# Crafting a Narrative Inheritance: An HCI Design Framework for Family Memory

by

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# Dedication

This dissertation is dedicated to my family, who let me lurk for 28 years to build up the insights to write this thesis. :)

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But wait there's more!

*"From whom the whole body, joined and held together by every joint with which it is equipped, when each part is working properly, makes the body grow so that it builds itself up in love." (Ephesians 4:16)*

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# Table Of Contents

# List of Tables

# List of Figures

# List of Appendices

# Abstract

This dissertation describes a research agenda for designing technologies to support and enhance intergenerational family memory. I employ an interpretivist, mixed methods approach combining ethnographic inquiry and research-through-design to understand the practices and values enacted in this context. These insights are linked to design through the concept of a narrative inheritance. Narrative inheritance frames family memory as a collective accomplishment among family members, both a negotiated process and a mediated product continually reconstructed across generations. To consider the implications of this negotiation and mediation for design, I include an analysis of three "wicked problems" facing those who seek to pass on family memories across generations: anticipating future audiences, curating large-scale collections, and negotiating dissonant values across many family members. The problems highlight the sociotechnical nature of family memory and values at work that influence design decisions and outcomes.

This work includes three studies employing ethnographic methods to investigate cross-generational memory sharing practices, focusing especially on the crafting of family stories and the challenges of managing the mementos and heirlooms which mediate family memory. The concluding two studies employ design prototypes as generative artifacts to elucidate and work out the socio-technical values and tensions which become embedded in design for intergenerational family memory. The insights gained from the ethnographic and design work in this thesis will help designers better understand the accomplishment of family memory in light of complex "wicked" problems, leading to more nuanced and engaging designs for real-world use.

The work presented in this dissertation makes the following contributions:

1) Identifies the practices enacted by families sharing memories with future generations, especially navigating mediation dilemmas,

2) Develops an understanding of how recipients of shared family memories respond to and interpret incompleteness (of narratives) and overabundance (of artifacts),

3) Explores the design space of collective, multi-lifespan systems for passing on a family's "narrative inheritance"

4) Develops a design framework for technologies for a "narrative inheritance" that helps designers identify and navigates the multiple consonant and dissonant values of intergenerational family memory.

# CHAPTER 1 - INTRODUCTION

## MOTIVATION

*"… I would like to know a lot more about my dad when he was in his teens and early 20s and stuff like that, just 'cause he was never very talkative or he didn't tell too many stories. I feel like I didn't know him super well. It wasn't like I really needed to get to the bottom of any specific story, I just want-- I would like to know." (Evan, Contested Memory Study)*

The memories of our family ground and guide us in our everyday lives. Memory influences our identity, our sense of belonging in the world, and the ways that we relate to events throughout our lives. Our autobiographical memory, the memory we have of our own lived experience, is a powerful tool in shaping our personalities, actions, and relationships. The memories of the communities that we are members of, including our families, ethnic groups, faith groups, and nation, also shape us as social beings situated in a particular sociocultural instance in history (Zerubavel 1996).

However, there are many challenges for families, and larger communities, to build their collective memory across generations. As seen in the example above, family members in older generations may be reticent about their lives or the family history they know. Sometimes, family members are separated by migration or disaster, and unable to share their memories through traditional storytelling, traditions, or by passing on their family heirlooms. Also, as children are born later into the lives of their parents, their grandparents may pass away before they are old enough to get to know them personally. In these situations, families turn to mediated forms of memory sharing.

Already, much of the communication between family members of different generations occurs over a distance and, thus, is increasingly technologically mediated. In a 2014 Pew Research survey of intergenerational communication, 79% of U.S. grandparents typically communicate with their grandchildren by phone. A 2016 survey by the AARP showed that 64% of adults aged

50-64 (the average age at which a person becomes a grandparent in the U.S. is 50) now use at least one social media platform, driven in part by the desire to stay connected with family[1][2].

In this trend toward predominantly technology-mediated communication, the casual, in-person, face-to-face interactions that normally facilitate intergenerational memory sharing in families become more difficult. In the absence of face-to-face communication between generations, older family members rely on mediated forms of memory, such as photo albums, recorded narratives, or written memoirs as "vehicles to 'pass on' memories that would otherwise be lost" (Lindley 2012). Further, digital oral histories and audiorecorded storytelling have been gaining popularity as ways to preserve and share family memories. Apps and online portals such as StoryCorps, MyHeritage.com, and LegacyStories.org[3] are examples of cloud-based digital repositories that market directly to families and people wanting to keep memories for the next generation.

Research in HCI and collaborative systems has addressed some of the challenges of connecting families over geographic distance, which makes mediated memory sharing possible. Systems provide better multi-modal, multi-participant communication tools (e.g., Brown 2015), ambient awareness to highlight opportunities to connect (e.g., Chung, Lee, and Selker 2006), and innovate ways to help foster a sense of connectedness across generations (Lee, Cha, and Nam 2015). However, design for *intergenerational* family memory must address both geographical and temporal distance. This context poses several unique challenges that distinguish it from other research in connecting families over a distance:

> 1) The timescale of passing on a message may be very long, years or even decades.
>
> 2) There may be no ability or expectation of response (especially if the person sharing dies as their message waits to be passed on). In this case, the dialogue required to build common ground in a typical conversation may not be present.

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[1] http://www.aarp.org/content/dam/aarp/research/surveys_statistics/general/2012/Insights-and-Spending-Habits-of-Modern-Grandparents-AARP.pdf

[2] Retrieved from The Washington Post, June 2017: https://www.washingtonpost.com/postlive/technology-helping-more-baby-boomer-grandparents-stay-plugged-in-to-grandkids/2014/10/31/3dda3c26-4ccb-11e4-aa5e-7153e466a02d_story.html?utm_term=.f86e90bed83f

[3] Storycorps.org, myheritage.com, legacystories.org; more examples here: https://www.thoughtco.com/online-memory-sharing-1422102 (Accessed 23 August 2017).

3) Because memoirs are intended for "future generations," the person sharing their memory may not always have a clear idea of with whom they are sharing, and likewise, the recipient(s) may have no direct relationship with the sender.

These challenges require a different approach than traditional research in collaborative systems. Researchers across disciplines, from human-computer interaction to media studies, have long recognized the augmentative potential of computing for enhancing and even transforming human memory. Yet, most of the research in developing interactive technologies for memory depends on individual, psychological model of memory. These approaches, which I will outline in Chapter 2, are insufficient for addressing the social and relational dynamics of family memory as a shared, collective endeavor. Van House and Churchill (2008), as a result, call for more engagement with theoretical scholarship in social memory studies to address the socio-technical context of memory in design.

This thesis brings together scholarship from social memory studies, theories of collective remembering, family memory studies, along with approaches in human-computer interaction and social computing to begin to map out and frame the unique design space of technologies for intergenerational family memory. My work starts by identifying several gaps in theory and design needed to create useful systems for this context. First, we lack a useful understanding of the practices that family members across different generations undertake to create, maintain, and pass on family memory. Second, new systems for personal and family memory, including those apps and online repositories I described earlier, have repeatedly encountered, but not yet resolved, the arresting problem of digital overload. This problem is complicated by users' uncertainty about what might be valuable to keep for the future. Third, technology designers lack a foundational framework through which to make sense of the complex tangle of personal, interpersonal, and cultural values in family memory, all of which change over time and can contend with each other. To address these open questions, this thesis takes a multi-disciplinary approach to unpack the values, practices, and social dynamics at work in family memory to better inform and direct future design work.

## THESIS AND RESEARCH QUESTIONS

To support intergenerational family memory and the processes in which family members engage to remember together, designers must incorporate a social account of family memory practices.

***THESIS: Interactive technologies that support and enhance intergenerational family memory sharing should mediate social remembering practices and negotiate diverse values across family members.***

This thesis incorporates three driving research questions which I address through a mixed methods approach. My research questions focus on understanding the social context of family memory (especially how members engage with memories that are shared and not recollected solely from their own past experience) and deriving insights for developing technologies embedded in this context.

## RQ1: Understanding family memory practices

The first question is "How do families collectively create and pass on their family memory?" For this research question, I seek to understand the practices, experiences, and values of "teller" and "listener" generations in memory sharing interactions. In particular, I contribute a multi-generational account of tellers' intentions and recipients' perceptions regarding the family stories that passed down through generations, both face-to-face and mediated in some way.

I develop and employ the concept of "narrative inheritance" to unravel the data and to frame the agenda of this thesis. Narrative inheritance, a concept drawn from literature in family memory which I will detail in Chapter 2, integrates two perspectives of family memory. It frames memory as a mediated action, a set of social practices grounded and conducted with some physical and communicative media artifacts. It also frames memory as information work organized around issues of disclosure, transmission, and privacy. Moreover, narrative inheritance serves as an analytical and design metaphor that is sensitive to the tensions that can exist between multiple participants in family memory, especially in passing on memories to future generations.

This line of investigation builds on existing work in HCI where the goal is to derive practical insights for design based on real-world values, social interactions, and digital media practices. This includes work on how elderly people decide what aspects of their lives to preserve and pass

on to future generations (Lindley, 2010). My treatment of this question draws on work in family memory studies about how narratives are transmitted and interpreted in families. A quite familiar and unresolved issue for families is how to ensure that future generations will not only receive, but understand the significance of the memories, and memory artifacts, left for them by their ancestors. My research will unpack this issue by developing the concept of "narrative inheritance" to ground and work through the dynamics of different generations engaged in the ongoing construction of family memory.

## RQ2: Addressing the unmet challenges of digital mementos

As families accrue artifacts that hold some sentimental value in their lives, a second question arises: "How do families effectively manage the memory artifacts- digital and physical- that they collect?" This second question arose out of a need to translate the aspirations reflected in the empirical findings from the first question into realistic design implications. Technologies for memory, which enable and encourage preservation of digital content, are all stymied by a persistent problem facing the larger field of digital archiving, which is a lack of digital curation.

A strong case exists for a minimalist curation strategy, where people constantly evaluate and cull their digital stores to avoid over-accumulation and ensure that only meaningful content is preserved. Existing technologies also depend on this use case. However, people generally don't do this well (Marshall, 2007). It is an even thornier problem in a family memory context where, as Kirk and Sellen pointed out, sentimental artifacts in a home serve several important social purposes in addition to representing a particular memory (Kirk and Sellen 2010). Further, family mementos and heirlooms are not only managed according to the personal preferences of their current caretaker, but also subject to the desires of past generations and anticipated needs of future generations. These artifacts facilitate and are bound up by social relationships in families and thus are difficult to organize according to traditional home organizational schemes.

In this line of questioning, I frame memory artifact management as an inherently a social endeavor carried out with value-laden materials and technology tools. To understand and tackle the challenges of management for design, I build a socio-technical account of how people relate to and manage their collections of mementos as part of a social group and over time.

## RQ3: Designing interactive family memory artifacts

I chose to address intergenerational memory sharing in families to focus explicitly on issues facing those engaging with memories "for the family," especially those are not from their own personal experience. Intergenerational sharing is primarily about linking future generations to previous generations through shared narratives and interpretations. It is also an activity that is largely informal, and therefore more vulnerable to disruption due to geographic or temporal separation.

My third question brings together the practices and insight drawn from my first and second research questions to define and explore the potential design space of developing intergenerational family memory technologies for the family. Following a research-through-design approach, I ask, "How can we embody or materialize family stories in a way that facilitates value-driven family memory practices across multiple generations?" This question grapples with the "wicked problems" of digitally mediated family memory that arise from the unique context of intergenerational memory sharing. Namely, it addresses 1) how family memories, at the scale of the digital, remain significant and salient; 2) how teller generations anticipate the needs and preferences of future listener generations; and 3) how families negotiate dissonant values in an asynchronous, asymmetric, and anonymous interaction space. Through bringing ethnographic, theoretical, and design-generated insights into conversation around these problems, I develop a design framework from this question that can guide future technology development to support intergenerational family memory.

To address these questions, I weave together ethnographic inquiry focused through a symbolic interactionist lens and research-through-design informed by value-sensitive design and interaction-driven design. My methodology is detailed in Chapter 3.

## Thesis Contributions

The contributions of this dissertation and their related research questions are:

1) Identifying the practices enacted by families sharing memories with future generations. (RQ1, RQ2)

2) Understanding how recipients of shared family memories perceive and respond to key disruptions of a "narrative inheritance," namely incompleteness (of family stories) and overabundance (of memory artifacts). (RQ1, RQ2, RQ3)

3) Exploring the design space of collaborative, multi-generational systems for creating and passing on the memories of the family that constitute a "narrative inheritance." (RQ3)

4) Developing a conceptual framework and translational design framework for the design of everyday technologies that navigate the values and tensions involved in intergenerational family memory. (RQ1, 2, 3)

## Thesis Scope

The literature referenced in the related work draws from theories of social and collective memory, family memory studies, and human-computer interaction. While the field of archives and museum studies is another field that has a great deal of valuable knowledge about managing collective memory, archival institutions tend to operate at the level of a society, and family memory is generally overlooked in favor of a focus on larger social groups. In the case where a family's artifacts are deemed important enough or iconic of a particular historical moment and deemed worthy to be added to an archive, they generally cease to be "just" family memory in the everyday, home-oriented way that I refer to it, and turn into a different sort of resource that is public, official, and historical. The professional practice of curating public, collective memory in an archive or museum is quite different in practice than the everyday negotiations that family members carry out, which would make it unlikely that their rules of practice translate into a family context. Thus, although archival issues and challenges are a natural extension of my topic, I do not rely heavily on the knowledge and methods of these fields in this thesis.

A parallel, emerging body of work merges interaction design with cultural heritage studies. There are HCI researchers who have started working on interaction and engagement in the context of memorial and tourist sites (e.g. Hornecker, Honauer, and Ciolfi 2014). However, their work focuses on a more institutional context, such as a museum or public memorial. In my focus on family memory, I aim to outline the design space for engaging interactive artifacts that allow family members to interact with stories of a more personal nature, and in a context in

which social norms are not yet formalized. The findings of this dissertation may apply to the challenges of community and public memory in some regards, and this is an area of future work.

## OVERVIEW OF CHAPTERS

This dissertation describes a series of studies which work towards a design framework for technologies that support intergenerational family memory. I frame intergenerational family memory sharing as a collective, co-constructive process through which the personal and inherited memories of diverse members are incorporated into a shared family narrative, influenced by temporal dynamics and shaped through social tensions.

Chapter 2 details the related literature and theoretical frameworks that serve as the foundation of this thesis. It also introduces the conceptual framework of a "narrative inheritance" which I use to frame my analysis and discussion.

Chapter 3 describes the overall methodological approach of this dissertation, and outlines the individual methods used in each study. The research studies presented each stand as independent investigations into the complex phenomena of family memory in an attempt to find purchase for design work. The mixed methodology constitutes a multi-pronged query to into the unique nature of family memory by unpacking the varied social practices of families as well as the various wicked problems, mediation dilemmas, and design paradoxes of mediated family memory.

Chapter 4 details my first study into the motivations, work, and mediation dilemmas of intergenerational family memory sharing. First, I gain an overview of why families want to share their memories, and the social influences which shape the family stories they share. From this overview, I will show that shared stories serve to convey a lot of the significance of events in the past, while physical objects serve to ground shared memories and anchor them into everyday life. In addition, much of the challenge in memory keeping is wrapped up in the social dynamics of bridging ancestors sharing their memories and descendants learning about and interpreting the past. Over time, each of these generations approach memories shared as family stories with different mindsets, opinions, preferences, and interpretative frameworks. These generational differences create dilemmas for those crafting mediated forms of memory, as they navigate

privacy and disclosure preferences while determining how to create artifacts that will survive the test of time and maintain their significance in the future.

A follow-up study, detailed in Chapter 5, focused on the social challenges of sharing family stories across generations, especially how they navigate uncertainty. This study relied on the theoretical concept of an "incomplete" narrative inheritance to unpack tensions in the values at work in sharing memories across generations. I wanted to understand the decisions and dynamics that lead to *ungelöst* family stories, those that are considered incomplete, unresolved, or suspicious in some way. In particular, this chapter examines how a narrative inheritance comes to be perceived as incomplete in light of the considerable effort undertaken by tellers, as seen in the last chapter, to preserve and share important stories of their past. Through this, the chapter uncovers some of the foundational characteristics of family memory as a fragmented, conditional, negotiated product and process.

Building on the prior chapter about missing pieces, I explore in Chapter 6 the problem on the other side of the spectrum—an overabundance of things. Mementos and mediated forms of memory, such as photos and videos, when in digital form, can yield enormous collections. This reality can create a paradox where overly large collections of valuable mementos lose their individual value. As mentioned earlier, in the digital space, the curation needed to maintain the value of artifacts in a digital collection rarely occurs. To uncover motivations that could be exploited in design to prevent collections of memory artifacts from losing their value, I explore how people handle an overabundance of sentimental things in the analog, physical world. I draw out the organizational, presentational, and identity-preserving practices that people employ to deal with objects with strong emotional attachments, and also how the other family members influence these practices. From this study, I also draw out how people made these large collections fit into their lives and homes environments to gain insight into how large collections of valuable memory artifacts in the "infinite basement" of digital storage might be integrated into everyday life.

These ethnographic, practice-focused studies yield a great deal of insight for design, but also revealed the social-technical gap between the limits of technical systems and the needs and

aspirations of users and other stakeholders in the social context in which a system is situated. These dilemmas resulted in part from situations where the diverse values that motivated and were enacted by different family members ran counter to each other. Thus, designing for sharing family memories necessitates engaging multiple users with deep social bonds but potentially competing values in a productive and ongoing shared activity. In my design chapters, I work out how some of the insights and dilemmas are articulated in design and play out in practice.

In Chapter 7, I present the design and field study of KidKeeper, a memento-gathering, audio-recording toy for young children's playtime. The purpose of this study was to draw out the values motivating parents to capture 'everyday memories" of their children. The design-based inquiry allowed me to examine more closely the paradox of value and abundance as it is created and experienced. This study was conducted in collaboration with David Merritt. Through the design concept of "integrated capture", I examine how embedded capture systems like KidKeeper can mediate interactions in a family memory context between those capturing, the ones being captured, and those who want the content that was captured. KidKeeper demonstrates one way that a family memory system can bring multiple users with different interaction values into alignment towards the accomplishment of a shared activity, even without express intent of all users.

