

Things We Own Together: Sharing Possessions at Home

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ABSTRACT

Sharing is an important facet of human relationships, yet there is a lack of research on how people share ownership of possessions. This paper reports on a study that investigates shared ownership of physical and digital possessions through interviews with couples and families in 13 households. We offer a more nuanced definition of shared ownership and show that certain practices, which are central to sharing physical objects, are not supported in the sharing of digital content. We suggest potential approaches to address this, focusing in particular on how the sharing of possessions plays a role in the building of relationships and is done against a backdrop of trust.

Author Keywords

Ownership; sharing; home; virtual possessions.

ACM Classification Keywords

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

INTRODUCTION

Sharing ownership of objects is a powerful way that people establish and maintain relationships with one another. As Belk states, “Sharing tends to be a communal act that links us to other people. It is not the only way in which we may connect with others, but it is a potentially powerful one that creates feelings of solidarity and bonding” [2, p. 717]. However, while sharing practices involving physical objects are well established in daily life, the ways in which sharing functions when it comes to digital content are neither well understood nor well supported. Indeed, research has demonstrated that ownership *per se* of digital things is more fraught and uncertain than that of physical objects, especially when that content is in the Cloud [16,19,21].

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CHI'16, May 07 - 12, 2016, San Jose, CA, USA

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ACM 978-1-4503-3362-7/16/05...\$15.00

DOI: <http://dx.doi.org/10.1145/2858036.2858154>

Further, when digital content is stored in shared repositories it tends to be seen as ‘mine’ or as ‘yours’, but rarely as ‘ours’ [22].

There is, then, a recognized need to better support shared ownership of digital content. However, research on the topic has often focused on the workplace [e.g. 4] and educational settings [e.g. 22], with the aim of enabling finding or re-finding of content in shared repositories, and preventing a build-up of clutter. Little attention has been paid to how systems could be designed to enable sharing and joint ownership practices around digital objects, with an eye to how these help define and strengthen relationships between people.

In the study reported in this paper, we explore how shared ownership is handled in the home, with the broader aim of considering how we might design to support shared ownership of digital possessions. Our contribution is threefold. Firstly, we clarify definitions of shared ownership, which, we will argue, varies by degrees. Recognizing distinctions across the ownership spectrum has implications for how we might design to support shared ownership.

Secondly, we offer insights into how shared ownership of digital content is accomplished in the current landscape of services and devices. We detail various approaches to sharing adopted by our interviewees, including the appropriation of single user accounts and the establishment of workarounds for service agreements.

Thirdly, we demonstrate some of the ways in which shared ownership is bound up with relationships. People become accountable to one another through their use of shared objects, and so shared ownership plays a role in how parents socialize their children and how couples exhibit trust in one another. These findings highlight how shared ownership at home is distinct from previously studied settings, and is worth focusing on in its own right. In the next section, we outline what is known about shared ownership at home.

RELATED WORK

To date, little research has focused specifically on shared ownership. As Belk observed, “Despite its pervasiveness, the ubiquitous consumer behavior of sharing remains not only theoretical terra incognita, but a nearly invisible and unmentioned topic in the consumer behavior literature” [2,

p.716]. Relevant research has primarily been undertaken in the field of consumer studies, and has focused on topics such as the sharing of resources, space, and knowledge in addition to the sharing of objects. [2,3,12]. Outside of consumer studies, research focused on domestic spaces has uncovered insights on sharing practices [13,23]. These areas of research have produced nascent definitions of shared ownership, insights into how it is managed in practice, and an initial understanding of what sharing implies for those doing the sharing. We review this literature, alongside relevant work done in HCI, here.

Beginning with definitions of sharing, Furby (a consumer studies scholar) made a distinction between ‘collective possession’ and ‘sole ownership.’ She found that collective possession was tied to the right to use an object, whereas sole ownership was tied to the right to control use of it, including use by others [12]. Belk and Llamas further distinguished between ‘sharing’ and ‘joint use.’ They identified sharing as “possession or ownership [that] is joint. The shared object is effectively ours rather than mine or yours...” [3, p.627]. This is contrasted with joint use, or “borrowing something or feeling that it is free for another person to use” [3, p.635]. Belk and Llamas argue that joint ownership is more likely to occur within the family than outside of it, where they say that joint use is more common.

This emphasis on family runs through the literature on sharing. Belk noted that “sharing within the Western family is centered primarily within the home” [2, p.724], and Furby argued that “Even within American society, most individuals experience many cases of collective ownership, particularly within the family setting” [12, p.165]. The focus on the home and family is bound up with three further themes. Firstly, sharing implies responsibilities to others in the home. Belk found that these “may include taking care not to damage shared possessions, not overusing these things to the detriment of others, and cleaning up so that others will find these resources in a similar state of readiness for their own use. Such responsibilities underscore a difference between shared possession and sole ownership” [2, p.717].

