doing looking at dogs?' I was like 'I was going to tell you I swear.' So that was really unfortunate. He's like, you're a mess I'm deleting this message you are not getting a dog right now, we're not ready for this" – P10*

Other participants discussed specific instances in which unintentional sharing led to tension between the couple. As one participant mentioned:

*"The only time that he's seen anything that I didn't want him to see online was some Facebook messages. I was actually on my laptop and he was behind me, and it was stuff from a friend who was male, and it wasn't even anything that exciting or anything, but I knew that he would be upset." – P1*

Conflicts that arise due to unintentional sharing of technology can be difficult for couples to deal with. One participant specifically described feeling unsure how to handle such situations:

*"There will be sometimes I would see who he's chatting with. Sometimes you're like 'who's this person?' Sometimes I would approach him and it can be tension because you have to balance a fine line. You don't want to be intrusive but at the same time as a person, for me, I like to know." – P4*

Needs for preserving the relationship by consideration of the other here appear to prevail over one's own curiosity. Unintentional sharing of such privileged information then becomes a somewhat interesting situation, as this accidental sharing aligns with actual preferences on the receivers' end. Thus, while unintentional sharing can occur, coping with the tensions such accidental sharing causes can prove challenging. The main cause of this sharing is the physical living situation of collocated couples.

## 4.4 Unintentionally Inhibiting Access

We identified several instances in which participants would unintentionally prevent their partners from accessing personal accounts and devices. When we asked participants why they did not share certain devices or accounts, many indicated that the lack of sharing was unintentional.

For example, one couple that had been living together for over a year used the same Netflix account. The woman said that she used the account more often than her boyfriend and uses the account freely. However, when discussing ownership of the account, she stated:

*"It's definitely his. He pays for it, and it's in his name. I don't even think I know the password to it, but it logs in automatically." – P1*

P1 mentioned that when the account logs off automatically she is unable to access Netflix until her boyfriend signs back in. Despite this inconvenience she had never asked to know the password. Thus, while the boyfriend did not purposefully withhold the account password, his girlfriend did not ask for the password. Typical of many similar conversations, participants often shared that they were willing to share accounts or devices, but either never had a reason to share their password or forgot the password to their partners' accounts.

In another non-access example during an interview, a participant wanted to show he could log in to his partner's laptop. He however could not remember the password, and expressed it did not really matter anyway.

Thus, unintentionally preventing access seemed to always occur because a practical need to share the device or content never arose, or that the partner did not feel a need to have such access from a social or affective standpoint, or even the practical need to remember after having used a device or account before, so the need to (further) share never came up in discussions or through couples' behaviors.

## 5. DISCUSSION

One of the interesting distinctions that emerged from our results was the differentiation between types of content that were potentially being shared. As highlighted in the introduction, personal devices are still generally developed to be personal devices and couples are essentially 'hacking' the intended use by sharing devices in the first place. But devices contain many different types of content in an aim to differentiate different types of content we divided it into three group, still routed in our data. We distinguish between *public content*, *tailored content*, and *personal conversations*. We define and discuss these different types of content before framing the sharing of the devices and different types of content within the theoretical framework of contextual integrity [22]. Finally, we discuss implications.

### 5.1 Different types of Content

When sharing devices, as we saw, one of the main motivations was one of convenience. Couples shared devices if one device was closer to them on the coffee table or if it was in the room they were currently in. And this lead to the deduction that couples also shared content because of convenience, such as media accounts and browsers, simply because they did not want to log out and in again, simply to have their own bookmarks or their own media history. Already back in the desktop era, Brush et al. found a similar motivation to share and use the same desktop account, despite having set up separate accounts for different family members [4]. But as we witnessed in our study, all content is not equally personal, some was considered more sensitive than other and some was considered more sharable than other.

#### 5.1.1 Public Content

We define public content as content readily available from not just a browser but also generally through media accounts such as websites, blogs, and music applications. Although some were located behind a paywall, most of it was not sensitive of nature since it was so widely available. We found that this type of content was fairly readily shared between partners.