In Chapter 8, I further expand this discussion of technology-mediated values through developing another prototype, Scatter. Scatter allows a storyteller to build a tangible "mosaic" of family stories out of a collection of audio recordings, and gift these to others. It is designed specifically to illuminate the competing values at work across generations as they continually re-construct a narrative inheritance. Through the design process of Scatter, I develop the concepts of authority and entitlement towards a narrative inheritance to works through some of the power dynamics at play as intergenerational family memory is negotiated over time. I also outline a translational design framework for narrative inheritance by drawing out the dimensions of the value tensions of narrative authority and entitlement as they are embedded into the design of Scatter. To mediate these tensions across users and over time, I propose the conciliatory sociotechnical strategy of narrative courtesy as a way forward in aligning potentially competing values in family memory.

## Summary

This thesis builds and demonstrates an argument for a collective, value-oriented approach to the design of technologies for mediating family memory. It addresses several gaps in the literature by synthesizing persistent design challenges as "wicked problems." To better understand and address these challenges, each study includes some investigation of the social, technical, and temporal elements and characteristics of family memory. This includes the social interactions, activities, roles, and values; the technical challenges of mediating information through digital and physical memory artifacts; and a temporal understanding of how these sociotechnical elements relate and change over time. The contributions of this thesis decompose the "wicked problems" of anticipation, negotiation, and curation of mediated family memory into addressable design problems. The resulting conceptual and design framework of a narrative inheritance offers a way for technology designers to navigate the consonant and conflicting values at work in family memory, while incorporating best practices of technology-mediated memory proposed by existing literature.

# Chapter 2 – Theory and Related Literature

## Overview

There is no single definition of family memory shared across the literatures that I draw from in this thesis. My working definition is that it is the shared, ongoing narrative that a family builds to create a sense of shared identity and connection among current, previous, and future generations. As a form of collective memory, it is persistent beyond the living memory of any single family member. Family memory is composed of stories from and about family members; memory artifacts like heirlooms and mementos; inherited knowledge, such as old songs, recipes, or genealogies; and traditions, ritual practices that unite the family through a regular, shared activity. For this thesis, I focus on stories told about the family.

There are several bodies of literature that come together to form a comprehensive conceptual, theoretical, and practical foundation for this research. First, I outline the literature from social and collective memory that contributes the foundational theories for understanding family memory as a social construct. It is from this field that my analytical concept of "narrative inheritance" is drawn. Next, I will describe existing work in Human-Computer Interaction (HCI) on designing for the activities of memory. This practice-oriented perspective on personal memory provides a precursor for my own practice-based approach to collective family memory. Third, I outline prior design work in HCI for family memory to derive lessons on which to build in my own work, and to highlight the gaps and challenges in this field that my dissertation will address. This work runs parallel with an emerging body of work on digital legacy, which addresses issues of stewardship and post-mortem management of digital data, especially in online social media. I briefly outline major themes from this work with regards to issues affecting "multi-lifespan" systems, which includes family memory technologies. To conclude this section, I synthesize this literature to identify three "wicked problems" that characterize persistent

difficulties in mediating intergenerational family memory, and which motivate a value-driven, practice-focused research approach.

## COLLECTIVE REMEMBERING: A SOCIAL ACCOUNT

Sociologist Maurice Halbwachs is widely credited with coining the term and modern concept of "collective memory", which describes the memory of a group that transcends the personally remembered experiences of its individual members (Halbwachs 1992). Some scholars use the term "collective remembering" to emphasize the nature of memory as a process: an ongoing collective engagement and interpretation of the past (Wertsch 2002).

### FAMILY AS A MNEMONIC COMMUNITY

Zerubavel (1996) suggests the notion of "sociobiographical memory" to describe how a person's membership in an identity group, such as their family, influences the ways that they remember. These "mnemonic communities" (ibid) are formative social groups in which members share a common identity, learn to make sense of the past, and enact this identity through their shared ways of remembering.

A person's foundational mnemonic community, Zerubavel argues, is their family (1996). Other mnemonic communities include ethnic groups and nations. Family memory is a special type of collective memory "characterized by the strength of its allegiances and its powerful emotional dimension" as well as its emphasis on the uniqueness of each individual comprising it (Erll and Kurian 2011). In contrast to memory in other groups, remembering specific people predominates in families, which also creates strong emotional and relational identification with other family members. Family memory is also intergenerational, "constituted through ongoing social interaction and communication between children, parents and grandparents"(Erll and Kurian 2011).

Families and larger mnemonic communities influence human memory in three key ways (Zerubavel 1996). First, what humans remember is filtered through the lens of social identity. Remembering is a constructive process of interpreting the past in light of the present, including present conceptions of oneself. Present perceptions of the past determine what facts are recalled

or suppressed, and also determine the tone (positive or negative) of the recollection. Secondly, every sociality has rules of remembrance. This is more salient at the national level where members of a nation are encouraged to remember certain things and in certain ways. Rules of remembering can define the scope and limits of collective memory. For example, a family-level rule of remembering is how many generations are typically included in accounts of "the family" before being systematically excluded as an "ancestor." Thirdly, people remember more than their own personal experience. Second-hand accounts of events and experiences shared through narratives can form part of an individual's own remembered past. For example, a child doing badly in school might be admonished by their parents to "remember" how hard "we" worked to get to here, regardless of whether the child was an actual participant in the work being referred to, and thus the child is encouraged to internalize the family memory as part of their own. In extreme cases, "the stories given to children are so compelling, so traumatic, and so dominant in their lives that even though the stories are about events that preceded their births they seem not like stories told of others but like memories of their own" (McNay 2009, p. 1178).

## Remembering as a Mediated Action

Social memory scholar Jan Assman (2011) distinguishes two main kinds of collective memory, communicative memory and cultural memory. Communicative memory is "everyday memory" transmitted through stories, conversational anecdotes and other interactions between family members. Cultural memory, on the other hand, consists of traditions, practices, and sites that are embedded with significance and serve as commemorations of the past. These rituals and artifacts are typically developed to support large-scale and long-term remembering over many lifetimes. The interwoven nature of practices and products leads to an understanding of collective remembering as a form of "mediated action," an activity taking place with cultural tools (e.g. texts and other media) that is situated in a particular cultural and social context (Wertsch 2002).

Family memory scholar Astrid Erll argues that most family memory is communicative, yet due to the interwoven nature of artifacts and communications, the distinction between communicative and cultural memory at the family level is not as distinct as it is at the national or large group level (Erll and Kurian 2011). For instance, families often appropriate and individualize cultural

memory, such as national celebrations or religious holidays, to make it distinctively their own, and communicate the significance of these observances to future generations through family stories. In addition, families also develop their own heirlooms and memorial sites to commemorate important family events, mirroring cultural practices and norms at the family level. Thus, collective remembering in families is characterized as, "the creation of shared versions of the past which comes into being through interaction, communication, mediation, and institutionalization" (Erll and Kurian 2011, p. 304). In this thesis, these four elements manifest in combination in my findings and implications for design.

## Memory as a Distributed, Social Construction

Olick (Olick 2008) describes memory as an interpersonal account, a collectively "negotiated process of sensemaking". Several models exist to explain how a particular memory is shared and interpreted among members of a group. This dissertation ascribes to Wertsch's (2002) model of "distributed collective memory" which explains collective memory as a shared representation of the past which is spread, uniformly or in fractured way, across the different members in a group. The distribution may be homogenous, which means that all members remember the same things and interpret it in the same way. A homogeneous distribution of memory is most likely to occur when all the members of the group participated in the event being remembered and, due to their similarity, interpret it in the same way. The distribution may also be complementary, where members remember and interpret the past differently but do so as a coordinated and complementary set of pieces. This type of distribution draws from Hutchin's (1995)model of socially distributed cognition, which has gained special traction with respect to how peer groups, such as friends or couples, collectively remember more about a shared experience than they might alone, e.g. (Harris et al. 2014). A shared memory may also be contested, where members remember differently and their interpretations of a past experience stand in opposition to one another. These distributions can co-occur in the same group across different memory narratives. For instance, a family can share the same interpretation of a patriarch's role in World War I, yet have a contested narrative about the impact of his service on his wife and children, depending on which of his children authored the narrative.

## Family Memory as a Narrative Inheritance

Oral historian John Goodall (2005)coined the term "narrative inheritance" to describe the stories about the family passed down to each generation, enabling new members to form a sense of identity and relationship. I appropriate the term "narrative inheritance" to frame family memory as a set of social practices grounded and conducted with some physical and communicative media artifacts. The concept of "inheritance" that I propose is a powerful lens for intergenerational memory because it draws attention to the multiple parties at work in passing down and receiving the content of memory, as well as the social dynamics of control over the narrative.

"Inheritance" expresses the underlying expectation of each generation to receive these narratives as part of their acceptance of their family heritage. However, family memory scholar McNay points out that this expectation is not always met: "narrative inheritance is not readily acquired; important and relevant stories may never have been told, or may have been told incompletely" (McNay 2009, p. 1178). In characterizing an incomplete narrative inheritance, McNay coined the phrase "absent memories" to refer to the holes left in family narratives by stories that were not told. Absent memories can serve particular functions in families, McNay argues, but they create tensions when they begin to disrupt the construction of a person's narrative inheritance. In my chapter on family mysteries, I expand this idea of an incomplete narrative inheritance from to include *ungelöst*[4] stories with unresolved uncertainties and dissonances that also were perceived as disruptive to efforts to build a narrative inheritance.

Fivush (2010) expounds on the tensions that can disrupt a narrative inheritance, as conceptualized by McNay, by pointing out the power imbalances that exist in memory sharing and storytelling. Fivush argues that the incompleteness in a narrative inheritance could be due to family ancestors exercising their "narrative authority," or the right to tell a story in the way that they wanted. One way of exercising narrative authority, particularly in the case of absent memories, was for a person to remain silent or reticent on aspects they did not want to share. A deliberate refusal to speak on a particular topic or to a certain audience can be a teller's effort to

[4] There is no word in the English language that quite characterizes the character of the memories and stories I are trying to describe here. *Ungelöst* is a common German adjective that means unresolved, uncertain, and undetermined as relates to detective mysteries and open questions, which fits my purposes nicely.

preserve a particular aspect of their identity from contrary information, or to protect themselves from revisiting painful or unwanted memories (Fivush, ibid). Family secrets are another well-studied example of an exercise of narrative authority, where information is privileged and distributed unevenly across family members (Vangelisti, Caughlin, and Timmerman 2001). Wertsch points out that these tensions are not only top-down; collective remembering is a triadic exchange between the teller, the listener, and any previous tellers, each with their own demands: "The author (speaker) has his own inalienable right to the word, but the listener also has his rights, and those whose voices are heard in the word before the author comes up on it also have their rights…" (2002, quoting Bakhtin 1986, p. 16). These unfolding dynamics across multiple parties shape memory as it flows across generations. Each of my studies examines how these privileges and power imbalances influence the collective construction of family memory and how to facilitate the negotiation of these dynamics through design.

In related work in digital legacy, Brubaker et al. (2014) have suggested using the term "stewardship" rather than inheritance as a more adequate description of the roles and responsibilities that recipients of inherited digital artifacts take on. Stewardship, they argue, conveys the notion of recipients as mediators, rather than owners, of a legacy, held accountable and responsible for their actions on behalf of another. A similar stewardship dynamic has been noted in related work in family memory sharing among those who have taken on the responsibility of being stewards of heirlooms and other memory artifacts in their families (Lindley 2012). Stewards, are distinct from owners, in Brubaker et al.'s conception, because they are acting on behalf of a collective, not themselves.

I find the model of stewardship useful to describe the attitudes and behaviors of people in a family who have taken on responsibilities of being a "memory keeper." However, not all participants in my various studies talked about family memory with a sense of obligation beyond their own desire to know. (This sense of responsibility was largely limited in my data to participants with children, although there were exceptions.) Yet, all of my participants had some concept of family memory as something they were entitled to have. Inheritance fits a broader conception of family memory. Further, inheritance gives me a different analytical power than stewardship, allowing me to pay more attention to the processes of handing down memories

between generations, rather than focusing only on actions after receipt. I use both concepts to unpack the dynamics of memory. I use stewardship to draw attention to the mutual accountability that family members have to each other, especially within a generation, and inheritance to highlight the attitudes and different reactions that family members across generations might have in these situations.

Just as family memory is an ongoing, constructive process, a narrative inheritance can be defined as an ongoing, co-constructive process of building a family memory over each generation. This definition encompasses memory as a process and product. It is an abstraction over the set of shared information (i.e. stories) and artifacts (i.e. physical & digital media) belonging to a family. Narrative inheritance also foregrounds the practices enacted employed by family members around issues of disclosure, transmission, and privacy of memory artifacts.

Studies in HCI and media studies have addressed the ways that family memory is mediated through physical and digital technological artifacts, but have not yet addressed the processes by which family memory is distributed throughout members of a family or how the context of telling and listening affect how memories are passed on. In the next section, I outline existing work in HCI on building mediating devices for family memory. The work proposed for my dissertation addresses the gap in the literature on understanding distribution and context.

## HCI Approaches to Designing for Memory

This dissertation builds on and contributes to existing research in human-computer interaction in designing for *autobiographical memory*. Autobiographical memory is defined broadly for this field as what one remembers about oneself, through one's own experience (van den Hoven 2004). Although this autobiographical memory is primarily focused on the individual, this body of work in HCI does not preclude a focus on collective remembering. Prior work on designing for memory in a social, family setting has incorporated many of the foundational assumptions of a "constructive approach" to memory, on which theories of collective remembering are built (Lindley 2012). In a constructive approach, memories are formed, rather than retrieved; narratives are actively reconstructed; and one's life story is constantly reinterpreted in light of current circumstances. A constructivist approach to memory places more emphasis on the

meaning and significance of what is being recalled, rather than the accuracy. Memory is not a matter of storing and retrieving information, but is instead understood as an ongoing, constructive, identity-making process that continually integrate traces of past experiences with one's current perspective and identity.

Although some research in HCI has incorporated a constructivist view, Van House and Churchill (2008) have called for more interdisciplinary input into the design of memory technologies. They especially emphasize incorporating theoretical insights from social and collective memory scholars to guide the design decisions going into technologies for memory. Most design decisions, they argue, are "hazardous"-ly utopian in their focus on the individual, psychological perspective of memory. The collective and cultural is often neglected, along with important issues such as the social dynamics that shape how we remember, the tensions of power that influence memory practices, and privacy concerns that emerge when people consider sharing their thoughts and experiences with a wider group.

A social lens on memory technologies is does not only expand the number of users or a system. It provides a new and useful approach, to understand and examine the successes, failures, and usage trends of technologies for memory that have been employed in a family context. In the next sections, I describe prior work in design for memory and building memory technologies for families, which illustrates current approaches in design and the lessons learned which motivate the development of a collective, value-oriented design framework.

## The Activities of Memory

Interaction designers who understand memory from a constructivist perspective aim to facilitate the user's ability to meaningfully engage, through some media, with their constructed views of the past. To facilitate this design work, Sellen and Whittaker (2010) broke down autobiographical memory into a set of distinct "activities of memory." Though these activities were envisioned for individual, personal memory, this breakdown is foundational for my own translation of the abstract processes of family memory into practices that motivate concrete design features. The activities of memory are outlined below, along with key design examples of systems created to support these activities.

This taxonomy, the "5 R's of Memory," was created as a critique of the traditional focus in HCI on the capture, storage, and retrieval functions of memory. It challenged researchers to broaden their notion of human memory to encompass the purposes that memory plays in various circumstances. Below I briefly describe each of the "5 R's": reflecting, remembering intention, retrieving, recollecting and reminiscing. I also add a sixth, forgetting, that was suggested by social systems designer, Liam Bannon (2006) to present a fuller picture of remembering as a constructive process.

**1. Reflection**. Reflection refers to the act of recalling a particular experience for the purpose of gaining some insight or knowledge from the experience or reframing the past in light of knowledge gained in the present. Reflection is purposeful and deliberate, and can be an individual or a collective activity. Pensieve, perhaps the most well-known example of a reflective system, explored different styles of prompts to encourage individuals to regularly journal about their day and later revisit these writings (Peesapati et al. 2010). The Photobox is an example of a physical memory artifact designed to provoke individual reflection over the long-term (Odom et al. 2014). The PhotoBox incorporated slow design principles to cause participants to stop to consider the ways in which they had become unthinking consumers of a constant stream of photo memorabilia, rather than engaging with the memories the photos aroused. Dong et al.'s ( 2015) Home Traces is an example of a system for collective reflection in households. Family members used their memory and knowledge about their technology use and daily activities to decipher a puzzle depicting the total household's technology use over the day, and through the process build a collective understanding of how they as a family choose to engage with technology.

**2. Remembering Intention**. The second activity is remembering intention, otherwise known as prospective memory. Prospective memory consists of stored cues to take a particular action in the future, or in other words, remembering to do something sometime in the future. Prospective memory can depend on retrospective memory, of which the other four are a type, because people use their knowledge of past habits and circumstances to make plans for the future. Alarms, calendars, and other context-driven reminder systems are forms of augmentation for prospective memory.

**3. Retrieval.** The third activity is retrieval, or remembering information or knowledge that one has. Technologies that support retrieval, such as memory aids, augment a person's ability to find relevant information stored in their long-term memory by improving their organization schemes and expanding the storage capacity they have available. SenseCam (Hodges et al. 2006), a wearable lifelogging device that passively records images and other trace data throughout the day, has been studied extensively as a means to help those with memory loss to recover details about their lives (Hodges, Berry, and Wood 2011).

**4. Recollection.** The fourth memory activity is recollecting. Recollecting is the act of thinking back in detail, to relive a particular event or bring back to consciousness details of a past experience. Lee et al.'s Reflexive Printer (2014) is an example of a device that facilitates recollection. The Reflexive Printer randomly selected photos from the owner's smartphone photo albums, and printed out distorted versions that the person then had to decode. This prompted people to recollect their past experience related to the photo in order to reconstruct the scene through the distortion. An important distinction Sellen and Whittaker (2010) make between retrieval and recollection is that retrieval involves the recall of information and knowledge, while recollecting is the recall of experiences. Yet, these might not be as distinct in practice, as recalling informational details about the past can be a precursor to and enabler of reliving an experience tied to those details.