Secondly, research on domestic spaces has found that sharing is key in the construction of shared identities. The home is an important space in which couples and families construct their shared identity through common preferences and aesthetics, as well as through compromise [23]. The latter is especially relevant in the context of shared spaces within the home: Gorman-Murray’s participants “emphasized the importance of juxtaposing personal objects together at home... as a way of symbolically bringing two lives together, generating a shared identity which is a combination of two individuals” [13, p.160].

Thirdly, and related to the point made above, the home offers a particular backdrop for how sharing is accomplished. In two HCI studies of communication in the home, researchers noted that spatial locations of objects conveyed information to household members [9,11]. Elliot et al. noted

that “Each location within the home has an owner...” [11, p.261], although spaces could belong to everyone in the house or to some subset of residents, as well as to an individual. Rouncefield and Tolmie’s study similarly found that locations of books communicated expectations regarding the appropriate use of those objects [24]. They highlight the importance of communal space, contrasting what is signified by a personal pile of books in a private space with books kept in a ‘general store’ (typically on bookcases), these being “...places where people put books that are *not* being currently read and these are understood to be available for reading” [24, p.147].

Notably, Rouncefield and Tolmie observe that in contrast to physical books, in the case of e-books “The book is not located within the broader topology of the home” [24, p.143]. Meanings that are associated with physical spaces in the home support the sharing of physical belongings. However, these meanings do not necessarily extend to digital content, such as when content that might otherwise be placed in a general store is located on a personal, portable electronic device. That said, in other cases, digital content is accessed via situated devices, such as family computers and games consoles, which are often located in communal areas of the home.

While work in HCI has looked at the sharing of accounts for family PCs [7,10], it hasn’t focused in detail on what this implies for possession of the content stored on them. Additionally, and as already noted, HCI research on shared repositories has largely focused on collaborative work rather than home settings. This research has highlighted various challenges when it comes to sharing digital content, including that it is often understood as individually rather than jointly owned [22], that it is rarely organized or decluttered [22], that it is difficult to find content in group repositories organized by others [4], and that use of the same Cloud service across collaborations can result in content being problematically aggregated across faceted identities [25]. Research has indicated a continued preference for managing collaborative work through email, for reasons including reliability, notification, simplicity, and a sense of control [4].

These findings resonate with Bannon and Bødker’s [1] earlier analysis of the construction, use and maintenance of common information spaces. They argue that these spaces are boundary objects, packaged and turned into immutables to allow for sharing across contexts and communities of practice, and over time. Work is needed to place items in common, so that they are understandable to others. Recent examples of what this work might entail are provided by Massey et al. [17], whose participants collaboratively organized content (e.g. by generating ‘ContentMaps’ using wikis or GoogleDocs to link directly to collaboration materials), and by Birnholtz and Ibara [5], who describe how collaborators consider the effects of their edits on their co-

authors, producing social messages as well as functional edits that have implications for group maintenance.

These practices for sharing digital objects clearly differ from those described by Rouncefield and Tolmie in relation to books. There are multiple reasons as to why this might be, and it is likely that all have a role to play: office vs. home, work vs. leisure, and physical vs. digital are all important distinctions that influence how sharing is done. While we cannot address all of these possibilities, in the study we present here we seek to learn more about how the sharing of digital content is managed at home, and whether and how it differs from the sharing of physical things. We articulate our research questions in the following section.

RESEARCH AIMS

We focused on three research questions in this study. First, we aimed to consider whether existing definitions of shared ownership are sufficient to capture behaviors around and attitudes towards a varied range of possessions, including electronic devices and digital content. Second, we aimed to understand how shared ownership in relation to these things is accomplished; how is shared ownership *done*, for physical and digital possessions at home? Thirdly, we aimed to explore how shared ownership is bound up with relationships. As indicated above, sharing implies responsibilities to others and plays a role in the construction of shared identities. We were interested in understanding how shared ownership of both physical and digital belongings was intrinsic to relationships.

Together, these aims comprise a broader goal. In understanding shared ownership practices and how they are bound up with human relationships, we sought to gain insights into how to design to support the sharing of digital possessions, and how to encourage people to make use of additional affordances provided by the digital environment.

METHODS

The home is a location where sharing happens readily [2,12], so although focusing our research there excluded examination of sharing practices more broadly (such as between friends), we felt that this tradeoff was worthwhile. Accordingly, our methods consisted of interviews in which we asked participants to discuss objects that were shared within the home (where they were kept and how they were used), with the aim of unpacking how their shared status was indicated, what rights and responsibilities they (and others) had in relation to those objects, and how they felt about them. We prompted participants to discuss physical goods, electronic devices, and digital content, while avoiding introducing distinctions between these in the structure of the interview.