In addition to information that is globally accessible, we found that some content was considered open information for both partners. For example, shared events, tasks, and grocery lists were not considered sensitive information and were relevant to both partners in a couple. Thus, this information was consistently shared through various applications.

#### 5.1.2 Tailored Content

Tailored content was defined as content that was tailored to the individual, often through personal algorithms such as social media and the browsing history but which was not necessarily *about* the person. This type of information was considered sensitive because it could inform the partner about previous digital interactions. Partners often maintained separate accounts for tailored information. For example, while couples did watch movies on

Netflix, they often maintained their own accounts and would frequently share accounts only when together.

#### 5.1.3 Personal Conversations

Finally, the last type of content that could potentially be shared was personal conversations found in email programs, social media direct messages and text messages. Often these messages would be unintentionally shared through notifications in personal devices or partners looking over participants' shoulders while using the device. This was the most sensitive type of content that participants mentioned and the type of content they rarely, if ever, accepted to share (with an interesting exception of the participant who helped his wife control her email).

This taxonomy of content is not an exhaustive categorization but it serves the purpose to better understand what and why our participants were willing and not willing to share different devices. In essence it helps applying our data to the framework of contextual integrity.

### 5.2 Breaking Down Contextual Integrity

The framework of contextual integrity [22] attempts to provide an explanation of how and why people become uncomfortable with sharing data or information pertaining to their person such as personal data, pictures, or information that could in aggregation reveal intimate details about the person. Nissenbaum argues that all areas of life and society are governed by norms of information flow, which dictates what information is considered private and that we as individuals have "[r]obust intuitions about privacy norms" that are rooted in social and stereotypic situations [22], p. 119]. Norms of appropriateness then leads to the maintenance of contextual integrity in a situation evaluated by the involved individuals.

Applying this framework it is clear that personal communication never meant to be shared with the partner, both from sender and receivers' perspective, is considered sensitive, as we witnessed in our interviews. The accidental sharing of this breaks the contextual integrity. Reversely, public content is not seen as overly sensitive, since it is readily available to others as well (although sometimes through a personal account). Tailored content complicates the situation because it takes otherwise semi-public data out of context. A friend's status is meant for *their* friends to see but the friend does not expect this to be seen by the friends' partners. The status is considered private to the friend's friends and inappropriate to share with even their partner. This type of content is to a higher extent deemed either appropriate or inappropriate to share with the partner on an individual basis, which muddles the regulation of sharing personalized content. Similarly, past search behavior is not considered adhering to informational norms when the search was for example done in private. These types of content challenge the normative force within the relationship, despite most of the actual content not being 'secret' content for the partner. But since it was lying outside the informational norms, it was considered sensitive for both sharer and receiver.

### 5.3 Implications

#### 5.3.1 Implications by Content Type

Our research examining couples' digital device sharing confirms the impracticality of the prevalent all-or-nothing access model used for many personal technologies, including cell phones, personal computers, and most online accounts. However, with technology being personalized, we also found that joint ownership of devices is not very common and that sharing technology is not solely about providing access to a partner's personal device without considering the type of content.

Public content was the most frequently shared information. While this often included sharing public media content, participants also highlighted the utility of creating public content through private accounts. This mechanism allowed for the creation of shared calendars through Google and shared notes through applications such as Evernote. Using this successful feature in other domains would bolster support of these existing sharing patterns. For example, devices and accounts could enhance the opportunities for couples to use shared spaces for photos, emails, and other content that is relevant to both partners. While some applications to provide these shared spaces, we must continue to improve upon the ability for users to switch between private and shared content to create more seamless experiences.

Participants often viewed tailored content, personalized to individuals, as content they were willing to share, though less frequently than public content. Further, the value of personalization often resulted in couples maintaining independent accounts. Thus, tailored content was most commonly discussed when participants spoke about time in which they unintentionally inhibited sharing, as these individual accounts require personal identifiers such as passwords to access. Devices and accounts that include tailored content may better meet the needs of couples and families by providing sharing mechanisms that allow partners to request access. Further, connecting platforms to partners' commonly used devices and accounts would eliminate the need to memorize additional passwords. For example, allowing couples to request or provide access by using their mobile phone numbers would provide a more accessible validation method for partners.