**5. Reminiscing**. The fifth type of memory activity is reminiscing. Reminiscing is a special case of recollection where a person relives past experiences for emotional or sentimental reasons. This type of activity I refer to as "memory for memory's sake." There is no express purpose to revisiting the past—it may not even be voluntary—and there is not necessarily any knowledge or insight gained from this experience. SoundCapsule is an example of a technology that supports reminiscing (Hsieh, Liang, and Chen 2011). This mobile app allows people to record sounds in their everyday environment, and then in some unexpected time in the future, they receive a phone call in which one of their recorded sounds is played back. This serendipitous "call from the past" prompts reminiscence as listeners relive the moment in the short clip.

**6. Forgetting**. While not a part of Sellen and Whittaker's taxonomy, forgetting has been argued by other researchers to be an important activity of memory. Forgetting is a crucial aspect of the "dual nature" of memory (Bannon 2006). Bannon argues that to deal only with the preservation aspects of remembering without attention to the ways that things are ignored, cut out, or buried fails to fully account for the activities that make up the reconstructive process of memory. Connerton (2008) offered a similar, but more social view of forgetting as a possible outcome of competing social agents and values in a collective.

## Designing Family Memory Devices

This section outlines studies aimed at understanding and facilitating social interactions around memory. The studies in this section used technical and design probes and reflective interviews to reveal the taken-for-granted ways in which memory artifacts were socially organized in the family and tailored for particular types of social situations. Each of the probes in these studies was a "family device," designed to support some collective interaction with shared digital or physical memory artifacts. The first study, (Petrelli, van den Hoven, and Whittaker 2009), had families to create a 25-year time capsule to qualitatively investigate how people envisioned preserving memories for their future selves. The second and third studies, Family Memory Radio (Petrelli et al. 2010) and CaraClock (Uriu et al. 2009), explored the possibility of creating tangible interactive experiences for a shared collection of digital family content, audio and digital photographs respectively. The fourth study, the Family Archive (Kirk et al. 2010) provided a platform to explore how families collaboratively organized their memory artifacts, illustrating the clash of values that might occur in a multi-user device. Following a brief description of these studies, their goals, and the challenges they encountered, I describe key design implications that emerged across these studies, namely that devices that were in some way integrated into the family home and would remain legible to future audiences.

### Preserving Memories for the Future

To explore what kind of mementos people might want to leave for the future, Petrelli et al. (2009) asked participants to collaboratively construct their own consolidated family archive by creating a time capsule to send to themselves twenty-five years into the future. Participants were

given a month to put whatever artifacts they wished into the time capsule. They were subsequently interviewed by the researchers about their motivation to include the pieces that they did. While this study relied on a contrived scenario and artificially limited time frame of interaction, it offered a future-oriented scenario to prior studies on family's regard for their material and digital mementos. An important observation was that families rarely included digital artifacts. A primary reason cited was their uncertainty about their ability to access digital content in the future, a concern echoed in (Kirk and Sellen 2010; van Erve et al. 2011). Additionally, in keeping with findings from other studies, participants resisted digitalization of their object. Mementos included in the time capsules were unique keepsakes that could not be digitally approximated (e.g., a failed DIY project), artifacts that were kept for their evocative value as well as their utility (an aging bottle of wine), and gifts for the future (wrapped packages from a child for their future children).

This study demonstrated that, at the time it was conducted, people did not consider digital preservation as a reliable or evocative medium for their mementos. Yet, while physical objects are still not digitally approximated, there is an overwhelming increase in the amount of "born digital" memorabilia that is being generated and captured with available digital capture technologies. Digital content and digitization affords cheap storage, duplication, and flexible interactivity which is attractive contrast to the physical. Researchers have proposed a hybrid digital-physical approach to mediating memories by merging physical objects with digital content (Banks, Kirk, Sellen, 2010). This allows users to gain the best of both worlds. However, as I discuss in my findings in subsequent chapters, even hybrid approaches bring dilemmas for users that require tradeoffs in functionality and interactivity.

## Interacting together with Digital Content

The Family Memory Radio was a prototype tangible archive for sound-based memory artifacts (Petrelli et al. 2010). FM Radio was created to facilitate "family remembering" using sound as a medium. Their design goal was to use tangible design to create an interactive, familiar artifact that families could use to intuitively interact with their recorded sounds together, bringing archived sounds out of participants' hard drives, where they were typically stored and forgotten.

The FM Radio was operationalized as a microprocessor with sound playback capabilities encased in a familiar vintage radio shell. The channels of the radio corresponded to different categorical themes of the sound content and could be surfed using the tuning knob. This study, along with others, emphasized the importance of physical materials and tangibility to the interaction experience of engaging with digital memory artifacts.

CaraClock (Uriu et al. 2009) was a collaborative system consisting of a distributed set of augmented digital photo frames. These prototypes were meant to encourage members of an extended family to reminisce together and discover shared aspects of their past. Each device belonged to a different family member, and individually displayed digital photos of that person's ancestors. When two or more family members came together and connected their CaraClocks, the devices would temporally synchronize to display photos taken in the same year, or the users' respective ancestors at the same age. The value of CaraClock's distributed approach is that new content would be discovered as a byproduct of some social interaction—when the family gathered together, their clocks would respond to the context. It draws attention to family memory as a social construct built by many family members sharing their view of the past. This device would work well for face-to-face contexts to facilitate conversational storytelling, but is primarily for contemporaneous interactions rather than intergenerational storytelling.

### Collaborative Organization

The Family Archive is a large tabletop device designed to allow household family members to integrate and organize their entire collection of family memory artifacts (Kirk et al. 2010). Family members could upload digital files to the tabletop device as well as take digital images of physical possessions to include them in their collection. On the tabletop screen, the digital artifacts were dumped in virtual "shoeboxes," where they could eventually be organized through annotation and rearrangement into a useable archive. The design of the Family Archive is reminiscent of The Living Memory Box (Stevens et al. 2003), a preceding device which similarly sought to encapsulate a family's entire collection of sentimental artifacts into a digital time capsule to be preserved for the future. The focus of the Family Archive however, was to

encourage co-located collaboration in managing family archives, which the authors argue was previously an individual activity.

The Family Archive was intended as a technical probe to destabilize existing power relations and social norms around authorship and control in family archiving practices. For instance, the authors explicitly designed the tabletop interface to be accessible for young children so that they would be able to easily digitize their own toys and mementos, as well as add annotations to the collection. Despite the designers' intent, during deployment, families did not engage in co-located collaborative activities. Instead, family members worked out agreements to use the device asynchronously. More members of the family were able to interact with the content; however, they mostly did so within the bounds of their existing archival roles, such as the mother as the collection organizer and the father as the device tech support. In addition, the contributions of less "competent" family members, usually those who were previously not included in archiving activities, caused frustration for the more experienced editors who were endeavoring to avoid disruption in their careful organization of the collection. The device was largely absorbed into existing memory management practices rather than disrupting them, although there were some changes in some families. When radically different uses of the system arose, such as being appropriated as a child's digital play area, the device was abandoned as a serious work place. The outcome of this study illustrates the need for more work on understanding family dynamics as relates to memory sharing, especially how different roles, relationships and values influence the creation and management of shared family memory.

## Common Goals: Integration and Legibility

These studies above demonstrated a range of approaches to address the challenge of fitting these collective memory technologies into everyday life and ensuring that they were usable over the long-term by the people they were intended for. My work builds from the foundational implications generated by these devices.

### *Integration*

The Family Archive proposed the creation of an all-encompassing "family device," a system which all household members "have access to, which all can use, and which supports a wide

range of different activities" (Kirk et al. 2010). In this vision, the Archive was integrated into the home like a piece of family furniture where a single interface existed for all family members. The device also hosted an array of capture and recording features and served as a safe storage place for valuable artifacts, or their traces of artifacts, to be stored. In a contrasting approach, the FM Radio was envisioned as an interactive display item. Similar to the Family Archive, there was one interface for all family members and this device both stored digital audio artifacts and enabled their playback. The explicitly public nature of the FM Radio prompted participants to reflect on how they might use the device in social settings with people present beyond the household family.

Kirk and Sellen (2010) noted that the arrangement of artifacts in the public spaces of a home were negotiated sites of performance of the family's identity to outsiders. The users of the FM Radio pointed out that some things they audio-recorded were not appropriate for public display, indicating that they could envision incorporating the device and its content into their home. Kirk et al also conjectured that some of the Family Archive users wanted to make it presentable to visitors, even tidying it up for visitors, although outsiders would not use it. These examples show that technologies can take on the same social expectations as other objects around the home when given a physical form that is embedded into the environment. The authors of these studies propose that designers can leverage the features of these artifacts to make them fit into families' home environments, and also activate social norms and behaviors to enrich interactions with the content.

This thesis incorporates and expands these insights about the importance of materiality for integrating artifacts in the home environment and into social behaviors. Further discussions are included in Chapter 7 to describe how families leverage materiality in their curatorial practices, and in Chapter 8 where materiality is used to guide and suggest interactions with a collection of digital audio content.

### *Legibility*

There are two approaches observed in the HCI literature on making shared memories legible to future audiences. The Memory Box (Frohlich and Murphy 2000) describes "telling stories with

things," where objects are associated with a digital narrative that conveys a story or description of its significance to the owner. This "anchored narrative" approach was also seen in studies like Tales of Things (Barthel et al. 2011)and Storybeads (Reitsma, Smith, and van den Hoven 2013) which also associated a recorded narrative with a particular anchor object for later retrieval. In the second approach, seen in CaraClock (Uriu et al. 2009), the displayed content was intended to help people discover storytelling opportunities when in the presence of other people who might have something to share. It facilitated in-person explanations. My work proposes a third approach, in Chapter 8, where the memory artifact's physical medium conveys some information about the nature of the content it references and contains.

Yet, in the work described above, the families' shared collections were rarely envisioned to be used by others beyond the users who created the archive. Petrelli et al. (2009), for instance, noted a surprising lack of narratives included in participants' time capsules; many of the objects families placed in their time capsule archive were highly personal and unintelligible without explanation. The objects thus required the presence of the owners to interpret and were not prepared for meaningful use by others. Oleksik et al. (2008) and Frohlich & Murphy (2000) suggested that using narratives that recount the setting and events represented by a memory artifact could help to elucidate more cryptic, symbolic artifacts. Yet, this practice was not considered by participants in these studies, perhaps because they were not thinking about their content outliving them. Work in digital legacy, outlined in the next section, addresses this shortsighted view of mementos.

While there are many studies in HCI that help families create meaningful media artifacts, from photos, to video stories, to audio mementos, and more recently, data-generated memory artifacts (Lee et al. 2016), there are few studies specifically focused on understanding just what it is that families intend to do with the meaningful stuff they collect. In addition, attempts to prepare artifacts for a future recipient primarily focus on attaching textual explanations, without any consideration of how the artifact might be transmitted from one's possession to another or how this artifact is perceived by its recipients.

## DIGITAL LEGACY AND MULTI-LIFESPAN SYSTEMS

A few studies in HCI and social media have started to grapple with the social implications of technologies that carry information into a future beyond the lives of their owner or users. Technologies in this design space constitute "multi-lifespan information systems" (Friedman and Nathan 2010). Multi-lifespan systems require designers to account for temporal considerations such as long-term use and obsolescence, future unknown users, and evolving contexts of use. Multi-lifespan systems must also be continually renovated in order to remain functional and relevant. Renovation may be operationalized as systems designed to be deconstructed and reconstructed by consecutive generations, or to pause and become nominally inactive for significant moments of time to draw back from everyday use and regain value from distance (e.g. Friedman and Yoo 2017). This allows for more systemic realization of the continual reconstructive processes of family memory, which I describe more in Chapters 4 and 5 and discuss in relation to design in Chapter 8.

Social media accounts that outlive their creators have become key "in-the-wild" examples of multi-lifespan systems. Research in this context broadly addresses "digital legacy," or the fate of the personal information that a person leaves behind and the social ramifications of its management and use. For the purposes of this analysis, I distinguish an "emergent" multi-lifespan system to highlight cases where a person's data and information is simply left behind on some platform that continues to exist after they pass away. I refer to "bespoke" systems to highlight the nascent area of design where information is created with the express intent to become a digital legacy and to be preserved for a future user. I discuss memory technologies in this thesis as primarily consisting of the latter—bespoke, intentional legacy systems.

One strain of work in digital legacy focuses primarily on the appropriation of a person's online social media profile after they die. The show how different social groups manage the left-behind online identity and spaces of a loved one. These studies shed light on the conflicts that can arise over the control of someone's personal information and online identity, especially when the parties managing this information are acting in a "steward" role, accountable to others, rather than as independent owners (Brubaker et al. 2014). Massimi and Baecker's (2011) investigation into post-mortem Facebook profile management showed how digital identity and digital possessions were worked out among different groups of the bereaved, and illuminated the need

for people to develop anticipatory strategies for how they wanted their digital selves to be managed after they were no longer around. These studies made evident the fact that there might be competing interests among social groups who assert a claim with respect to how a person should be remembered.

Though these studies of emergent multi-lifespan systems have focused primarily on memorial practices, there is evidence that these same tensions translate into contemporary mediated interactions. Family memory involves both posthumous and contemporary interactions. Sas and Whittaker (2013), for example, studied couples' interactions with their shared digital mementos after a breakup. They showed that people often disagreed about how to treat shared digital mementos because these had differing emotional valence. Former romantic partners had different opinions on what artifacts, such as photos and text messages, should be kept from their shared content, and how shared artifacts and their metadata could be altered. This work highlights the centrality of personal attitudes as influences in how shared digital content is handled. Although in a stewardship model, people feel a sense of responsibility towards the other party, in this study, people had more self-interested motivations. I will show in my findings in Chapters 4 and 5 that in family memory, family members have a range of altruistic, obligatory, and self-interested motivations that shape how personal and inherited memories are shared and passed down from generation to generation.

The second smaller strain of work has addressed issues with bespoke multi-lifespan systems created to help people leave a digital legacy. Jamison-Powell et al. (2016) examined some of the issues and potential harms of legacy messaging systems, which allow a person to use social media to send or broadcast pre-written communications timed to be delivered after they die. The authors study the impact that posthumous messages could have on the bereaved recipients, focusing on how people might react to receiving a posthumous message from a deceased loved one. They found that potential recipients of messages from the dead wanted to retain control over when and how a message was received, regardless of the expressed desires of the message sender. This was due to the emotional toll a message from "beyond the grave" could have when received unexpectedly. This focus on the recipient's experience opened up a number of questions about agency in the asynchronous and symmetrical communication scenarios made possible by

multi-lifespan systems, especially regarding recipients who are not conscious users of the system, but who are chosen targets of the interaction. I further explore these questions of agency in intergenerational memory in Chapter 8 as part of my conceptual framework of a narrative inheritance.

Thomas and Briggs (2014) also looked at some of the issues that older adults perceive with bespoke multi-lifespan systems. They conducted focus groups with a combination of youth and older adults to elicit opinions and reactions to current and proposed digital legacy projects, ranging from digitally enhanced tombstones to QR-coded trinkets in a second-hand shop. Some focus group participants were intrigued by these ideas, but others had misgivings about who might have access to the information and whether the information conveyed was appropriate. Some thought that the technological memorial itself was "crude" and "indulgent" to even allow access to personal information about the deceased person. Participants were also worried about the misuse of what they might share. Those who were receptive of such systems wanted guarantees that the information they shared would be used in the right context and safe from vandalism by hackers or Internet trolls. The findings of this study, together with Jamison-Powell et al.'s insights about recipients' potential reservations about these kind of systems, emphasize the critical importance of prioritizing an understanding of the values at work in memory sharing scenarios, especially across the different stakeholders affected by the system. These values become embedded in the design of the interactive systems and have far-reaching effects.

A key takeaway from these prior works is that the interests and interactions of stakeholders in a digital legacy or shared digital mementos are not all aligned. People had different attitudes toward shared artifacts, different approaches to stewardship, and different ideas about what was appropriate to leave behind. These varying preferences are further complicated in the virtually anonymous context of intergenerational memory, where future recipients may not be known in advance. While work in digital legacy has been primarily envisioned to serve those who had direct relationships with the content owners, my work on digitally mediated remembering expands this line of research to take a longer term, multi-generational view of remembering where future users may not be known and content is continually reconstructed for future generations.

Family memory technologies are collective, multi-generation systems which are subject to the dynamics of control and change across members in a group and over time. As I will show in the studies comprising this thesis, potential issues are often worked out through the face-to-face interactions characteristic of social memory sharing practices. However, when families turn to mediating tools to pass on their memories, these dynamics are not well-handled. The next section details three "wicked problems" that manifest in family memory due to the unique long-asynchronous, anonymous, asymmetric social interaction space.

## WICKED PROBLEMS IN DESIGN FOR FAMILY MEMORY

The theoretical lenses of collective remembering and family memory illuminate myriad opportunities for the design of family memory technologies, especially in framing them as multi-generational systems. Other work on collaborative interactions around organizational memory from other realms of HCI and CSCW (e.g. Ackerman and Halverson 1998; Ackerman and McDonald 2000), has usefully addressed sociotechnical problems in these contexts by adopting perspectives that take into account the sociocultural or sociopolitical dynamics that affect how people interact with and interpret information artifacts. Likewise, applying a collective memory lens to issues in the design for family memory opens up new ways of re-framing and understanding the reoccurring and pervasive problems from this literature, and allows me to identify three "wicked problems" for design for family memory.

I use Buchanan's (1992) formulation of wicked problems for design as a useful lens for this thesis. Wicked problems are a "class of social system problems which are ill-formulated, where the information is confusing, where there are many clients and decision makers with conflicting values, and where the ramifications in the whole system are thoroughly confusing." There are ten properties of wicked problems, but I will focus on the most salient properties for this research.