Interviews lasted for 1-1½ hours, were conducted in participants' homes, and culminated in short home tours. In cases where participants shared devices with other members of the household, we also asked for tours of the devices to investigate the ways that participants organized shared con-

tent. Interviews were audio-recorded and photos were taken, with consent, during the home tours.

We recruited participants through advertisements and mailing lists. Participants received a £30 gift voucher to thank them for their participation. We interviewed 18 people in 13 households (referred to as H1-H13 below), which had 39 members in total, in the United Kingdom. Participant names have been changed for anonymity. Interviews were arranged with a primary participant, and other household members participated if they were interested and available (5 of 13 interviews included multiple participants). Participants' ages ranged from 15-52. Seven of the thirteen households were comprised of couples without children and the remaining six were families, with children ranging in age from 1-22. Participants worked at a variety of occupations, including dressmaker, software engineer, puppet-maker, biologist, archaeologist, graphic designer, homemaker, and student.

Data Analysis

The first author analyzed transcribed interviews using open and axial coding [8]. Emergent themes were consolidated in a master list of themes and sub-themes with relevant quotes related to each one. The second author analyzed four of the transcripts, discussing each with the first author until agreement with regards to themes and sub-themes was reached. Themes included joint ownership, primary ownership, shared accounts, sharing experiences, locations of objects, and lending out, among others.

FINDINGS

We begin by drawing nuanced definitions of shared ownership from our data, describing how objects come to be shared, how people know that objects are shared, and what can be done with shared objects. Following this, we discuss specifics of sharing devices and digital objects. Finally, we draw out what it means to share objects, in terms of building relationships and a sense of home.

Defining Shared Ownership

Our data indicates a distinction between two kinds of shared ownership: *joint ownership*, where something is considered to be jointly (and equally) owned by a number of people, and *primary ownership*, where an object is considered to be primarily owned by an individual who allows others to use it. Note that primary ownership is distinct from borrowing (and from Belk and Llamas's 'joint use', which combines primary ownership and borrowing). We define borrowing as access to or use of an object belonging to someone else for a limited time, whereas primary ownership is a more open arrangement, in which others have an expectation of being able to use an object freely so long as this doesn't impinge on the primary owner's use.

The distinction between joint and primary ownership has implications for the ways in which things are perceived and used. For instance, one participant described how she treat-

ed her partner's books, which we would define as primarily owned by him, differently to her own:

Girlfriend: *But if I was going to read something I wouldn't think twice about reading one of Tommy's books.*

Interviewer: *Yeah.*

Girlfriend: *I probably wouldn't like write in one or something, you know... I would take pencil to mine, but I wouldn't necessarily, I wouldn't probably do that.*

Interviewer: *To his, yeah.*

Girlfriend: *But I wouldn't have a problem with like, you know, taking it with me somewhere or anything like that.*

Interviewer: *Yeah, yeah. What about lending it out?*

Girlfriend: *Yeah, I probably wouldn't lend it out.* (H12, 25, girlfriend in couple)

The boyfriend's books were kept in their apartment and while the participant felt she could read them without constraint, she was uncomfortable performing other kinds of actions that would normally be associated with ownership.

This contrasts with joint ownership, an example of which comes from a participant with three siblings who bought computer games together with his brother:

We had quite a few discs and things for like Sonic Heroes and stuff that we used to play back in the day ...me and my older brother saved up together to buy several of them, and so we shared those, we generally had priority over them as well, so sometimes share them with our siblings, sometimes didn't. (H5, 18, son in family with four children).

In this case, the games belonged equally to both brothers and either was free to make decisions about whether their other siblings could play them.

We also draw a distinction between types of ownership that are not shared: *sole ownership by design* and *sole ownership by default*. The former refers to objects that people view specifically as their own. These might be borrowed by others with permission, but they are not viewed as shared. For instance, in the four-sibling household mentioned above, one brother had a collection of comics that were kept in a drawer under his bed. Other siblings were expected to ask permission any time they wanted to read one of these, as they were understood as belonging to him. Sole ownership by default refers instead to objects that could fall into the categories of shared or primary ownership, except that others simply refuse to use or accept ownership of them. These are possessions that would normally be considered shared, but that in some specific cases, were not.

For example, in a house where music was generally shared, the mother told us how the stack of CDs in the kitchen were considered her own: *"So like all the old stuff I've got here which nobody else would touch with a bargepole. These are definitely mine"* (H7, 44, wife and mother of two teens). A

similar sentiment, described from the opposite perspective, was voiced by a woman living with her boyfriend; she generally considered all of the artwork in the home to be jointly owned by them, except for one particular piece that she disliked. This she defined as belonging to her partner alone.