Private content, such as online conversations, was rarely shared among couples. Participants often specifically spoke of intentionally not sharing this type of content. However, due to the close proximity of couples living together, this personal information was occasionally shared accidentally, occasionally leading to awkward or uncomfortable moments as a consequence. Therefore, with private information it becomes necessary for the user to have more direct control over the presentation of these personal accounts and conversations. Existing designs make it easy for users to see messages when they appear from various applications. However, our participants' discussions of unintentional sharing highlight the importance of providing easy ways in which users can change these design settings. Users may wish to change or hide notifications based on their location, time of day, or online activity in order to maintain privacy in shared atmospheres. For example, a user may wish to disable notifications from all online conversations (including Google Hangouts, Facebook, etc.) when watching Netflix or Amazon movies, as these applications are frequently used with his or her partner.

Trust can be demonstrated by providing access, but trust also means not using all the access that has been provided to you. Providing or being provided access thus is not the same as sharing all content within an account. Automatically surfacing content from accounts that both partners have access to may not be appropriate. Providing this greater level of control over private content could help reduce these awkward moments among couples, while helping individuals maintain their desired level of privacy in their otherwise shared lives.

### 5.3.2 Device Implications

Trust and intimacy play an important role in couple's daily lives, as they share a household, friends, and many other personal aspects of life [14]. Sharing of personalized devices and passwords, can be a behavior used to demonstrate trust. Couples indicate a level of trust by providing each other access to accounts and devices, but

this does not mean that they necessarily want to utilize this access. While sharing of personalized content was generally considered easy, our participants aspired to provide their partners with a sense of personal space by not using their partners' devices or accounts, even when access is provided, particularly personalized content and communication was considered too personal to share. This has consequences on the ways in which technology supports household communication and coordination.

We thus found that many of our participants used personal devices as a place to maintain or provide their partner with privacy and independence. Their considerations for maintaining privacy however were not simply determined by the two partners, but adhered to a common understanding of informational norms and maintenance of the contextual integrity. While our interviews focused on couples, we found that many of our participants' households included in-laws, roommates, extended family members, and children, each with their own goals and interests [13]. Thus, deciding whom to include in 'the household' and how to accommodate their preferences surrounding digital access remains a challenging question that persists for technologies that exist within or for multi-person settings. As households become more complex and include more people, the need to support more specific intentional sharing becomes vital.

One obvious design suggestion would be to implement multiple profiles for personal devices, easily adjustable for example through identifying a fingerprint or two separate access codes. Although, as previous research on desktops have pointed out, these profiles were in reality not always used [4], the ease of access through a simple log-in mechanism, could mediate ease of access. But it would be naïve to think that sharing (or accidentally glancing over) of personal devices would *never* take place, and one suggestion is to use our content taxonomy for defining default privacy settings. Personal communication should per default never be shown on top of a locked screen (but could be set to be shown) but public content could be readily available. Tailored content should be easily adjustable for display and access on personal devices.

Designers must also consider the dynamic nature of relationships. Participants rarely discussed the opportunity of a breakup or divorce, although one participant did state that the hardest part about breaking up would be to "go through your drive and separate each other's photos" (P10). While users may not be thinking about such an unfortunate situation, as system designers we should prepare for such complications. Such preparations will be especially important in situations where multi-user systems create archives incorporating information, valued memories, and personal data from individuals.

## 6. CONCLUSIONS

Through an in-depth exploration of couples' sharing practices, we have identified four common sharing behaviors: intentional sharing, explicitly not sharing, unintentional access and unintentionally inhibiting access. Pervasive one-user paradigms cause couples to 'hack' the intended use of technology to support sharing needs. At the same time, we found many couples reserve particular types of content, mainly personal conversations with others, as a way to maintain privacy. Yet, existing technologies have not provided collocated couples with the ability to maintain the desired privacy in shared living situations. Through this work, we connect content types with sharing practices in order to reveal how technologies may better support both information sharing and privacy needs.

## 7. ACKNOWLEDGMENTS

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