First, wicked problems have no definitive formulation. Every formulation of a wicked problem corresponds to the formulation of the solution. In this case, my solution space is an attempting to design technologies to capture, curate, and revisit family memories which facilitate intergenerational interactions. This formulation helps to give form and shape to the wicked

problems I identify. Yet, it is not a complete solution, and any findings that I present in this thesis are specific to this formulation of the problem.

Next, wicked problems have no stopping rules. It is impossible to identify when a problem is solved, merely when it is sufficiently worked through for the formulation of an appropriate solution. This thesis will work through several iterations of the wicked problems facing design for family memory, continually refining and reframing the problems to ground and gain insight to the problems. It pauses at the point where enough insight has been gained to formulate a design framework from the lessons learned and to direct future work. I do not claim to "solve" family memory or exhaustively cover any of the problems. Rather I attempt to bring this research area to a point where an analytic or determinate design of interactive systems is possible.

Finally, for every wicked problem there is always more than one possible explanation, with explanation depending on the *Weltanschaung* (or intellectual perspective) of the designer. There are myriad possibilities for addressing the asynchronous, anonymous, asymmetrical nature of intergenerational family memory. As a sociotechnical researcher who takes a symbolic interactionist, value-sensitive approach to this research, the strategies to address the problems that I identify will have this flavor. I discuss my orientation to this research in detail in the Methodology in Chapter 3.

In the following section, I highlight three wicked problems for family memory in a digital age which are socio-technical and require an investigative approach that integrates both technical design and social inquiry: 1) Anticipating Future Audience, 2) Negotiating Dissonant Values, and 3) Curation at Scale. These problems are interconnected and pervasive across all attempts to mediate intergenerational family memory practices (technology-based or otherwise). Thus, they must be addressed in order to move forward in creating useful systems that support collective, intergenerational family memory.

### Anticipating Future Audiences

Older generations put considerable effort into **anticipating the needs and preferences of future generations** as they pass on their memories. Though this has not been extensively studied, works

by Lindley (2012), Thiry and Rosson (2012), and Thomas (2014) provide important insight into these efforts as they are experienced by older adults.

Thiry and Rosson's (2012) study found that older adults who wanted to share their memories paid careful attention to their perceived audience. When they were reminiscing in a conversational way about their lives, interviewees reported that what they might share would vary depending on who was listening. Further, they were sometimes hesitant to share their memories with others because they doubted they had anything of value to share about their lives. However, some thought that their knowledge of past events and historic circumstances would be of interest to younger generations and had created specific narratives about these experiences that were meant to be shared broadly.

Lindley's (2012) study of grandparents' specifically focused on people engaged in efforts to preserve their memories "for posterity". The grandparents interviewed for the study were creating their memoirs, personal narratives composed primarily of text and audio recordings, and also managing heirlooms and physical mementos. While these memoirs were considered to be personal, idiosyncratic, and reflective of their own personality, they also saw them as being "for the family," because they were "shaped by the perceived wishes and needs of their intended audience" (ibid, p. 26). The grandparents described contributing to family memory as a three-fold responsibility: guarding against the loss of the content, guarding against the loss of meaning of the content, and guarding against the loss of accessibility to the content. To these ends, the memoirs they created were purposed to protect and preserve the content of family memory narratives and artifacts, to retain their significance and interpretability for future audiences, and to provide a universally accessible means of accessing the memories they contained or embodied.

Thomas' (2014) related focus group study examined how older adults viewed legacy technologies for passing on their memories and life experiences. While older adults saw value in preserving information about themselves after their death, they only saw this value in certain contexts. Notably, one such context was for a descendant who knew nothing about them to gain some idea about who they were. However, along with common concerns of accessibility, the focus groups drew out a number of unique concerns from their participants relevant for this thesis.

Participants worried about the misuse of their legacy information by outsiders, trolls, or people with more technical expertise than they had. This concern points to fears that digitization or recording one's memories might be forfeiting one's ability to control the story that was later told, in comparison with in-person or analog methods of sharing. Lindley's (2012) study of grandparents contained echoes of this worry, as interviewees laid out very specific expectations about who their intended audience was and how they wanted their story to be told.

These desires to know and anticipate future audiences in order to appropriately shape a story is a wicked problem for this design space. By definition, mediated memories are most useful for contexts when in person sharing is difficult or impossible. The characteristic asynchronicity, anonymity, and longevity of intergenerational memory creates the need for mediation, yet, complicates this mediation in practice. A primary difficulty of grandparents, or members of older generations who want to share their memories, lay in ensuring that these stories they left behind, regardless of the medium, were received by their descendants as they intended. To address this worry, I devote significant attention in this thesis to ways to bridge the gap between telling and listening generations in a family to facilitate memory sharing even in contexts where future audiences are not fully known.

## Reconciling Dissonant Values

Easterbrook argues in his seminal "Review of Conflict Literature for CSCW" that "If designers ignore issues of conflict in the explicit part of the design, then their underlying assumptions about conflict, or its absence, become embedded in the system" (in Grasso, Cawsey, and Jones 2000, p. 2). Similarly, Friedman (2004) calls for critical reflection and in-depth study of the values embedded in the design of social systems, an approach termed value-sensitive design. All systems, she argues, operationalize some moral values from the designers or users in addition to technical values, like efficiency or speed.

Dissonant values are an inescapable feature of social groups, and must be considered in systems that mediate social interactions. Miller et al. (2007) terms these dissonances in design as "value tensions" and cautions that when they are unaddressed, the resulting frustration from users can be catastrophic to the system. Results might range from a lack of appropriation, to abandonment,

or even “sabotage” of the system, such as hacking security settings or exploiting loopholes. Yet, Grasso argues that value conflicts in shared systems, like those characteristic in family memory, cannot be resolved through the informative, logical argumentation common in information-based resolutions. "It is not always possible,” she says, “and maybe not even desirable, to solve these kinds of conflicts, as they are subjective and linked to personal factors" (Grasso, Cawsey, and Jones 2000). Examples of these kinds of conflicts were examined by Sas and Whittaker (2013) in their study of ex-partners’ regard of shared mementos and Kirk et al.’s Family Archive (2010). In these studies, the multiple stakeholders—owners, users, and non-users—had differing values about how their content should be handled. Some of these values were operationalized by the system (e.g. egalitarian use in the Family Archive), while other values were not supported. The conflicts in values were not resolved, leading some users to abandon the system and to institute social rules in their family to control interactions in the way they preferred.

There have been some suggestions for ways to address these conflict in design. Grasso’s approach to resolving conflict was to try to persuade users to accept a contrary opinion by appealing to other values that were not in conflict. Niemantsverdriet, van Essen, and Eggen (2017) identified an alternative approach to conflict resolution in their analysis of roommates using shared lighting systems. They observed that usage conflicts that could not be resolved through discussion were typically resolved by one party yielding privilege. In other words, one person gave up their right to control the system in the way they wanted. These approaches, and others, could be useful ways to facilitate the continually negotiated process of memory sharing, especially with respect to control over whether and how a memory is shared. I pay special attention to how these value negotiations are carried out in my studies of memory sharing practices (Chapters 4, 5, 6) and how they are operationalized and embedded in design (Chapters 7, 8).

## Curation at Scale

As the amount of digital content increases, people’s active management and organization of digital artifacts decreases. Many people embrace digital mementos, especially digital photos and videos, because of the minimal space, low cost, and easy mobility of keeping large volumes of content. However, without curation many of the interactive benefits of digital content are lost.

The practices and processes of selecting, organizing, maintaining, and displaying a collection of material is broadly considered as curation. Curation, while it has a general meaning, has been extensively studied in institutional archives and library science, as well as applied to data and digital curation. Yakel (2007) defines digital curation as "the activity of managing and promoting the use of data from its point of creation, to ensure it is fit for contemporary purpose, and available for discovery and re-use."

Everyday users in their homes are not trained in curation nor given time to do the work, as is the case with professional archivists. Several researchers studying how people manage large collections of digital content have found that in practice, curation of digital content rarely occurs. In research carried out by Marshall and coauthors on how individuals managed personal stores of digital content, the problem was summarized as, "Despite the acknowledged importance of digital personal information, it is difficult to convince many people of the urgency of this [curation] problem" (Marshall 2007, p.3). The urgency of the problem may not be apparent because users primarily access their archives in short-term retrieval contexts, and are not thinking about the long-term value and significance of artifacts in their collections.

This finding was echoed in Whittaker et al.'s (2012) meta-review of lifelogging studies, which found that people's everyday access to digital content tended to be limited to items recently added to the archive. The predominance of short-term engagement with digital content is quite problematic for digital memory artifacts. Researchers in personal digital archiving refer to efforts to shift digital collection management practices towards long-term considerations as "future-proofing" digital archives e.g. (Janssen 2010; Whittaker et al. 2012; Findlay 2002).

A key motivation for long-term curation practices in personal digital archives, Marshall (2007) argued, is that the over-accumulation of digital material can obscure those items that have long-term value. Further, van House and Churchill (2008) stress that "passive preservation," simply leaving an artifact to be rediscovered later, is not enough for ensuring that the artifact is available, findable, retrievable and accessible in the future. Since maintaining long-term value is the principle concern of memory artifacts, addressing the seemingly shortsighted lack of curation

that characterizes how people currently manage personal digital stores is of paramount importance.

My work informs those efforts by revealing patterns in the ways that people approach their collections of mementos and how these influence people's preferred behavior. I also draw out ways that curation is not simply about organizing objects but also complicated by the social expectations that accompany a stewarding role, and the personal emotions that characterize family memory. This analysis is covered in detail in Chapter 6. The KidKeeper study in Chapter 7 employs a technical probe to further untangle the social and the technical values that seemed to simultaneously enable and obstruct efforts of memory keepers (parents in this case) to effectively manage the multitude of digital memory artifacts that they collected.

## SUMMARY

The findings and design approach chapters build on the findings and implications generated by prior literature. The concept of narrative inheritance and the theoretical framing of collective memory as an ongoing construction are foundational concepts for this thesis. The various prior attempts to design technologies for families illustrate the importance of taking a social, value-centric approach to design. The devices and probes developed in prior work also serve as important sources of insight for design features in my own exploratory design work, described in Chapter 7 and 8. Notably, these studies emphasized the importance of materiality, integration into the home, and legibility to future audiences. Work on digital legacy and multi-lifespan systems introduced the possibility of dissonance among various stakeholders of a system where no one user is the owner of the content, and all are stewards. I explore these issues further using both the lens of stewardship and inheritance to give attention to the shared accountability and the shared agency that exists as family memory is passed down across generations. The wicked problems I outline in this chapter are pervasive influences across all the subsequent studies in this thesis. These problems are interwoven and each influences the others. My research will contribute a design framework for handling these socio-temporal dynamics of anticipating future audiences, curation at scale, and negotiating dissonant values by drawing insight from everyday practices that family members employ to prepare and pass on family memories.

# Chapter 3 – Methodology

## Overview

The goal of this thesis is to generate insight into the collective remembering practices of families, and to develop a conceptual framework to guide the design of future family memory technologies. To do this, I have designed a series of studies to examine in-depth the behaviors and values of family memory sharing. The analytical perspectives employed by these studies are designed to obtain insight into phenomena that are visible and intentional as well as those that are latent and implicit.

This thesis has two components: ethnographic and design, which are linked methodologically by a focus on interactions and interactivity. The ethnographic component follows a grounded theoretical, interactionist approach to understanding family memory. The design component follows a research-through-design approach, drawing on the design frameworks of value-sensitive design and interaction-driven design. Each of these components are generative and mutually informative. I will detail their implementation in this thesis in the following sections.

This mixed methods approach has analytical and practical value and serves to address my research questions in two respects. First, it allows me to understand family memory as a situated practice to generate insights about memory practices and values from real-world experiences. Second, it is a methodology well-suited to foregrounding and disentangling the complex social and mediated interactions of family memory, to generate design implications from ethnographic insights. In the sections below I will detail my overall research approach and explain the methodology for each chapter.

## Mixed-Methods Approach

### Ethnographic Component: Symbolic Interactionism

The studies presented in Chapters 4, 5, & 6 were conducted according to an interpretivist, grounded theoretical approach. This approach generates insight from a reflexive, bottom-up interpretation of qualitative data (Corbin and Strauss 2007). Qualitative data were collected formally through interviews and from conversations on relevant forums. Informal observation data, which was used to sharpen and corroborate findings from interviews, were collected through audio recordings and reflective memoing during my participation in family gatherings. Although the informal data collection is not reported in my findings, it is an important aspect of the preparation and reflection in an interpretivist analytic approach.

The data collection and subsequent analysis is focused through the lens of symbolic interactionism, which is sensitive to the ways that people construct meaning and interpret their experiences through their interactions with other people and with the world around them. Fine and Beim (2007) argue that symbolic interactionism is a valuable theoretical perspective from which to examine the social construction of memory because of this sensitivity to interactions and practices. Symbolic interactionism supports the interpretation of collective memory as both a process and a product, a dualism necessary to maintain the integrity of the concept of collective memory (ibid). This interpretive flexibility is ideal for the interdisciplinary work of this thesis, which alternatively examines family memory as process, focusing on the work of remembering, and as an artifact, which is composed of family stories and related media. Further, an interactionist lens opens up a broad range of collective remembering scenarios to investigation, including those that do not necessary lead to a cohesive memory. In particular, this approach allows me to normalize the existence of disruptive phenomena in the development of family memory, such as silences and contestation, by framing them as contingent outcomes of common situated storytelling practices.

Through this lens, I approach family memory as a set of social practices that families enact in their project of creating "the family," which involves developing a shared knowledge and interpretation of the past. Family memory is also the socially constructed knowledge and interpretative frames that are built and transmitted in these interactions. By focusing on the constructive practices and the constructed memory, I gain practical insight into how technologies

can mediate and support family memory interactions and artifacts, and how possible interventions might influence this context.

## Design Component: Value-sensitive, Research-through-Design

Research-through-design is a generative methodology which seeks to apply knowledge from humanist approaches to improve the practice of design and to direct designers in solving complex design problems (Zimmerman, Forlizzi, and Evenson 2007). In this approach, new knowledge is created through the making process by applying insights gained through prototype design and implementation (Gaver 2012). Zimmerman et al. (2007) outlines the contributions of research-through-design to an HCI problem: 1) It helps identify important gaps in theory and identifies opportunities for design by providing a template for bridging from theory to a specific problem. 2) It generates design exemplars as concrete embodiments of theory and technical opportunity, making this knowledge apparent and tenable to design practitioners. Gaver (2012) adds to this that insights gained through critical reflection on these design products can feedback into more focused investigation into the scenario and context of use. 3) It helps to clarify and reveal a framing of the problem that design seeks to address through a holistic view of conflicting and intersecting perspectives.

Zimmerman proposes research-through-design as an ideal framework for interaction design researchers addressing "wicked" problems, characterized by paradoxes and conflicting goals (Zimmerman, Forlizzi, and Evenson 2007; Buchanan 1992). I outlined three wicked problems in my last chapter illustrating the complex social environment of family memory complicated by the milieu of already existing technological and media interventions. This thesis leverages this particular strength of research-through-design to tackle the "social-technical gap" in design for family memory (described in Chapter 2).

To implement this approach, I rely on a combination of value-sensitive design and interaction-driven design, directed by the vision of "everyday" unremarkable computing (Tolmie et al. 2002). Unremarkable computing is an updated version of the vision of ubiquitous computing, where computation devices not only proliferate into everyday life, but also become taken-for-granted as they are seamlessly integrated into the activities of daily life and the environment. These various

frameworks sensitize the design work of this thesis in important and complementary ways, which I describe below.

### *Value-sensitive design*

Part of the goal of this thesis is to identify the values at work in the construction of family memory, especially those that are embedded into mediating technologies. I focus on human values, in contrast to functional system values such as efficiency or accuracy. Ames et al. (2010)distinguish two kinds of values with respect to the design and sociotechnical research communities: "large-V" values and "small-V" values.

"Large-V" values such as trust, privacy, or sustainability are society-scale cultural values that are embedded in design and enacted through technology. Proponents of "value-sensitive design," such as Friedman (2004) argues that such values must be embedded top-down into the processes of technology development through the research questions and sensitivities in the design process. These values also manifest in the ways that users appropriate or reject certain technologies or features of technologies.

"Little-v values" are those that exist in smaller collectivities, which in this thesis are at the family level. These values become apparent through close investigation of the ways that family members articulate and justify the peculiarities of their interactions and technology use. Little-v values are situated and negotiated and are key components of a family's way of expressing and reifying their family identity.

Although families are typically thought of as unified with respect to their values and identity, the context of family memory is a space where this unification is being worked out. Thus, I include in my  analysis the sensitizing concept of "value tensions" proposed by Miller et al (2007). Value tensions result from the dissonant and conflicting values that manifest in shared multi-user contexts and can affect the appropriation of the system: "Values matter to people who use and are affected by the use of information systems – so much so that at times unresolved value tensions have contributed to the failure of information system appropriation." When value tensions are unresolved they can lead to failure of the system in the real-world.

Our approach acknowledges the importance of taking both "Large-V" social and cultural values into account along with "Little-v" family values. Moreover, as family memory involves multiple people, I highlight the implications of the many different sets of user values that come to bear on shared systems in this context.

### *Interaction-driven design*

"Interaction-driven design" is an exploratory research approach developed expressly for designers of novel interactive technologies to better direct and refine the interactive components of their system (Maeng, Lim, and Lee 2012). As this is a fairly new research approach there are not many studies that have employed this framework. However, I have found this approach to be exceptionally well-suited to design for the peculiarities of intergenerational memory sharing technologies.

Interaction-driven design considers the interactive experience of a product, or its "interactivity," as a distinct third element in its human-centered design along with user needs and object features. Distinguishing interactivity from the users engaged in interacting and the objects that mediate the interaction allows me to focus on supporting practices, which is the key goal of this thesis. Remembering is situated practice, yet intergenerational memory sharing is a context in which both the users and the mediating objects are ambiguous. There can be multiple people interacting at any time and these people will change over time. In addition, memory artifacts can be specially designed, bespoke objects, as well as ordinary objects that acquire special value in myriad idiosyncratic ways. A focus on interactivity allows design processes to unfold in the midst of this ambiguity without requiring researchers to narrow their scope prematurely.