The spectrum of ownership that we introduce here is broader than that presented in prior work, which has not distinguished between joint and primary ownership inside the home, and which has not identified instances of sole ownership by default. In the following sections, we unpack what it is about an object that makes it jointly or primarily owned, what implications this has for responsibility and accountability, and how it is bound up with relationships and home-making.

Determining and Indicating Ownership

Our analysis highlights two factors that indicate ownership: an object's origin and its location.

Origin and Acquisition

One means of determining an object's ownership is its origin. Purchasing, gifting, and association with shared experiences were all cited by participants when describing who owned an object. Objects that had been purchased jointly were typically interpreted as jointly owned, as seen in the computer games example above. In contrast, objects purchased by an individual were seen as being primarily owned by that person, even if others could use them freely. Similarly, gifts to couples or families were associated with joint ownership while gifts to individuals indicated primary or sole ownership:

Son: *I think we have got a pretty big collection of movies. Generally I think most of them people will watch just on their own choice, but there's certain ones that sometimes people get a bit tetchy about if people don't ask first.*

Mum: *Well it's if they were gifted to you isn't it?*

Son: *Yeah, really...*

Mum: *Because then there's an ownership.*

Son: *If we receive them as a gift.* (H5)

Alternatively, jointly owned objects were those that were created together or acquired as part of some shared experience:

Yeah, well when we moved in we had to like get all the furniture and we didn't really see a table that we liked for the price we could afford. So me being an engineer just said 'Oh, let's just make one' and then, yeah, we just had, my parents had these planks of wood and then we just like worked out, looked on the Internet, found a design, worked it out... I would say that's something that we share, like probably did the same amount of making. (H12, 25, girlfriend in couple).

More mundane examples of joint ownership included photographs from events and vacations that had been experi-

enced together, even when these were taken by individuals (in some cases with a camera that was seen as solely owned). One couple considered travel guides used in vacations that they took together as jointly owned for this reason as well (see Figure 1). Additionally, where objects were representative of the family or couple, they could be seen as belonging to everyone within the relationship. For example, a baby book in H11 that was carefully created by the mother was nevertheless considered to be owned by the father as well. She noted that “...he makes all the right sounds with regards to showing an interest... But he wouldn’t put any legwork in.” Even so, she felt that the album belonged to both of them because “*Jamie is just as important to me as he is to Ray*” (H11, 40, wife and mother of a young child).



Figure 1: Jointly owned travel guides from vacations a couple took together (H4).

In some cases, origin seemed to be the only factor that could be used to identify primary ownership. Some primarily owned belongings were kept in ‘general stores’ [24] and could be used by anyone in the household, within reasonable constraints (as with the girlfriend’s reluctance to write in her boyfriend’s books). Although we did not introduce the topic, some participants noted that the only instance in which primary ownership might be re-expressed was in the circumstance of breaking up:

Girlfriend: *So there has been a joining of stuff. So you would probably be like ‘Oh yeah, that’s Allie’s Eddie Izzard DVD’ whereas I’d probably now, we’d just be like ‘Those are our DVDs.’*

Boyfriend: *Yeah.*

Girlfriend: *Unless you left me crying in a ditch for some other harlot then I’d be like ‘That is totally my DVD.’* (H4, 28 & 30, couple)

Here we see that the DVD collection is assumed to be shared, but the knowledge of where things originally came from persists.

Physical Place

A second, and no less important, factor in determining ownership is where an object is stored. As noted in previous research [24], the placing of books can signify their status for purposes of sharing. We also saw that shared books were kept on bookshelves in communal areas such as living rooms, front halls, and staircase landings, whereas solely owned books were kept in bedrooms, and as noted above, sometimes under beds when bedrooms were shared. Essentially it held that if someone did not want other people to use an object they owned, they kept it out of the communal areas of the house. As noted, this does not necessarily mean that things in communal areas are always shared (people other than the primary owners have to want to use them, otherwise they are solely owned by default), but storing an object in a communal area is typically a sign that it is open for use by others in the household. Indeed, in one case a mother moved a series of horse books she had loved as a teen into the general store of books, in an (unsuccessful) attempt to encourage her teenage daughter to read them (H7).

Our study also supports the idea that the lack of physical presence of digital possessions has ramifications for how shared ownership is signified and enacted, as noted in previous research [24]. This differs according to whether digital possessions are stored on shared or personal devices, and whether they take the form of shared content or shared streaming accounts. Next, we address each of these in turn.

Sharing Digital Possessions

Shared digital possessions included music, photos, movies, games, and e-books. The ways in which these were shared was not consistent across households, and did not necessarily entail these objects being placed in communal areas – either digital or physical. Here we describe how participants shared digital objects through different types of repositories, both online and on devices, and how sometimes objects were considered shared even when only one person had direct access to them. We will now describe these practices, which both complement and contrast with those we found with physical possessions.

Shared Repositories

Participants used various kinds of shared repositories to store shared digital objects, some of which were housed on shared devices (such as family PCs) and some of which were accessed via shared accounts. Family PCs were bought to be shared, unlike many other shared devices such as tablets or older laptops, which often became shared over time. Family PCs also differed from other shared devices in that they housed both shared and personal files. This mix of content necessitates maintenance and organizational work; like shared communal spaces of a home, household mem-

bers' use of the family PC could affect others who also used the device.

Shared content on family PCs, such as photos and music, was typically considered as jointly (rather than primarily) owned, and was made up of contributions from multiple family members. Photos were often stored in shared folders, and music was typically associated with, and sometimes bought via, a single iTunes account:

Strangely the children seem to like our music, so eventually, Danny's been doing it over a few years, all our CDs he has put them all on the computer... And everybody's music is all shared, so anybody can have anything. So for example if you buy an album on iTunes it goes on there, then anybody else in our family can have it... (H7, 44, wife & mother of two teens).

Households that did not share devices adopted other mechanisms for building shared repositories. None of the couples without children in this study had the equivalent of a family PC, but they did use Cloud services such as OneDrive and Dropbox to store shared objects such as photos. One couple (H8) had appropriated Facebook as a shared repository for photos, because it was seen as free, having plentiful storage, easy to use, and accessible to far away friends and family:

Husband: *So in the end I think Facebook is an acceptable compromise.*

Wife: *Yeah, because everybody gets to see them after we've been there so it's kind of actual, it's easy, it's accessible, people don't have to spend a lot of time, you know, you don't have to spend a lot of time sending those photos. It's very, yeah, it's nice.* (H8, 31 & 31, husband and wife)

In other instances, accounts were used to build online shared repositories, such as in one couple's use of Amazon Kindle:

Wife: *Yeah, I think when we first wondered about whether or not to get a Kindle in the first place sharing was a question, it was like 'Well, I would get a Kindle but not if I can't lend you a book that I've just read.' ...Because that would be silly. So I think it was only, we wanted to know that there was a way of doing it and if you can have more than one device on your account then that's fine.* (H13, 34, wife & mother of two young children)

In this example, personal devices mediated access to the shared store, and this was also the case for shared iTunes accounts and shared Cloud folders. So while these repositories could work in much the same way as a family bookshelf or CD rack in a living room, an important difference is that one person's use of an object does not necessarily mean that another cannot use it at the same time.

Personal Devices & Accounts

Another way in which shared digital possessions differed from their physical counterparts was that they were some-

times stored in places that only one person had direct access to.

Interviewer: *...speaking of photos do you guys have like shared photos anywhere? Are there...?*

Boyfriend: [to girlfriend] *They're all on your camera aren't they?*

Girlfriend: *Yeah, well I've taken them off... yeah, you wouldn't know where they were would you? So trusting. All over the Internet, doctored and, no, I just dumped them in my OneDrive because I keep, kept a backup...* (H4, 28 & 30, couple)

Although they agreed that these photos were jointly owned, they were stored on a device (and Cloud service) that was only used by one partner in the couple. Here, there is a sense of there being no need to create a copy of photos taken by another person; one person takes responsibility for the shared possessions, which are located on a solely-owned account.

Sharing Streaming Services

In addition to building repositories of shared content, some households shared accounts that enabled digital content streaming, which might be accessed via shared or personal devices.

Shared devices

Shared laptops and tablets were frequently used as a way to access streamed movies or music. These devices were often left logged into accounts that were shared amongst household members, therefore allowing everyone who had access to the device to use the accounts. For instance, in one home the two small children could log in to watch TV on the shared family laptop:

You know, so I think the only time when they might watch something on their own would be if Liam wakes up early in the morning and we don't want him to wake us up, "Go away and, yes, you can, yes, you can watch TV." (H13, mother of two young children).

This kind of arrangement has similarities to the storage of content on shared devices, with two key differences: there is no real perception of ownership when it comes to streamed content, and no expectation of long-term, persistent access to that content.