This flexibility works well for bridging insights about practice and social interactions from my ethnographic work. Using interaction-driven design in a research-through-design framework helps to translate the interactions, both conscious and implicit, that shape family memory into tenable design features.

## SUMMARY

The ethnographic and design components of this thesis are mutually informative. The ethnographic studies serve to describe and derive insights from people's real-world experiences, behaviors, perceptions and expressed values. Design grounds the intuitions of this ethnographic research and provokes deeper reflection on and discussion of the insights and implications. These reflections generate further questions that can be explored in conversations with users to advance an understanding of the scenarios in question. They also help illuminate paradoxes and latent values that cannot be articulated by users but that influence social interactions and design outcomes. In this way, this thesis weaves together a grounded theoretical approach focused through a symbolic interactionist lens and a research-through-design approach sensitized by value-sensitive, interaction-driven design. This mixed methodology results in a productive inquiry for understanding the memory as a collective accomplishment and addressing some of the wicked problems in design for family memory.

In the next section, I will detail the methods of data collection and analysis that were employed in each individual study contained in this thesis. All studies were approved by the University of Michigan Institutional Review Board.

## INDIVIDUAL STUDY METHODS

### STUDY 1, 2 – UNDERSTANDING FAMILY MEMORY SHARING

The goal of the studies described in Chapter 4 and 5 was to understand the motivation, practices, and challenges of family memory sharing from real-world experiences. I followed a grounded theory approach for this study (Corbin and Strauss 2007). I conducted semi-structured interviews with 21 people to better understand how memories are passed down through generations in families. All participants had spent most of their lives in the U.S. but, as is common among American families, traced their heritage to a diverse array of different countries around the world. Roughly half of my participants (4 younger generation, 4 older generation) were first generation Americans with some extended family living elsewhere. Participants were recruited through local community organizations, cultural centers, and universities through

emails, network contacts, and word-of-mouth. I offered an incentive of $15 to participants. A detailed description of recruited participants is included in Table 1.

Interviews were conducted in two main rounds. First, I interviewed 10 people actively researching their family history {participant IDs: Eli, Karen, Vivienne, Caleb, Joe, Oscar, Barb, Lilian, Alina, Robert}. These participants were primarily older (age range from 50-80) with adult children and many with grandchildren. One memory keeper was younger (Eli, early-thirties) had been working for several years on researching his family's genealogy and was writing a book about it. In these interviews, I asked participants to describe how they told stories about their life to their children and grandchildren, how they learned about their own ancestors, and what aspects of their own past and their families' past could be difficult to talk about. I also asked them to reflect on the motivations and challenges that they faced interacting with older generations.

Two of the memory keepers I interviewed were also family memory preservation consultants (Joe, Caleb). They provided advice to other aging adults in their local community about how to pass on their legacies, through recording oral histories, writing memoirs, and preserving heirlooms. I met these participants by attending one of their workshops. They had thought through issues from their own families in relation to how they might generalize to those with whom they were working, and helped us gain a better understanding of the shared challenges among the diverse families of my participants.

Second, I interviewed 11 younger adults, ranging in age from mid-twenties to early forties, as representatives of the "next generation" (Kristine, Tina, Anne, Lisbeth, Gloria, Lincoln, Evan, Larry, Janine, Maggie, Marie). Three of these participants had at least one child. Participants were a convenience sample, recruited through responses to an announcement on an unmediated listserv. I screened respondents to select those who had spent their lives in the U.S. to provide some common cultural framework. My participants were diverse with respect to their attitude toward family memory. Although many expressed an interest in learning more of their family's past, some were not interested at all. With only two exceptions, participants were not actively engaged in any family research endeavors. In interviews, I asked what they wanted to know about

the lives of their older family members and in what ways they learned about their family history. I also asked them to share what stories about their family they found most interesting, what were the difficulties they faced in learning more about their past, and how they envisioned sharing their own memories with their future descendants.

Interviews ranged from 30 minutes to two hours, with most lasting an hour, collectively adding up to over 16 hours. All interviews were audio-recorded and transcribed immediately after they were conducted. Interviews from memory keepers and younger participants were initially analyzed separately according to their own emergent themes. The codes and themes from interviews were discussed between the authors, and iteratively refined throughout each of the interviews. Themes from each set of interviews were then combined and reviewed to identify value tensions that might manifest across generations. Insights from these findings are presented in Chapters 4 and 5, and are used to ground discussion of my design framework in Chapter 8.

| | **Pseudonym** | **Age** | **Cultural Background/ US Region** | **Have kids?** | **Involved in family history?** |
|---|---|---|---|---|---|
| **Listener Generation** | | | | | |
| | Tina | 30-40 | E. European / Latina, 1st gen | Yes | Yes |
| | Lisbeth | 30-40 | E. European, Jewish, 1st gen | Yes | Yes |
| | Gloria | 30-40 | White, Midwestern US | Yes | yes |
| | Lincoln | 20-30 | White, Midwestern US | No | no |
| | Evan | 20-30 | White, Midwestern US | No | No |
| | Kristine | 20-30 | White, Midwestern US | No | No |
| | Maggie | 20-30 | White, Midwestern US | No | No |
| | Marie | 20-30 | White, Midwestern US | No | No |
| | Anne | 20-30 | White, Midwestern US | No | Yes |
| | Gary Larry | 20-30 | Chinese American, Western US | No | No |
| | Janine | 20-30 | Multi-ethnic (European/Latina), Midwestern US | No | Yes |
| **Teller (Keepers) Generation** | | | | | |
| | Eli | 20-30 | African-American, Eastern US | No | Yes |
| | Alina | 50-60 | White, Eastern US | Yes | Yes |
| | Robert | 50-60 | White, Midwestern US | Yes, grandparent | yes |
| | Vivienne | 60-70 | White, Western US | Yes | Yes |
| | Barb | 60-70 | Latina, Eastern US, | Yes, grandparent | Yes |
| | Karen | 60-70 | African-American, Southern US | Yes, grandparent | Yes |
| | Joe | 60-70 | Jewish, Midwestern US | Yes | Yes |
| | Caleb | 60-70 | Jewish, Midwestern US | Yes | Yes |

| | | | | | |
|---|---|---|---|---|---|
| | Oscar | 70-80 | E. European Jewish, Midwestern US | Yes, grandparent | Yes |
| | Lilian | 70-80 | White/W. Euro, Eastern US | Yes, grandparent | yes |

**Table 1. Participants of Family Memory Keeping Study. N=21**

## STUDY 3 – CURATING MEMORY IN AN INFINITE BASEMENT

The goal of this study was to gain insight into a key "wicked" problem, curating memory artifacts at scale. To do this, I framed this as an issue of overload to draw out how people manage an overabundance of valued and sentimental objects. I examined 2,405 posts on two subforums of a public website devoted to "uncluttering" one's life, that is, getting rid of excess belongings and other objects. On this site, UnClutterNow.com (name changed for anonymity), some people aim to be minimalists, some people seem to be recovering borderline hoarders, and many people just have accumulated too many things in their lives. Based on their accounts and profile descriptions, participants were primarily from three geo-cultural regions, North America, Western Europe and Australia. All posts were in English.

I largely focused on posts in the subforum "Sentimental Clutter" where participants discussed issues regarding things that had been important to themselves or other family members, and which formed the basis of personal and family memories. The posts were primarily about problems with objects that invoked remembrances, often with an emotional attachment.

On the Sentimental Clutter subforum, users discussed what constituted sentimental objects, how to rid themselves of excess memory objects, what to keep and store, and what issues they were experiencing in the curation of their memorabilia. Many of the comments were personal stories and advice to others on the forum based on each participant's personal experiences. The subforum postings were almost entirely preoccupied by physical objects, so I supplemented these with posts from the Technology subforum, which included discussions of digital objects, to better understand what was general to sentimental artifacts and what was specific to physical objects. All the posts on the site were from 2010-2013, shortly after the site began, up to when the forum collapsed due to a software change (in the explanation of the forum administrators).

In my qualitative analysis of the forum, I drew out descriptions of participants' memory-keeping practices, attitudes towards curation, and the social, emotional and temporal dynamics that influenced how personal, shared, and inherited memory artifacts were regarded and treated. issues around materiality, and design insights. This analysis uncovered some of the unseen and taken-for-granted processes by which users select, organize, and arrange the items in their collections of memory which provides important foundation for my design work in subsequent chapters. The findings from this study are detailed in Chapter 6.

## Study 4 – KidKeeper: Integrated Capture of Everyday Memories

The goal of this exploratory design study, conducted in partnership with David Merritt, was to elicit the underlying values that motivated families' efforts to capture "everyday" life and to explore a way to translate these values into design. KidKeeper (Figure 1) is a prototype developed to explore the values embedded in the context of assisting parents in capturing "everyday" memories of their young children. I led the field study of KidKeeper, including conducting the interviews and analysis which is presented in Chapter 7. David Merritt created and built the KidKeeper system and organized the deployment of the prototype. In describing the methodology and findings of this study, I refer to "we" to acknowledge the joint effort of this work.

**Figure 1. KidKeeper: "Froggy" prototype**

| Family M=Mom D=Dad | Family Arrangement Stay at Home (SaH), Part-time work (PT), Full-time work (FT) | Children (Age) | # of Audio Clips |
|---|---|---|---|
| Family 1 (M1) | PT Mom, FT Dad | 1 boy, 2 girls (7, 5, 2) | 391 |
| Family 2 (M2) | SaH Mom, FT Dad | 3 boys (all 7) | 216 |
| Family 3 (M3/D3) | Both parents FT | 2 girls (8, 6) | 60 |
| Family 4 (M4/D4) | SaH Mom, FT Dad | 2 girls (7, 5) | 304 |
| Family 5 (M5) | PT Mom, FT Dad | 2 girls, 1 boy (10,6,4) | 201 |
| Family 6 (M6/D6) | PT Mom, FT Dad | 2 boys, 1 girl (all 6) | 234 |
| Family 7 (M7/D7) | SaH Mom, FT Dad | 2 boys (7, 5) | 189 |

**Table 2. Participating families in KidKeeper deployment**

KidKeeper was deployed with simple functionality, which is described in Chapter 7. Families were given a short tutorial about how to activate its recording and playback functions, and given basic instructions about how to troubleshoot issues, such a lack of wireless connectivity. David continuously monitored the toy's status during the deployment to ensure there were no issues. Although there was a case where the wireless connectivity failed in a household, the local interactions with KidKeeper were unaffected and we were able to simulate the normal web-based activities of the system in a "wizard-of-Oz" style workaround.

To evaluate whether KidKeeper was able to proactively preserve the everyday moments of young children's lives, we deployed it to seven households. We started recruiting parents from our own social networks and employed snowball sampling to recruit other parents. Our only criterion was that families have at least one child in our target age range (2-7 years). Refer to Table 2 for more details about the participating parents and children.

These seven families participated in a weeklong deployment, with semi-structured interviews at the beginning and end of the deployment. We felt one week was sufficient to gauge whether KidKeeper would be accepted as a normal part of children's playtime and to gather enough recordings for parents to reflect and respond to in the post-study interview. We wanted to examine the basic feasibility of our approach, reserving emergent and other long-term behavior

for a subsequent study. Eleven parents and 18 children participated in the deployment, and all families were two-parent households with multiple children. We had a wide range of family arrangements with respect to the amount of time parents were able to spend directly interacting with their children (see Table 2 for details). These family arrangements are important for situating the analysis of the values that motivated parents to capture everyday life. In three of the families, the parent who spent the most time at home participated in the interview (Family 1, 2, 6). In three of the families, both parents participated in the pre-study interview, and only one parent was able to participate in the post interview (Family 3, 4, 5). In Family 7, both parents participated in both interviews.

In the pre-study interviews, which lasted from 40 minutes to 1.5 hours, parents were asked to bring 2-3 mementos of their children, and discuss their values and goals in how they wanted to remember their kids. The interview questions addressed how they currently created mementos of their children, and how they managed their collections of memorabilia. After the interviews, the families were introduced to KidKeeper, including its purpose and instructions for use, and were given a toy to leave in their house for one week. In the post-study interviews, we asked about their experience using KidKeeper, especially regarding its dual role as a toy and a memory capture device, and their thoughts about audio recordings as a part of their collections of memorabilia.

Interviews were transcribed and analyzed following interpretivist methods of grounded theory (Corbin and Strauss 2007). We used open coding to draw out from the data descriptions of memory keeping practices, parents' memory-related values, and reactions to KidKeeper. These practices and values were then discussed with the other authors to draw out themes and socio-technical challenges. Several iterations of discussion and analysis of the interview transcripts were conducted among the team until consensus was reached. The findings and implications from this study are presented in Chapter 7.

## Study 5 – Designing a Framework for a Narrative Inheritance

The aim of this final study was to develop a design framework for family memory technologies that was sensitive to the value and social dynamics at work across generations. This study

employed research-through-design in the interaction context of enabling families to explore large collections of audio-recorded family stories. The findings and insights presented in the chapter are the result of several rounds of design and development which served to focus the scope of the conceptual work and refine the design. Although each of the studies in this thesis are presented linearly, in practice they were parallel and overlapping.

The primary design used to focus the analysis in Chapter 8 is Scatter, which was developed and informed by prior work on capture, curation, and retrieval of family memories. Besides, Scatter there were several prototypes and design projects undertaken in this effort to explore design for family memories in everyday life. These other alternatives were important aspects of the reflective, iterative process of research-through-design.

For brevity and clarity, I will focus on the lesson learned from the direct precursors to the prototype presented in this study. The first design was called "StoryBall."[5] Inspired by old Magic 8Balls, it was a simple handheld globe that, when shaken, would tell you a story about your past. StoryBall was highly evocative when it was presented to various audiences as a design concept, which demonstrated the widespread interest and applicability of this research problem and the power of a research-through-design approach. When applied to the original context of family memory sharing, StoryBall helped to identify a number of knowledge gaps that needed to be addressed before I could develop a defensible design rationale for memory technologies. To begin to lay out these knowledge gaps, we sketched a number of "apps" for StoryBall that imagined different kinds of stories, different gestures, and various social situations in which StoryBall would be useful. Parallel to these, we also iterated on the StoryBall form and scenario to develop a second, more automated prototype, OneDay[5]. OneDay appears like a crystal ball and sits as a centerpiece at the center of the dining table during important family gatherings. It is an ambient recording device that detects and responds to contextual cues to determine what part of the gathering might be important to capture and save for later. OneDay also keeps track of

[5] StoryBall was first proposed by Mark Ackerman and developed over a series of conversations with me, Xinda Zheng and David Merritt. OneDay was similarly developed. KidKeeper (Chapter 7), developed by David Merritt, was first envisioned as variation of StoryBall called "FuzzyBall," but then the project took on a life of its own.

context cues and shows captured content on its spherical display when a similar context arises again.

StoryBall and OneDay raised a number of important design questions which were difficult to answer definitively: Does a StoryBall belong to an entire family, or to an individual, or to a discrete household? Who decides what stories a StoryBall contains? How is the context that drives OneDay determined? Who directs what context can be considered? To further interrogate these designs and gain insight, a rudimentary works-like prototype of StoryBall was demoed at a family reunion. In its demo form, StoryBall was a wooden box (it was difficult to fabricate a globe) with a microphone and pushbutton trigger for recording audio, and speaker for audio playback, an accelerometer for gesture recognition, and Raspberry Pi running a Python script for automation. In addition to the original concept of shake-activated playback, I added a recording capability so that the pilot family could add some stories to the ball. Family members were prompted on startup to press a button to record a story, and then shake the box to hear a recording played back. The "storybox" demo was well-received. However, StoryBall and OneDay replicated many of the same challenges that were apparent in the literature.

I realized through this demo that while the interaction was enjoyable, the interaction scenario surrounding these prototypes was not quite developed. In particular, the social dynamics of family memory were not well-represented in proposed interactions of the prototypes.

With these lessons learned, I embarked on more contextual research to try to develop a cohesive understanding and design rationale for facilitating the social process of memory sharing in families. The results of this research are discussed in Chapters 4-6.

In addition to the need to unpack the social processes at work, I also found that content management deserved special attention. Unlike other contexts of digital curation, memory artifacts like recorded family stories could not be organized as an afterthought or precursor to some other activity. Further, a focus on curatorial interaction as a design activity would also shed light on some of the emergent paradoxes discovered from prior studies, such as the overload and devaluation of memory artifacts that results from the desire to capture everything (Chapter 6 and 7), and the lack of regular interaction with digital memory artifacts in spite of the need to

regularly interact with them to maintain their value (Chapter 4 and 6). To connect this issue of curation with the social dynamics of family memory, I decided to pursue a design which mediated the construction of family narratives. This design eventually became Scatter.

To help synthesize a design rationale from the insights gained from my contextual research and to address the questions raised by my pilot prototypes, I sketched out a number of design concepts and accompanying scenarios. I chose to continue with Scatter because it was conceptually well-developed with respect to its purpose, and could be reasonably implemented with available technologies. These sketches and scenarios helped me to work out the interactivity and form that the Scatter concept would take. The scenarios were also a key method to work out ways to situate these designs as a part of everyday life in the home, a weakness identified in my pilot study. The initial concept that inspired Scatter, "Collect," is depicted in Figure 2. The annotated iterations of the scenarios as well as their storyboards are available for reference in the Appendix B and C.


**Figure 2. Initial conceptualization of Scatter as a mosaic**

As the designs were being worked out in the scenarios, I also investigated the material and electronic components necessary to realize the vision set out in the scenarios. Many of the scenarios were adjusted to account for currently available technologies. For Scatter, I investigated

several ways to implement the tangible, mosaic-style interface, including consulting on the feasibility of the design with electrical engineers and embedded firmware developers. The final technical implementation, using off-the-shelf hardware, was decided on based on time, cost, and feasibility. While I focused primarily on refining the interaction design of Scatter (critical for developing the design framework), the fabrication and interaction design elements were tightly coupled. Changes and iterations to the software features and included sensors cascaded down into resulting changes in the form and material design. Other physical forms and technical interactions styles could be explored in future work. The ones that I developed for this prototype were sufficient for my purposes of working through the social dynamics of co-constructed memory. The details of the final prototype implementation are discussed in Chapter 8.

**Figure 3. The Scatter prototype interactive platform**

A critical part of research-through-design is the reflection on the design products. Through these reflections on the design and implementation of Scatter, I developed a conceptual framework of narrative inheritance and the resulting dimensions of the design space for family memory sharing technologies. To get initial feedback on the design of Scatter, and the conceptual framework it embodied, I held a design critique with one of the family memory participants (ID: Tina) who was keenly interested in family memory and had engaged in several

different attempts to record family stories and everyday memories. The purpose of these feedback sessions was to identify gaps in my design rationale, test and refine the interactivity of Scatter, and to gain preliminary reactions to the prototype. This critique helped to refine the theoretical framework of narrative inheritance through provoking discussion about some of the implicit values that were reified in the design. It also yielded some preliminary validation of the mapping of the design dimensions and directions for future work. I detail these reflections in Chapter 8.

In my conclusion in Chapter 9, I will present a synthesis of the lessons learned from each of the chapters and their contributions to building an understanding of family memory as a narrative inheritance. I also will reflect on the methodology employed in this thesis, including alternative outcomes that I could have pursued and the limitations of this work.

# CHAPTER 4– KEEPING A FAMILY MEMORY: THE WORK OF INHERITING MEMORIES

## INTRODUCTION

The process of creating a shared family memory resembles other kinds of storytelling, but the deeply personal, emotional, and temporal nature of sharing memories is a unique experience. Sharing memory "of the family" is fundamentally an identity project, laden with values, expectations and responsibilities distinct from social reminiscing (McNay 2009; Layman 2009; Zerubavel 1996; Erll and Kurian 2011). Passing on family memories to the next generation as a "narrative inheritance" engages value distinct from personal reminiscing and social reminiscing about one's own past experience. In this chapter, I lay a foundation for a practice-focused, value-sensitive framing of intergenerational family memory.

Memories of the family are a form of collective memory, both personal and shared among the members of the family as a whole. Halbwachs, a seminal scholar in the field, argues that in family memory, all can be equal participants (in Erll and Kurian 2011). However, this seems an incomplete characterization, and indeed, technologies based on this assumption of equal participation have failed in the past (e.g. Family Archive, Kirk et al. 2010). The findings of this study offer a more nuanced view, that all members of the family might participate in family memory sharing, but perhaps not in the same way. This study unpacks the motivations, attitudes, and practices involved in family memory to create a more comprehensive account of these activities.

To gain insight, I sought the dual perspectives of "keepers" and "descendants." The term "memory keeper" is popular in museum studies and has gained informal parlance in the amateur memento preservation world to designate specialized containers (such as scrapbooks or keepsake boxes) designed to keep memory artifacts safe. People who refer to themselves as "keepers"

likewise take on primary responsibility in their family for maintaining family memories and mementos. Among participants in this study, there was often only one keeper in their family, although this is not a rule. I use the term "descendants" in this study to refer to the prospective recipients of family memories that are passed on to "future generations." I note here that *everyone* is a descendant and thus can speak to their experience in that role, while few—typically one or two people in each generation in a family—consider themselves keepers.

My choice to learn from the experiences of both keepers and descendants contributes a dual perspective missing in prior work. Related ethnographic work in HCI has looked at people who desire to pass their memories on to future generations. Although they did not use the term "keepers", many of their participants might consider themselves so. Lindley (2012) and Thiry and Rosson (2012) studied grandparents creating memoirs for their children, considering their motivations to share and the challenges they encounter when transitioning from analog to digital media. While these studies focus on older people passing on their own memories to their descendants, I take a relationally and temporally broader view to encompass people passing on both their own memories and family stories, or inherited memories from their ancestors. This allows me to gain a better understanding of the roles that people inhabit in memory sharing.

Because family memory is repeatedly handed down over many generations, prior literature in HCI has characterized the responsibilities as a "steward" role rather than an ownership role (Lindley 2012; Kirk and Sellen 2010). The social accountability that accompanies this stewardship role both motivates and constrains the ways that people interact with their own memories to be passed on and those they have inherited from others. The details of how these social influences play out in practice has not been fully explored due to the scope of prior literature, but are critically important to account for in designs that intervene in a family space. Beyond the feelings of responsibility that result from this stewardship role, we know little about the future-oriented motivations that are actually driving people to curate, care for, (re)construct the "memory of the family" that the next generation comes to know. These motivations will be briefly described in this chapter in relation to the broader practices of family memory, and explored in more detail in Chapters 5 and 6.

In this chapter, I show that current endeavors to create mediated forms of family memory for future generations require extensive effort from keepers. Unpacking these activities into practices helps focus future design efforts, similarly to the activities of memory identified by Sellen and Whittaker (2010), and clarifies the varied values at work. The wicked problems of anticipation, negotiation, and curation facing design for family memory are grounded in the scenarios and accounts described in this study and will carry through to future chapters.

## THE WORK OF MEMORY KEEPING

These findings were drawn from interviews with 21 participants. The details of interviewees and the data collection process is reviewed in Chapter 3. I privilege accounts in this chapter from "memory keepers" that I interviewed (Karen, Vivienne, Caleb, Oscar, Joe, Alina, Barb, Lilian, Robert), people who were deeply invested in preserving and passing on their family memory. This analysis includes perspectives from younger generations when their perception adds depth to the experiences of older generation participants. In my findings, I describe the motivations of family members passing on their family memory, and the resultant work of finding, deciphering, and passing on stories about the family.

### MOTIVATIONS

First, I ground my account with a description of what motivated my participants to pass on their family memory. When asked to consider what interested them in learning about their family's past or on passing on their family history, participants' main motivation was in making the past more relatable. In the case of older adults, they wanted younger family members to know of and appreciate the people they had known and the things their family had done. They also felt a sense of urgency to pass on information that only they might know, and sought out more formalized forms of sharing their stories to ensure they were passed on to the future generations.

#### *Including ancestors as part of the family*

Karen, for example, wanted to encourage younger generations to envision older ancestors as part of the family, even if they had never met them.

*So as far as they're concerned, the family started with my generation. Because none of the grandchildren saw [older generations] …. So what I have to do is sorta indoctrinate them with my parent's generation. And try to get them to visualize the generation before them. (Karen)*

For Karen and others, creating this vision of ancestors went beyond collecting biographical information. They wanted to pass on an impression of personality, not just information, to engender feelings of closeness.

*"And my father told me a lotta, lotta stories. And so I just kept them in my head and I'm just trying to get them down on the paper. So that when I'm narrating… they will be able to give more than just, 'this is Uncle so-n-so and his related to grandma so-and-so, and this is the child of him...' I don't want to put that on there. I want to put the little-known facts. … More personal and more colorful, yeah. So, the imagination can take you to where I'm talking about." (Karen)*

Karen's goal for her descendants was to be able to relate to their ancestors in a similar way to how she related to them. Her effort to share the stories about them were shaped by this effort. She wanted her shared memories, and thus the past itself, to *"really come alive so people can really imagine, wow!"* Erll and Kurian (2011) note that family memory is unique in its focus on remembering people, and this showed in my participants' emphasis on people and important events that had been experienced in their lives.

### *Feeling a sense of urgency*

The second motivation was the impression that time was running short. This realization acted as a catalyst for participants to gather stories that characterized a person, or moment, that was likely to disappear. Lisbeth explained in her account of her experience of her parent's sudden interest in telling stories:

*I think it was a sense of time running short. And the fact that we're not living together. ... and also definitely I think the presence of [my daughter]. The sense of them wanting her to know things that they may not be able to tell her directly. I think that's why they made the albums and ... for my father definitely it's still working on the family tree and getting in touch with the relatives. (Lisbeth)*

Lisbeth perceived that that her parents' sense of urgency to start passing on what they knew was due to changing family circumstances. Lisbeth added that in addition to this urgency, her parents were motivated to start capturing their stories in a way that would enable them to be passed on

directly to their granddaughter. I highlight here that direct transmission was important to many storytellers. Rather than relying on second-hand relaying of their stories, Lisbeth's parents wanted to ensure that their stories were conveyed in some way, as an important concern in intergenerational memory sharing that will reappear in my data later.

### *Realizing exclusive knowledge*

The sense of urgency was similar to a third motivation that keepers recalled, which was the realization that they were the last source of some little-known information. Karen, for instance, realized that her parents had told her stories about an older sibling who had died as a baby that no one else in her family knew. Her memory held the single trace of this baby's existence. As she got older, and her parents passed away, she realized that if she did not tell anyone or preserve this knowledge in some way, it would be completely lost.

*And I have stories about my oldest brother that my parents told me. Not a lot, but there are a couple stories that my parents told me. And I want to put that on there because I'm the only one that I know of that has a picture of him. (Karen)*

Karen realized that she had exclusive knowledge, and felt it was important to share. If not for her own initiative, that information would be lost. In another example, Caleb pleaded with an older family member to divulge their exclusive memories. In this case, he knew of the existence of this special knowledge and could request that his family member share it.

*Start with the oldest member of the family, with the least known and the fewest images. Has the best chance of convincing somebody, "if you don't do this now, it's going to be lost. … you're probably the only one who knows this, you gotta do this." (Caleb)*

The two scenarios, personal realization of exclusive knowledge and another's request of exclusive knowledge, formed a third motivation to share. In the former case, which could be described as a secret, only the teller could recognize and intend to pass on what they remembered. In the latter, another family member might share part of a memory but have incomplete knowledge and thus need the contribution of the teller to complete the story. Yet, in other cases, such as Lisbeth's example, the recipient was not quite ready to hear the stories that older generations wanted to tell.

### *Formalizing memory sharing*

Older generations sometimes came to a realization that face-to-face memory sharing would not be possible. Many of the keepers in my study were creating memoirs and mementos to preserve their stories in this case. While this was a gradual process for some, Lisbeth noted that her parents quite suddenly changed their memory sharing mode from in-person storytelling to a written format. Lisbeth surmised that this "unusual" style resulted because she had less informal interactions with her parents on a regular basis.

*I see now with my parents, they're making more of an effort to leave things in a written form. From my mother, at some occasion when my brother turned 30 I think, she made family albums. She wrote on the pictures who the people were and where they were from. Going back several generations, these were the oldest pictures that I had. And that was very unusual because we've never done that in my family. I think that the main part of the reason that they've done that is we're no longer living together and I no longer have that way of sharing stories when there is a prompt or a situation. It needs to be a little bit more formalized. (Lisbeth)*

Lisbeth thought sharing memories in this written format created a more "formalized" scenario that ensured important memories were passed on even without a prompt for the story. In this way, Lisbeth's parents were unwilling to leave to chance the opportunity of passing on their memories.

In my data, I observed a strong agreement across generations with respect to their motivations for participating in memory sharing. Descendants echoed these motivations I list here, saying that they wanted to hear stories about their ancestors that *"really tells more about him as a person" (*Anne) especially in cases where the story was *"my only reference"* (Marie). This motivational alignment is key for the future of design to mediate interactions in this context. As I will show in later sections, and in subsequent chapters, family memory is a contested intergenerational space, particularly regarding *what* memories are shared and *how* memories are shared. However, the common objective shared by generations—to make the past more relatable and to communicate a sense of connection to generations that would never meet—can serve to unite family members in the face of diverging opinions on how to carry this out. In the remainder of my findings, I describe the work that family members understand to find, decipher, and pass on family memories.

## Finding the Story

Family stories incorporated more than what a single person could recall. There were, for instance, different sources of information, different perspectives that gave insight into people's varying experiences, and unfolding events that could be interpreted differently based on the time that a person was involved. Many of my participants shared that they not only wanted to pass on their personal memories, but that they were also trying to learn more about their family to pass on this information as well. Here I note that keepers were engaged in efforts to augment their knowledge and memories of people they had personal relationships with, as well as to find out more information about ancestors they had not met. Participants described having to search out people with the desired memories and exchange information with other families (including distant relatives) to find what they wanted. They also had to navigate taboos and sensitive topics and deliberate about the possibility of violating the privacy expectations of family members.

### *Drawing out the story*

Participants who were in search of a story were looking for information sources to help them build a complete picture of the past person or event that they wanted to share about. There were some common, quintessential practices that my participants talked about, such as "asking questions" of an older family member in the know or "having conversations" with a person who had a story to tell. The immediate availability of a knowledgeable family member was the ideal scenario that participants hoped for when they were in search of a story about their family's past. However, in many cases, memories from others were not so easily available. Not everyone with a story was willing to share what they knew, or even recognized the value of their story to the family.

Tina recalled that her grandmother did not have stories to tell her about her past. Instead Tina had to draw out stories from her grandmother as she sought to learn more about her family's past for her own benefit and for her children.

*I think with my other grandmother, I would ask her a lot. For her to tell me stuff, because she grew up in Guatemala during a really interesting period, and I was interested in knowing what was it like to live during this violent period. So, she would tell me stories, but for her it wasn't so interesting, it was just*

*how life was for her. So, it wasn't as fluid, she didn't have a story, she would try to answer my questions. (Tina)*

In Tina's case, her grandmother just tried to answer her questions, and it was up to Tina to determine what she thought her grandmother might know and be able to tell. Fortunately, Tina had some knowledge of the context in which her grandmother had lived which gave her a cultural and historical background with which to frame her story and ask meaningful questions. Although this could be more work for a recipient who wants to learn more, Lisbeth saw this as an opportunity to craft her own narrative from her ancestor's memories:

*And I think that this was, now reflecting on it, really a wonderful value of being able to spend time with somebody over time is, a story is, you get to drive it. You get to build it by asking questions. You keep asking questions until that thing in your head has a shape. That's what I remember about the stories with my grandmother, is I would kinda keep pestering and asking things until I was satisfied with whatever I understood. (Lisbeth)*

Lisbeth enjoyed the process of asking questions and "driving the story." While on the one hand, it could entail more work for the listener to try to draw out and interpret stories from an ancestor's memory, on the other hand, this dynamic allowed listeners more freedom to shape the story as they wanted. Shared memories are mutually constructed by tellers and listeners, but, as we explore further in our next chapter, this dynamic can be prone to disruption.

These scenarios where direct communication could occur between family members were best-case scenarios. In many cases, especially for my older participants, the ancestor in question had already passed away. Other times, the ancestor was living but was inaccessible due to language barriers or relational distance (such as a divorce or family feud).

## *Finding people*

When a family member with direct knowledge or experience of some aspect of the past was not available, or unwilling to share, participants had to find someone with the right memories to help them build their story. Participants described these meetings as hoped for, but serendipitous.

For example, Karen shared how she gathered information about her late grandfather's life through as many people as she could. She had recently discovered an old family friend who had

known Karen's grandfather as a child and, now as an elderly man, was one of the few remaining people with a living memory of him.

*Because I met a man my age who used to escort my grandfather down through the woods to church every Sunday. Because my grandfather started going blind …And he'd go up and find him wandering in the woods. So, he was telling me that story. So, I told him, I want you to call me and tell me some more stories about my grandfather so I can put this in the narration. And then I heard some other stories, because that Sunday we went to my grandfather's church. (Karen)*

Other participants shared their experiences finding people who knew about someone they were investigating, with examples of wandering through graveyards and crashing weddings and funerals among the more extreme examples of their activities. In these searches, I note that participants often did not know *who* they were looking for or even *what* they hoped to find out. They were driven by a desire just to find someone with a memory of any kind. This searching practice is notable for its ambiguity and length. First, because my participants were not looking for something concrete, it would be impossible for someone else to help them find it in any other way than joining them in the search. Secondly, even when my participants found someone with the kind of memories they were searching for, it was insufficient to answer their query because it was not well-defined. Third, finding people could span years, even decades, as keepers steadily built up their stories about the family. Stories that were told in this span were often in progress, unfolding over time and expanding as more and more information was added or re-contextualized.

### *Trading information*

While there were public records available to augment the information my participants sought, the personal accounts of people were still highly valued. This was in part because people's accounts of a person contained more personality than official records, which was a key motivation of my participants. As my participants sought out people with desirable knowledge, sometimes they also ended up being the person who was found by another information seeker. Eli shared that in this situation, he would trade stories with another seeker from a different family who was also trying to find people with information about the past.

*[You can] also trade stories with other people researching the same people you are—distant cousins of some sort of the other. Often what you find is what's published, or what they say does not correlate at all*

*to the facts. I have done some work when I couldn't figure out what story was true…The further back you go, the fewer and fewer facts are available, so you have to do some digging. (Eli)*

In this trade, Eli received information about his family, and also offered some information in return to the other seeker. This exchange was dependent on trust, rather than verification. Eli added a caveat that *"often what they say does not correlate at all to the facts."* There was no guarantee that what he learned in this exchange was true. Yet, he trusted the other seeker's intention in the information they gave, and weighed it against the other knowledge he already had. He still found this exchanged information valuable, even though it's veracity was unknown, because it was so scarce. In my next chapter, I explore how people reconcile the uncertainty introduced when they encounter this kind of unverified information.

The second aspect of this practice is that the information trade occurred between two secondary sources. Eli did not find someone with a memory (as I saw in Karen's account above), he found someone who had been told a story by someone with a memory. Thus, the information he received from them was shaped and focused by the values and beliefs of a different family. Eli made the decision to accept stories from an outsider as a valid contribution to his own family story. This is an example of his agency to craft the narrative as he saw fit, an entitlement that Halbwachs argues was his as a result of his membership in the family. In the next chapter, I will further explore the dynamics of acceptance, resistance and rejection of crafted family narratives.

### *(Dis)Regarding boundaries*

In their quest for memories, my participants were mindful to respect the boundaries of the relatives they sought out. As relationships grew more tenuous, and common ground grew more thin, such as with distant relatives, the more careful participants had to be in navigating sensitive topics, and being aware of privacy concerns.