Personal Devices

Personal devices were also used to access shared accounts. For example, one couple both used the boyfriend's Premium Spotify account. This initially led to trouble because Spotify does not allow multiple users to access one account simultaneously:

Boyfriend: *So we've had like battles in the past when we've been in different locations...*

Girlfriend: *And you, as soon as you hit play the other person gets kicked off. And you, it's happened a couple of*

times, like ‘Right, I’m going to win this’ and eventually found that peace could be found by one of us being on offline mode. (H4, 28 & 30, couple)

This example highlights some of the constraints associated with sharing digital content, and workarounds participants used to circumvent them. In the next section, we look at some of these constraints more closely, asking what responsibilities they entail but also what opportunities they offer.

What does Sharing Mean?

Prior work has indicated that possession is bound up with being accountable for something and being able to act upon it in certain ways, including getting rid of it [19]. When possessions are shared, actions may need to be negotiated with others, and accountability is not only to the object itself but also to other people, as mediated by the object. In this section, we focus on what sharing *means* in the context of family and home.

Accountability

Rules and norms for sharing were not standard across households. In some households it would be acceptable to lend out shared books, whereas in others this would be frowned upon. Despite these kinds of variations in sharing practices, the status of an object as shared always implies constraints on any one person’s use of the object because they can be called to account for it by others. Sharing objects necessitates that they are treated well, so that they can continue to be used by all members of the household. Our data highlighted a few ways this took shape with shared devices and digital possessions, including keeping them organized and comprehensible to others, and avoiding impeding others’ use of them.

Organization was often led by a manager of a shared space, who would prompt others to deal with the content they had stored there, including deleting it; participants made clear that limited digital storage was a major factor in ‘cleaning’ shared devices. In one household, the father had configured the shared PC to have multiple backup drives, and he also managed others’ use of that PC: “Dad manages to make sure there’s nothing, it doesn’t get too full and we’re only allowed to put certain things on certain drives” (H7, 15, son). In both digital and physical spaces, the standard rule was to check with all sharers of a collection of objects before getting rid of any of them:

...I did check with the children first of all about any DVDs that they don’t watch anymore, I said ‘Can we, tell me which ones we can get rid of and I’ll just sell them.’ So I did that, yeah, of course I’d double check it with them first. (H9, 40, mother of two teens).

Parents also enforced rules on children’s use of shared devices that taught the children to consider the effects their actions could have on other people who relied on the device. For example, a mother and son discussed how the son was careful to avoid infecting the family computer with

viruses, which was especially important because the mother ran her own business and kept work files on the family PC:

Son: Normally if it’s like a dodgy kind of file or something like that I’ll sort it out on my laptop, send it to myself on the computer, because it’s like our pride and joy with all the work.

Mum: ...We’ve taught the children all about viruses and things and we never take any risks with that because it has all my work on there. (H7, 15 & 44, son and mother)

In these examples, people who used the shared devices were accountable to one another: they had to act in such a way that the devices did not run out of storage or become infected with viruses. In the same way that the couple who shared a Spotify account took measures to avoid impeding one another’s access, use of shared devices was undertaken with others in mind.

Additionally, building repositories of shared content also required that sharers made the repositories meaningful for all users, as the girlfriend in H12 describes:

Like if you open up a Dropbox folder and someone’s just got their own structure it’s like quite hard to understand that. Like the way I organise my documents is completely different to the way Tommy organises them.

While this was negated to an extent with accounts such as iTunes and Kindle, and services such as Spotify where default organizations exist, shared folders allow the opportunity but also necessitate the effort to create structures that all parties can understand.



Figure 2: The shared family PC in H7.

Trust

Taking account of the needs of others within the household means that sharing not only entails general consideration but also builds trust between sharers. As one teenager said about sharing:

I think it's good because it shows that you have a level of trust with your own family, at least that's always nice to know you can trust each other. (H5, 18, son in family with four children).

We saw that parents used sharing as a way to teach children about responsibility, fairness, and generosity. For instance, two families with shared PCs made a practice of applying all iTunes gift cards to a shared account. Purchases were not constrained, although family members would check with one another before making a purchase, and perhaps make some kind of repayment if the desired item wasn't wanted by others:

If Andy really wants something that maybe nobody else wants and I'll say 'Well hold on, that's £5, that's quite a lot' and then he'll say 'Well I'll give you my money' or he'll mow the lawns or something, say 'I'll mow the lawn and I'll clean the car for it' so we do that kind of thing as well. (H7, 44, mother of two teen children).

This arrangement both relies on and reinforces trust between those who share the account.

Trust played an important role in other sharing arrangements for digital objects as well. For instance, when asked about differences between sharing digital and physical objects, one mother argued that there weren't real differences because *"I guess if you live in the same house it doesn't make any difference because you have just as much access to them because [the other person is] there"* (H11, 40, wife and mother of a young child). This recalls the couple in which the boyfriend did not know where their jointly owned photos were stored, but trusted his girlfriend to keep them. Because digital objects are not necessarily accessible even when present in a house (due to password protection and social norms about accessing other people's devices and personal accounts), their accessibility for non-primary owners often relies on the primary owner in a way that is not necessary for physical objects. Such arrangements demonstrate trust in the other person and in the strength of the relationship.