My participants showed a range of ways that they addressed sensitive topics, such as taboos and emotionally fraught memories, when they encountered them. Taboos are often morally fraught, but for the purposes of this analysis, I consider them to be any topic that was considered off-limits for casual discussion. While some people tried not to bring up topics that would cause controversy, or *"pull up any skeletons,"* other participants dismissed those concerns as unimportant

in the face of their desire to learn more about the person or situation. In some cases, the decision of observing the taboo or dismissing it was dependent on timing: *"back then it was a taboo, but now it's so commonplace..." (Karen*). In other situations, the taboo was not universal to the family, and a family member who did not have the same reservations chose to share what they knew. Anne recalled an instance where her mother broke a taboo that her father's family kept, because she thought that Anne should know more about that aspect of her history.

*I would say on my dad's side of the family there's a lot of topics people just don't talk about, so most of what I know about my dad's life growing up, he told me the funniest stories, but his actual family situation, I just heard it from my mom, because he never talks about it, and no one in his family talks about it. When my mom told me, she's like, "Don't tell anyone I told you this, but, just so you know." (Anne)*

Anne's mother thought it was important for her to know more about her father's family, so she chose not to respect the boundary that they had set. This disregard was not taken lightly however, and was not disclosed to other family members who might disagree.

Participants also described ways that they learned more than was intended for them by overhearing someone else's conversation. This is rather banal and commonplace, but deserves some discussion due to its implications for concerns of privacy, disclosure, and control. Most unintended disclosure is envisioned to result from some surreptitious action, without the knowledge or consent of the storyteller's. However, in these cases, participants recounted overhearing stories that were not for them even when their presence was known and accounted for.

The first case I will designate as a case of passive listening. Tina gives an example of this as she shared how she heard stories from her normally reticent father:

*I find with my dad, I find myself surprised a lot. He rarely tells me stories. He tells other people stories and I happen to be there. He tells a lot of stories when he's with his friends. (Tina)*

Tina "happened to be there" as her father reminisced with his friends, but her presence was not a barrier to the retelling. By being present, although she was not the intended audience, she learned more about her father's past.

The second case is eavesdropping. Eavesdropping can occur by concealing one's presence, of course. However, in the following example, the tellers did not realize that they were understood by other family members present. Larry shared that he learned the story of how his parents met, one of the few stories about their past that he knew, by eavesdropping on his parent's conversations with friends that they had in another language.

*Part of [the story] they told me [when] they were like, "Oh, when are you gonna find a girlfriend?" Part of it was eavesdropping. … they don't know how much Chinese I understand so whenever they talk to their friends on the phone, or kinda in the car, then I can hear what they're saying. So, a lot of it is putting pieces together. (Larry)*

Larry learned bits and pieces of the story partially from direct telling and partially through overhearing what his parents told other people. They did not realize he was listening to these stories because they misjudged his language ability. Larry was able "[put] pieces together," ascertaining a much more detailed account of the past than what his parents had intentionally disclosed to him. This additional knowledge could also provide him additional context to understand other bits of information that might otherwise go unnoticed, which might result in him learning a lot more about his parent's past than they realized.

Larry's case is an interesting example to consider for memory capture technologies. A key aspect of privacy concerns about recording devices is the awareness that people have about whether it is recording or not (McReynolds et al. 2017). However, in the case of technological eavesdropping, a person might be peripherally aware that a recording device is active, but they might not actively recognize that information is being gathered and saved. This issue of privacy and awareness resurfaces in our design study on KidKeeper in Chapter 7. In this case, the eavesdropping that Larry and Tina engaged in help them to learn more about their family and put pieces together from details they might not otherwise have been told.

In this section, I showed that family memory sharing involves a significant effort by participants to find a story. Each party in a memory sharing interaction were active agents. Listeners sought out answers with questions and pieced together stories from anecdotes and fragments of conversations. They sought out other people with direct experience and people with complementary information to augment their knowledge. However, these practices were subject

to significant uncertainty and doubt. Further not all stories that were received were immediately understood. In my next section, I outline ways that participants tried to understand and interpret what they had learned.

## Deciphering the Story

### *Contextualizing the story*

In many cases, stories about the past needed explanations to make sense to current listeners. Implicit information needed to make meaning out of the narrative was provided by the usually-unspoken context of the events depicted in a shared memory. However, the context could be lost as the story made its way across generations. Families might move to different regions and living environments, cultural norms and customs change over time, or the activities remembered might no longer take place, and their meaning in a family story might be lost on listeners.

Gloria shared an example of an important family story that her grandfather told her about a time when he broke his arm jumping off a barn. She held this story dear for its depiction of resilience in her family, but at first, she didn't have the necessary common ground to completely understand it.

*[My grandfather] told me about a time he was a kid, and he broke his arm because he, and his siblings were jumping off the barn into bales of hay, and he missed the hay a little bit. … My mom, and I have talked about that story a little bit. And one time I asked her... Because, I had misunderstood the story. At first, I didn't realize there was a bale of hay there. Grandpa just told me he broke it jumping off a barn. And I was like, "Why were they jumping off the barn?" (Gloria)*

Because Gloria had not grown up on a farm like her grandfather and her mother, she did not have the common experience and knowledge needed to infer missing details and make sense of the story her grandfather told her. Gloria's mother had to add her own story, bringing her own experience to bear, to explain the parts that did not make sense.

*She said, "Everybody did it, I did it." And I was like, "What?" She said, "Yeah, you jump off the barn into a big hay stack or a bale of hay or something like that." And I said "Oh, there's a bale of hay," [chuckle] she goes, "Well, there's supposed to be." And so... Yeah, 'cause I didn't grow up in the country. … So, I had a vision in my mind of the story, and my mom helped me correct it. So that it wasn't the craziest thing I ever heard of. (Gloria)*

Without the proper contextualization, a relatively mundane activity like bale-jumping became to Gloria *"the craziest things I ever heard of."* Differences in common knowledge or familiar experiences across generations (and even within generations) required those sharing family stories to add additional narrative explanations to ensure that the listener had full understanding of the story. Fortunately, in Gloria's case, she still understood the reason why this story was important to her father, and to her mother. A harder task for keepers was to bridge a disconnect between generations so large that significance of the story to the family identity was no longer obvious.

### *Translating records*

Many of my participants came from families that made use of paper records to preserve and pass on their family stories. These records ranged from individual records, like personal journals or daily planners with jotted notes, to heirloom records like a "family Bible." Like the contextualization that needed to occur to explain situated stories, these records often had to be translated or re-interpreted by each generation to maintain its use in the family and the accessibility of the stories it contained. Anne described a time when her parents discovered an old family Bible but were unable to read it. Special pages in Bibles were commonly used in 18th and 19th century European and American families from Christian backgrounds to record the names, births, and deaths of immediate and extended family members. The information in Bibles of key ancestors could serve as important references for building a family tree. However, Anne's family Bible was written in a language her parents did not know, and with handwriting that was indecipherable.

*I had a family Bible that another relative had at their house that I didn't even know existed, and it was all written in German in their cursive writing. … the traditional cursive writing is really different than the one they use for English. I had to actually get some of my dad's relatives who grew up speaking German and could read it to decipher first the handwriting, and then what it said or meant. (Anne)*

Fortunately, Anne had living family members who were able to interpret the handwriting in the Bible and pass on the information. Without this help, it could take years to resolve. Vivienne faced a similar issue, but did not have family who could translate the information. Her family had kept their own limited genealogical records, but these were in a different language. Vivienne

struggled with how much effort to invest to learn more about that side of her family, given the time and expense it would require.

*[For] the records that are in foreign language, most of the information I have on those people are what's been passed down. … and that doesn't go back very far. So, I don't know much about them, mostly because it's in a different language. And it's expensive to figure it out. You have to hire a researcher, and most of those records are handwritten so it's not like you can run it through a translator. … I don't know whether it would be worth it or not. (Vivienne)*

Vivienne had records that had been made by a previous generation to pass on information about the family, but considerable expense would be required to translate these records. Despite the efforts of prior generations to prepare these records, they were effectively useless because of their difficulty to access. This situation echoes the similar worry expressed by people regarding digitization of family mementos and other content. Like these cultural records, digitizing family memories could make stories and information available that might not otherwise be able to be passed on directly. However, deciphering these kinds of records can be costly. These records, if too costly to decipher, might be discarded, or if viewed as sufficiently valuable, they might be passed on for a future generation to re-evaluate.

### *Recognizing past alterations*

A key effort that some of my keepers recalled was recognizing when a story, or the record that corroborated a story, had been changed by someone before. Oral storytelling yields a certain amount of variability as people add their own flair, and this kind of versioning was known and expected among participants. As an elderly participant, Coral, quipped, *"Accuracy is not the goal."* However, family stories were informational in many respects. As such, when significant details were omitted, added, or changed, they could alter the tone or outcome of the story and cause it to fall under question as a veridical account of the past. Recognizing these changes was an important task for many participants as they tried to make sense of how the many different stories they gathered fit together into a cohesive narrative that they could pass on to future generations.

Yet, recognizing even rather substantial changes was a challenge for each generation. Consider the example from Maggie, who questioned the stories about her heritage that her father claimed

in his *"Irish story."* Through a series of doubts, she began to recognize aspects of his version of the family's origin story that were not quite true. On the one hand, Maggie recognized there might have been a change when her father's stories were juxtaposed against his brothers' stories:

*"[My dad] says that he's second generation from Ireland, but then some brothers will say other things about like, "No, we've been here for a while."*

Further, Maggie reasoned that based on how long her family had been in the U.S. that her father might be exaggerating the extent of their Irish ancestry: *"They are all supposedly completely Irish, but being in the US for so long, if my Brown family was here for so long, it wouldn't make sense for them to all be completely Irish."* The story did not fit into the timeline of the grand narrative that Maggie had constructed about her family and so did not *"make sense."* Finally, Maggie's own lived experience made her father's story implausible:

*"Well one, I could tell that I wasn't your standard pale, red-headed Irish person. In the summer, especially younger, I would get very, very tan. …And I'd be like, "Okay, this doesn't seem like your standard Irish thing."" (Maggie)*

Motivated by these series of doubts regarding her father's story about her family's Irish heritage, Maggie decided to investigate her family heritage on her own to settle her doubts. Maggie's case was not unique—other participants' recall doubts about their ancestor's stories of family origin, as well as their tales of life-changing experiences or purported accomplishments. I delve more into the nature of these doubts and the efforts of keepers and non-keepers alike to recognize and resolve them in my next chapter.

## Reconstructing the Stories

After tracking down information sources and deciphering inherited stories, keepers had to decide how to reconstruct the family stories they gathered into a narrative inheritance. Some of my participants were passing on their stories casually, such as in conversation or as the topic was brought up, while others were trying to weave the stories together in a larger more formal narrative, usually to be inscribed in some artifact. All of my participant "keepers" discussed their attempts to use analog and digital media to replace face-to-face sharing of these stories. I focus in this description on informative artifacts meant to convey and pass on stories.

Participants described an impressive breadth of creative media they had employed to record and pass on their family stories to the next generation. Examples ranged from a video slideshow, photo albums, film reels, and a book of biographies, to a quilt, a life cookbook, ancestor playing cards, and QR-coded objects linked to a cloud repository of audio recordings. Most of these projects involved digital content, either digitizing analog artifacts (usually paper), rematerializing digital content (like printing photos), or creating some digital media from a collection of content (like a personally narrated video). I describe here some of the common themes in my participant's descriptions of their endeavors to compose these artifacts to be passed on, especially in light of challenges they face. I focus on how people were thinking about the content, the purpose, and their relationship to the content rather than the specific material of the project.

### *Shaped according to agenda*

Tellers shared their memories with a range of agendas. Some derived personal enjoyment from sharing about their lives and about people they had known, while others discussed sharing stories as more of an educational effort. From these agendas arose personal goals, like the desire to *"leave a legacy,"* to *"indoctrinate"* younger generations of family values, or to instill a similar appreciation of beloved ancestors. Joe, for example, shared that he became motivated to make a photobook of a trip he had taken with his late wife so that his recently born grandson would know who she was.

*After my wife passed away, I was pretty much immobilized, … But then my grandson came along, and I got motivated to do something because he would never know his grandmother… And I can't tell you why, I can't tell you what caused me to focus on [this] trip, but it was two weeks when his dad, and aunt, and grandmother, and I were together, …. the stories behind those pictures and what they represent were really cool, and I got motivated to make him this book. (Joe)*

Joe felt it was important for his grandson to have some familiarity and impression of his wife. Creating the book was a "*poignant*" way for him to share her memory, *"'cause she's not here to tell her side of the story."* This goal of ensuring that future generations had knowledge and perspective about family members was a powerful motivator for my participants.

### *Clarified through work*

These agendas and goals that my participants expressed were not always apparent to them at the outset, but were often clarified in the process of working on the narrative. For example, Joe shared that he started by organizing photo albums, then realized that he really cared more about telling the stories that the photos represented rather than the pictures themselves.

*It hasn't been until I've been doing this work that I've come to realize the stories that I value are worth preserving. … how many pictures do I have of [our grandkids] at a petting zoo, touching a rabbit and playing with a chicken or whatever? But unless it has some meaning, I'm not sure I really wanna keep the picture now. But I wanna capture the story that goes with it. (Joe)*

The realization that he really valued the story shaped Joe's entire approach to storytelling. He stopped keeping photos altogether, and focused on ways to preserve stories associated with the things around him. Each person and family is different in what kind of memory artifacts they value. This scenario illustrates one way that working through a narrative crafting project can help people discover what they value. Caleb similarly shared that he came to a realization about what he really wanted to pass on only after several failed projects that he *"spent a lot of money on"* and that were *"damn time consuming."* Although this resulted in several unfinished projects that my participants were not happy about, the insight helped them better refine their next approach. I highlight some of the challenges that come with and as a result of this narrative-building work in my discussion and in my next chapter on family mysteries. I focus more in-depth on the natures of processes and projects that Joe and Caleb describe in Chapter 6 on curation practices. In addition, the clarity that come from working on a specific memory project further motivates a design approach to helping families address some of the difficulties they face.

### *Overwhelming in its extent*

Yet, simply clarifying their purpose and developing a project was not the only goal or obstacle. Once they found a promising project, or an idea for a project, several tellers recounted becoming discouraged by the sheer amount of work it would entail. Oscar shared his struggle creating a family history book for his family. He had a fascinating collection of content that was left to him by his father and was augmented by years of his own research into his family's past. But he couldn't figure out what to do with it because it was overwhelming in its extent.

*"The way it started was when my father died, he died at age 93 in 2005. And among other things, first of all, he was very aware of his history, and he emigrated as a refugee from Nazi Germany with my mother … when he was in his 80s, he recorded a series of... I think it's seven or eight hours of memoir, memories. …Somehow, it's just too hard to get my head around it, it's too hard to deal with." (Oscar)*

Echoing Oscar's struggle, Caleb reasoned that being overwhelmed might be the big challenge of people in his generation trying to pass on their memories: "*I think people want to leave a legacy. It's just too big— they just don't know how to do it. It's too big." (Caleb)* The endeavor of recording ones' memories or preparing a narrative from a collection of content, was seen as important and even urgent, but difficult to approach. Moreover, while the extent of the project was discouraging with the content from just his generation, Caleb pointed out the sobering fact that the proliferation of digital media in his children's lives would make the problem worse.

*I still ended up with an ungodly amount of stuff. But nothing like what my children have. With these cameras, I mean these phones that take pictures, it's probably one or two orders of magnitude than [photographs] I took. So they're going to have this problem in spades. (Caleb)*

Although dealing with a large amount of content could be overwhelming, my participants valued having it. It was preferable to having nothing, however, they felt simple possession (i.e. *"It's ours and I have it")* was insufficient to settle the need to pass on their stories to the next generation. It is worth noting here that participants lumped all the content they had together as material for their potential narrative, including content that may have been kept and crafted by someone else, like oral history recordings and inherited collections of mementos. This demonstrates the continually renewing nature of family memory, where each generation builds their own narrative from what has been passed on. I return to how participants thought about ways to renew a narrative inheritance in the section on mediation dilemmas.

## Looking to the Future

Most of my participants were older adults keenly aware of their waning time. All of them described wanting to find some person in a younger generation to carry on the work after them, but unfortunately, few volunteers had been found to *"inherit the task."* In addition, it was difficult for them to envision what future descendants would be like, or would want as part of their narrative inheritance. The examples in this section show how people worked around difficulties in anticipating the future, especially anticipating the wishes of descendants who were the

intended recipients of the memories they wanted to pass on and finding help to carry on their work in the future.

### *Anticipating descendants' wishes*

Even with a motivating project and clear goal in mind, a memory keeper's endeavors could be stymied by an inability to anticipate what their intended audience might want. On one hand, keepers responded to this ambiguity with the "*inertia*" of doing nothing, letting repositories of content sit as they procrastinated on recording their own stories. An alternative reaction was, as Caleb described to do *"as much as I have interest in doing."* He imagined his descendants to be much like himself, and proceeded as though he would be the recipient.

*The only way I can answer that is, if I have descendants "like myself." If any of them are like me, if there were a thousand stories, I want a thousand stories. So, it's going to be how much time, resolve, resources, am I going to have here. But I'm not going to run out of stuff to do. (Caleb)*

Rather than sit idle, Caleb chose to create an image of an ideal descendant and used this persona to help motivate and direct his efforts. Joe offered a similar third alternative, with a more colorful explanation of how he decided to simply disregard his audience altogether and focused on telling those stories that he enjoyed telling. This way, at least he derived some value from the experience, and the future uncertainty could work itself out:

*Somebody asked me the other day, "Why should I do this if my kids don't care?" My answer was this: "They may not care now, they may care when you die, they may care when someone else passes, they may care when a child is born, or they may just wake up one day and go, 'Who the f*ck am I? And who the f*ck are you? And where did you come from?'" And I said to him, "Don't do it for them, do it for you." (Joe)*

For my participants, inertia and silence were a worst-case. They had stories they wanted to tell, information to share, and a legacy to pass on to future generations. As Caleb emphasized, *"They've gotta know. They've gotta be exposed the stories."* The stories they wanted to pass on were packaged into narratives that were shaped by an agenda and personal goals that could be inward or outward facing. In either case, keepers exerted significant effort to forge a narrative out of large and diverse collections of content, sometimes iterating over several different projects to find something that worked. Due to the enormity of this memory sharing project, the work was expected to be passed on to future generations. Yet, tellers could not always find a dedicated

keeper to pass on the work to and thus these mediated narratives were loaded also with the hope of being passed on until acquired by someone with like interest.