Building Relationships and Shared Identities

Sharing also provides a mechanism for members of the same household to share their knowledge about which objects others might enjoy. It was central to sharing practices that people knew each other's tastes and preferences, and so knew which objects other people might want to use, often making recommendations to each other. Indeed, recommendations were one way in which objects became shared. These objects represented shared experiences and cultural references for family members, and their accumulation was bound up with shared identity and home making. One example of this is a family who collected Studio Ghibli movies and enjoyed watching them together:

We've got a massive collection of Studio Ghibli because every birthday or whatever someone gets someone else a Studio Ghibli film, which is always really great because we

love Studio Ghibli. (H5, 18, son in family with four children).

Notably, this works differently when digital objects are accessed primarily through streaming services. In those cases, the objects being used were not part of a collection built by a family over time because they were accessed through a service and not owned by family members. One effect that this has is that the work of maintenance and curation is done by the service rather than by the family.



Figure 3: Physical objects “are more about building a home” (H12).

Another difference between physical and digital possessions was that physical objects are part of people's shared experience of living in a home. They are a persistently visible and accessible resource, the use and availability of which is connected to membership in the household. As one participant put it, while digital objects were *“more of a store of your own personal stuff,”* physical objects *“are more about like building a home”* (H12; see **Figure 3**). For couples especially, shared objects (frequently those jointly owned by the couple) could be seen as a representation of the couple's relationship. These were often put on display in the home, as in the case of a set of favorite photos a couple took together of places they had lived (H4). Digital objects, being essentially invisible to any potential sharers who are not primary owners, do not seem to share the same capability of home-building.

DISCUSSION

The analysis presented above allows us to make three contributions in this paper. First, we offer more nuanced definitions of shared ownership and sole ownership, drawing distinctions between joint ownership and primary ownership, and between sole ownership by design and sole ownership by default. Second, we offer insights into how shared ownership is managed in practice, and third, we highlight what

this means for those doing the sharing. In this Discussion, we draw out the relevance of our findings for HCI.

We emphasize here that, as indicated by our data, only the extremes of the ownership spectrum are fully supported when it comes to shared digital possessions, and that the ways in which shared ownership is accomplished are different for digital in comparison to physical possessions. This raises various implications for design, which, while made tentatively, are offered to illustrate how we might facilitate the sharing of digital possessions and further support the ways in which this is bound up with human relationships.

Supporting the Ownership Spectrum through Action

Our data suggest that different types of shared ownership are not supported equally when it comes to digital possessions. While sole ownership can be maintained and even extended (for example, owners can provide copies of objects to others), and joint ownership can emerge (e.g. through the use of shared repositories), primary ownership was not supported. We saw no evidence for digital communal spaces where primary owners retained their ownership of a digital possession but shared access to it with others.

If richer support for the ownership spectrum is needed, one way of designing for this might be to support more breadth when it comes to how people are able to act upon their digital possessions. Prior work has highlighted the need for a richer grammar of action in relation to digital possessions [15] and has indicated how *giving* rather than *copying* digital content enables different opportunities for design [18]. Here, we suggest that different types of ownership could imply different sets of actions, including loaning out content that is solely owned, making freely available content that is primarily owned (perhaps with select constraints, such as making it read-only), and opening up access to jointly owned possessions, in the context of a system that might nevertheless draw a distinction between different users (and, for example, apply metadata accordingly).

Support for such actions could underpin some of the ways in which accountability is made manifest when sharing physical possessions. Our data show that constraints that are integral to the trust and consideration bound up with sharing physical belongings are weakened when it comes to digital possessions: if a person creates a copy of a digital possession in order to share it with someone else, or if sharing is mediated by personal devices such as iPods or Kindles that sync with shared accounts (essentially copying items from them), then if one person changes or destroys their version of an object, it does not affect others. Thus, our data show that issues of accountability and trust were restricted to the use of shared devices and shared accounts, rather than shared repositories of digital possessions (such as Kindle or iTunes).

One approach to incorporating the need for trust into actions such as lending out content, or making it available to others at home, would be to mimic the ways in which this is

currently accomplished with physical belongings. With material possessions, the artifact in question is effectively given up on trust until it is returned, a situation that contrasts starkly with the system-reinforced and time-limited (14 days) action of loaning that is currently enabled by Kindle. Indeed, reintroducing some of the vulnerabilities bound up with ownership could ironically reinforce feelings of ownership; as Odom et al. [19] note, an important part of feeling in possession of something is being able to give it away.

However, people may feel that an expected digital affordance is being removed if limits are placed on their ability to create multiple copies of the things that they own. An alternative way forwards would be to consider how to replicate some of the desirable outcomes of the constraints that are associated with physical sharing, such as their role in relationship building, by looking to other ways of necessitating trust or building knowledge of shared tastes and interests. So while a digital equivalent to loaning or otherwise accessing a primarily-owned object might avoid imposing limitations on its owner, it could have other ramifications. As an example, links could be maintained between copies of a digital possession that are created when an item is shared. These could, at an abstract level, highlight when the object is being used and so underpin awareness and connectivity, or alternatively, they could influence its metadata, resulting in a plural history of use. As an example, an eBook that has been shared in this way might become imbued with metadata (or a digital patina [14,20]), that highlights when and where it has been read, and by whom, or it might be inscribed with comments created by multiple people. These possibilities raise implications for awareness and trust, just as loaning out a physical object would.

Furthermore, there is scope for these possibilities to differ across the ownership spectrum. Plural histories might be more pertinent for joint ownership, whilst loaning out solely owned content could entail the prevention of the borrower's actions from affecting permanent metadata.

Supporting the Ownership Spectrum through Representation

These suggestions shift our argument from considering ways to support ownership through design for actions, such as giving and loaning, to design for representations, such as of histories of use. We can stretch this further by considering how accumulations of digital possessions might be meaningfully represented and made visible in the home.

As noted, we saw plenty of examples of digital possessions that were considered jointly owned in our data. However, these were rarely presented as meaningful representations of families or couples, nor were they easily distinguished from content that others were not interested in (that which might be considered solely owned by default). Jointly owned repositories were often established through the appropriation of single-user accounts simply because they worked with a particular service and device (such as the

creation of shared iTunes accounts on shared computers), and these accounts, which contained everybody's content, did little to elevate or make visible collections that were meaningful to everyone in the home. Likewise, shared streaming services did not separate a history or preferences that was representative of common interests from those targeted at individuals.

Current efforts to support 'family accounts' (e.g. in iTunes) allow certain rights to parents, but they do not facilitate the building of collections that are of interest to the family as a whole. Were this to be supported, these collections might be made visible (such as via screensavers), thus reinforcing family identity. Furthermore, use of jointly owned content could contribute to a family history that, for instance, makes visible preferences and consumption habits over time – the type of information that is often shared when it comes to jointly owned physical objects through knowledge of who is using them. While this has implications for privacy, work on tracking the locations of family members has highlighted how what might be interpreted as an invasive technology can instead underpin feelings of reassurance and connection [6]. Thus, designing transparency into a family collection could reinforce its status as belonging to all of its members, whilst facilitating knowledge sharing and capitalizing on trust.

Sharing at Home and the Role of Trust

The notion of trust runs through this discussion: sharing at home is sometimes wholly dependent on it. Our data shows how content on personal devices (such as photo collections) was in some cases considered jointly owned, even if others did not know where it was or how to access it. Whilst this is partly indicative of the difficulty of building shared repositories (what data we do have on the use of these resonates with findings from CSCW [1,22] – making shared folders comprehensible to others does not seem easier in home settings), it also emphasizes that people may see no need to create additional copies of content that is under the care of their loved ones. Indeed, their not doing so is an indicator of their confidence in their loved ones. In addition to the need for better design for shared repositories, this highlights a separate set of design opportunities that may be unique to the home, and which speaks to the need to allow significant others easier access to jointly owned, but privately held, stores. We might ask what the technological equivalent would be to saying to a family member, 'The photo album is in the bottom drawer,' when that photo album is a digital version that resides on a password-protected Cloud service. Ways of supporting this could perhaps draw on NFC (Near Field Communication) or Bluetooth technologies to open up temporary access to co-owners, without the need to email a link or dictate a password to them. The resulting expansion of access would signify the connection between the owners of the photos, whilst also acknowledging that sometimes joint ownership is most simply mediated through a human relationship, rather than the building of a shared file store.

CONCLUSION

This paper supports previous assertions that sharing helps people "establish and maintain relationships with one another" [2] and further, shows how that happens in practice across a spectrum of types of shared ownership. In addition, it provides insights into how sharing digital possessions is done at home, filling a gap between prior examinations of sharing physical objects at home and digital repositories at work. Sharing at home is different. It builds, and is done against, a backdrop of trust; it is integral to relationships and it plays a role in home-making. Consequently, it demands something different to the requirements of digital repositories in the workplace. Designing for this entails recognizing more nuanced differences in the ownership spectrum, and supporting their enactment and representation.

ACKNOWLEDGMENTS

We are grateful to our participants for their time, generosity, and openness.

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