### *Seeking help*

An obvious strategy for most participants who were overwhelmed by a project was to seek out help from other members in their family. However, perhaps because of the immensity of the effort, my participants shared that even those family members interested in family history could rarely be depended on to help out. Caleb lamented this fact when talking about his children and grandchildren:

*The majority, vast majority, are interested and would love to look at it when it's done, but don't want to be involved. (Caleb)*

This inability to find fellow keepers also formed part of the reasoning and justification for my participants to exert such heroic effort to inscribe the stories into some persistent medium rather than relying on face-to-face communication. As Caleb explained, *"if nobody wants to inherit that task, the information will just get lost. Whereas if it's on paper, it will be more likely to be kept."* This statement echoed the urgency and fear of loss that I discussed previously, which motivated efforts to be more purposeful about memory sharing. It also reflected a hope that future generations would keep a record that is passed on to them even if they have no desire to take on the role of keeper. This is reasonable given the social norms around heirlooms, yet this assumption was problematic in the paradigm of digital mementos. Caleb rightly ascribes this norm of obligatory record-keeping to a paper medium, because there is not yet any indication that digital content is, or will come to be, regarded the same way as physical object (Golsteijn et al. 2012). I further explore the expectations of stewarding inherited memory artifacts in more detail in Chapter 6.

Although the work involved in crafting a narrative inheritance involved a significant amount of effort that could at times be overwhelming, the anticipated audience could serve as a great motivator, when known. However, a lack of concrete knowledge can also discourage participants in their efforts to craft a narrative to pass on. Nonetheless, the work and expense is justified to participants as they developed means to convey their own personality and the personalities of ancestors in a way that reflected their relationships and values. In the next section, I explore a

number of dilemmas that were present in my data that were part of participants reasoning process, and worry, for how to appropriately mediate and share the narrative inheritance that they wanted to prepare.

## Dilemmas Of The Mediated Memory

In the previous sections, I outlined some driving motivations and key practices that influence how memories are shared. Memory artifacts in these examples served to anchor family memories, providing grounding and expressivity to the stories, and, helping to ensure that stories can be passed directly from one person to the next even when those involved do not have a chance to know each other. Artifacts across different media, from digital to physical, play important roles in family memory sharing and can also provide useful design metaphors on which to base a technology's form and interactivity (see technology heirlooms for examples in Odom et al. 2012).

Yet, as I will describe in this section, memory artifacts are also sources of what Miller et al. (2007) term "value tensions." Value tensions are counter-values which are neither right nor wrong, nor of different priorities, but where the implementation of one negates the other. The value tensions at work in memory artifacts were expressed by my participants as unavoidable tradeoffs in the nature of the artifacts that cause some disquiet or dissatisfaction, even when the artifact is otherwise successful in its role to trigger and convey a memory.

### *The Dilemma of Significance*

When physical artifacts were used as "vehicles of narrative excursion" (Lindley 2012), they were often regarded and treated as special objects. Petrelli and Light (2014) refer to this regard as distinguishing mundane from "sacred." These special objects-turned-narrative vehicles can communicate their significance by their unique aesthetics, a quality Odom et al. (2012) sought to leverage in their technology heirlooms, or they may gain a sacred quality through the careful ways in which they are treated. This "interactional significance" created a dilemma that I illustrate and unpack through a poignant conversation with Lisbeth, a participant whose parents had given her a few precious mementos and heirlooms that she wanted to cherish and embed into her life.

Lisbeth explains how interaction communicated significance using examples from her parents' home where she grew up. She notes that specialized interactions created awareness of artifacts with narrative value in her home, and also served as a prompt to encourage her to enquire about the stories represented by the objects.

*I think there was definitely something about something being special. There were things that seemed to you like they were special somehow. Especially by not being used every day or by being behind a glass wall. I don't remember, there might have been, stories about -- this carpet that I step on every day. But what about the carpet on the wall that I never step on, why don't I step on that one? There was a sense for me growing up that some things are special and those you kind of don't use or you take special care. (Lisbeth)*

The *"special care"* taken with special family artifacts was practically needed to preserve them as long as possible, but also provided important social cues to family members like her who did not know what they were. Lisbeth acknowledged that keeping these artifacts out of daily use would *"keep it fresh"* and also promoted *"a nice ritual"* around them when they were occasionally used. The findings of Petrelli and Light echo this point in their proposal that technologies designed for memory might incorporate a ritual aspect and be only brought out infrequently as the occasion warranted.

Yet, Lisbeth wished that these special objects could somehow be better incorporated into her daily life. Their specialness limited how close she could be with the memories and relational associations they represented. Infrequent use created distance, but every interaction brought an object closer to ruin.

*…Especially for things that are perishable in some ways, it does bring a dilemma for me. Keep them or use them? I don't have a consistent approach to that. Kind of sort of randomly, I use the baby blanket and of course it gets soiled and I wash it and the lace frays, so I don't use the baby bonnet next. Because, I know what happened with the baby blanket. Or one cup gets broken and none of the others get used. But then I do want to use them so it's like, well, what do I do with it? It's special, but it would be even more special if I could use it. (Lisbeth)*

This worry about ruining a special artifact might point to durability as a key design implication for intergenerational memory artifacts, and indeed this has been noted before (e.g. Odom et al. 2014). But the dilemma behind the question of "keep or use" that Lisbeth debated is that many objects gain precious character *because* they are fragile and so unlikely to survive. In another example, Lisbeth described an ordinary mechanical pencil that she inherited from her father.

The pencil was highly significant to her as a young child *("kind of a big deal"*) because it was a souvenir from his travels outside of the then-communist Soviet Union and was source of stories about the world beyond. It became an heirloom for Lisbeth by lasting impossibly long, linking an important period of her past life to the present:

*He did manage to create an heirloom out of the pencils that he brought there. Because he brought a mechanical pencil that he said he was going to give to me when I went to college. And amazingly, he managed to hang onto it until I got to college fifteen years later. And I still have that pencil. (Lisbeth)*

The amazing longevity of this ordinary fragile pencil distinguished it from other heirlooms that Lisbeth had from her family. Its mundane quality meant that she could keep it close and incorporate it into her life (she kept it in a pencil pouch with all her other writing supplies), and its longevity, despite this use, made it special.

*I think what makes [the pencil] so special is that it is an everyday object. Like with my grandmother's things, …[they] are supposed to be heirlooms, …and you take care of it, and you show it off. With the mechanical pencil, it is such a disposable object and the fact that it's still here, it's very touching to me. (Lisbeth)*

The dilemma of significance presents a tradeoff in values. On one hand, artifacts gain value through special regard and treatment, and this treatment in turn become a signal that there is a story to be told. On the other hand, that regard can create distance and prevent an object from being meaningfully integrated into a person's everyday life.

This dilemma plays out in the design of technologies which hold and anchor family stories in a physical object. Design approaches to create memory artifacts with physical components can augment existing items (using potentially fragile, yet emotionally significant objects) or create bespoke objects (which can be customized and made durable, but may not evoke the same sentimentality). The interaction design of objects in both cases will need to distinguish between objects for "everyday" casual use and those designed for ritual use in special occasions.

### *The Dilemma of Survivability*

Mementos and heirlooms posed unique affordances for keeping and sharing memories. The longevity of these objects enabled them to maintain a long-term presence, in the home or another storage space, which scaffolded value gains that occur over time. Like memories of

mundane activities and stories about everyday life, ordinary objects could acquire more significance over time, especially as markers of some notable period in the past (as seen with Lisbeth's example) or as remnants of a time now gone. They could also persist long enough to gain a significance that they did not have originally, such as when the original owner passes away. Lisbeth gave an example of a family china collection that was passed from her grandmother to her mother. Her mother disliked the collection because of how much work she had to do to maintain it, but dutifully kept it. But, after Lisbeth's grandmother passed away, the china collection became more meaningful to her mother.

*[My mother] never placed value on them, in fact, they were kind of annoying in various ways. And after my grandmother died, I think she started seeing them differently. ... It became a sentimental connection after my grandmother died. (Lisbeth)*

Her mother's sentimental connection to the china collection arose after a major life change, and a major loss. These major life events might be anticipated, or may come as a complete surprise. The shifts in sentiment that may come as a result of these life events are more uncertain. I explore this quandary further in Chapter 6. Here it suffices to say that an object may suddenly gain significance to its keeper due to external circumstances.

The dilemma however, is that until it does, an object with limited value otherwise might become a *"nuisance"* and be discarded. Karen gave an example of losing a family heirloom this way. Her grandfather came from a family of hunters, and left behind an antique shotgun that he wanted given to his oldest grandson. However, the shotgun fell into the possession of a distant relative who failed to recognize its significance to the family and sold it away in a yard sale.

*[My] aunt, she told me to go get her father's shotgun, because he wanted it passed down to my oldest brother who was named after him. … But, it never got passed down. Because [my relative] wouldn't let us get anything.…And I found out when I went down this time, that my [relative]'s niece just had a big yard sale. …I'm sure that amongst those things were things from my grandmother. So, unfortunately, that happened. (Karen)*

Unfortunately, although the heirloom shotgun survived in the family for decades, its significance was not duly communicated, or perhaps appreciated, and thus it was lost.

This example also draws out a distinction of roles that the notion of inheritance adds to the stewardship model of memory artifacts. As family members are passing down memories via

stories or artifacts to each generation, there may be stewards who accept the responsibility of maintaining what they are given and of ensuring it is shared with the rest of the family and passed on in some way to future generations. The "keepers" in my study ascribe to this role. On the other hand, there are also "conduits," family members who inherit family memory, including stories, information, or objects, but have no interest or intention to keep or pass them on. Conduits are people whose decisions regarding a family artifact or family story in their possession are almost completely based on their personal preference rather than a collective expectation or family norm. A memory artifact's survival while in the possession of a conduit is completely up to chance. Nevertheless, conduit family members are important ways that artifacts are passed on to future generations when they cannot be bequeathed directly. I discuss in Chapter 6 ways that designers can increase the likelihood that an artifact might survive when it is passed on to a conduit, rather than its intended recipient.

The Dilemma of Survivability is that, while artifacts can last a long time and gain sentiment as they persist, there is no way of predicting that they will gain sentiment. There is also no guarantee that this sentiment is equally significant to all the members of the family and especially to the one who possesses the artifact. Without the regard, and accompanying norms, accorded to a memory artifact, an object may be discarded from the family's collection. The survival of a narrative artifact often comes as a result of its continued presence in the home and life, but continued presence is predicated on some existing significance in many cases.

Survival concerns both presence and significance. These are intertwined and mutually-constructed. There is very little a system can do to prevent its disuse while maintaining the agency of the user. However, the affordances of the system can encourage creative appropriation in a way that maintains its value across many different scenarios and for as long as possible. For example, technologies that serve practical, aesthetic, or ludic value beyond their purpose as a memory artifact may survive longer than those solely tailored only for memory purposes. I return to this point in Chapter 6 in my discussion of how memory artifacts can be appropriated to fit into the lives and homes of their current owners.

### *The Dilemma of Privacy*

The third dilemma I unpack through an example from Janine, a younger generation participant who was thinking about ways to passing on her own memories when she got older. In her example, she deliberated about the usefulness of personal diaries and journals as sources of family stories, since she kept a diary of her own. She was excited by the prospective value of diaries as richly informative mementos, with exactly the kind of personal, unfiltered, slice-of-life stories that she, along with many of my participants wanted to inherit. Yet, she worried that it was too much information for future generations, not in scale, but in depth.

*Because I think journals, really, are one of the most private ways you can get to know someone but they're also so private. It's almost like you get to know someone on a level that not even their closest friends or family members knew them. So, it kind of begs the question like, do future generations want that kind of knowledge, should they have that kind of knowledge about an individual? (Janine)*

Janine questioned whether the introspective writings of an ancestor would be desirable to someone in comparison to a crafted presentation. Further, she suggested that access to this information might even be a moral question of appropriateness to access. Attempting to consider her own journals as a family heirlooms gave Janine pause, and she acknowledged that she would have significant privacy concerns. Even with the stipulation that her journal would only be read far into the future, after she had died and it was bequeathed to "generations down the line," Janine still was cautious about what she might willingly reveal about her innermost thoughts and what she would *"choose to keep secret and sacred."*

However, when considering whether she would choose to read a personal journal left behind by an ancestor, Janine felt that her desire to know would overcome any misgivings she might have about intruding on someone else's thoughts. She refers to this disregard as "entitlement" to her past.

*I think with the access that I have now to a lot of other realms of information, there's still this kind of mystery, or shroud of mystery, around like heritage and family heritage. So yeah, I think especially for us millennials, it makes us that much more curious, or maybe feel like a sense of entitlement towards those histories. Yeah, it's an interesting question, but I would if given some kind of documentation, devour it. Completely. (Janine)*

Janine's reasoning illustrates the third dilemma of disclosure, enlightenment versus privacy. In these quotes, she regards her own journals as intimate information sources that she would not willingly make freely available. Yet, she sees those similar artifacts left behind by others as

valuable documentation that she would "devour." The expectations Janine, and participants like her, had for their own content were not necessarily symmetric with their expectations about the treatment of other's content. Yet, the true dilemma was not only in differential treatment but also in inferring the disclosure preferences of others when they were not explicitly expressed.

### *Summary*

These dilemmas complicate the efforts of keepers choosing how to pass on a narrative inheritance. None of these were right or wrong ways to proceed, but the decisions could have long-lasting effects. Sometimes, as I will discuss in Chapter 6, keepers could not adequately anticipate how these artifacts would be received and made decisions about memory artifacts that recipients later disagreed with or even changed. It is important for designers to keep these dilemmas in account through the development of new technologies. Every narrative design decision has a tradeoff, but the impact of these decisions may only be discovered over time, after a handoff, and be invisible to the creator.

## CHAPTER CONCLUSION

In this chapter I have outlined the motivations, practices, and challenges that face families passing down their memories across generations. I found that the driving motivation of sharing memories was to make the past more relatable, and that this was strengthened by a sense of urgency, the realization of exclusive knowledge, and a need to formalize memory sharing to avoid memories being lost.

I uncovered a collection of practices that participants enacted to find, decipher, reconstruct stories, and pass on stories as part of a family memory. I note that this work to build a narrative inheritance is distinct from personal memoir writing, which has been addressed in part by (Landry 2009). Although some of the practices involved writing personal memoir, participants were also sharing their inherited memories of others as much as they were talking about their own lives. The time and effort required to undertake these projects was often overwhelming, even for my expert participants, and help from younger generations was rarely offered. Design cannot address all of these issues, especially those that result from an inability to predict the

future. Yet, it can intervene better mediate the family memory that participants wanted to pass on by taking into account the dynamics of collective co-constructive experienced by families.

My participants employed various media as a means to directly transmit stories to a future generation. These memory artifacts were also a way of making sure the story would survive longer than face-to-face communication was possible. But even successful memory artifacts, which were accepted, understood, and cherished by their recipients, had tradeoffs that participants struggled with. These tradeoffs resulted in "dilemmas" of significance, survival, and privacy because there are no answers to these problems. They encompass what "value tensions," circumstances where supporting one value in a situation challenges another value.

The dilemma of significance faces a tradeoff between everyday use and esteemed regard. The dilemma of survivability draws attention to the values associated with longevity and durability, and also to the existence of self-interest conduits who may come into possession of an important family artifact. The dilemma of privacy demonstrates the asymmetry of values about one's own private information and the treatment of others' left-behind personal documents. These dilemmas illustrate tensions that can become embedded into design. They carry through into each of my subsequent chapters.

These dilemmas complicate decisions not only of what memories to share, but how to share them. They interact with the aforementioned "wicked problems" in ways that are not quite predictable. The concerns of survival, for example, are bound up with all three problems. It is complicated by anticipating future audiences, where valuable memory artifacts might not end up in the hands of those they are intended for; the perception and reality of overload, which may affect the actions of people who receive something for which they have no clear value or purpose for; and negotiating dissonant values, where people with differing regard for a memory artifact must assert their opinions on how it should be handled. These issues are ones which designers of family technologies will face, to some degree, as they facilitate passing on a narrative inheritance. I return to a discussion of the dilemmas of survival and significance in Chapter 6, as keepers and descendants wrestle with ways to curate collections of personal and inherited memory artifacts to

ensure they have continued attention and value in their life. I discuss how materiality plays a role in helping digital mementos survive in Chapter 8.

This chapter has described broadly the practical accomplishment of family memory sharing as it is carried out across generations. There are several areas that bear further examination, which I address in future chapters. In my next chapter (Chapter 5), I further investigate how uncertainty is encountered and handled in family stories. I examine some of the "mysteries" that arise in family memory sharing. These are sometimes caused by disagreements about disclosure, part of the dilemma of privacy, as memories as passed continually from generation to generation. In Chapter 6, I glean insights for how to help people manage and overcome overload and begin to meaningfully engage with the overwhelming amount of content that they generate and inherit from others. Chapters 7 and 8 explore ways to support the work of memory sharing through mediating the creation, curation, and sharing of family memory artifacts through design.

# CHAPTER 5 – "DISPEL THE MYTH AND MYSTERY": RESOLVING AN INCOMPLETE NARRATIVE INHERITANCE

## INTRODUCTION

In the previous chapter, I outlined the work of crafting a narrative inheritance for future generations in a family. In this chapter, I more closely examine this work as it occurs in the midst of uncertainty. Continuing my focus on family stories, I concentrate on the experience of "listeners," or those on the receiving end of a family memory, and how they perceive their narrative inheritance. I focus especially on how listeners deal with an "incomplete" narrative inheritance (McNay 2009).

In the absence of face-to-face communication between generations, older family members rely on mediated forms of memory, such as photo albums, recorded narratives, or written memoirs as "vehicles to 'pass on' memories that would otherwise be lost" (Lindley 2012). Several participants discussed their efforts to create memory artifacts to help tell their stories in the previous chapter. These mediated forms of memory sharing are not new. Yet, prior literature has noted that older adults worry that as media become increasingly digitized, their carefully crafted articles might be lost, inaccessible, or worse, meaningless (Thomas and Briggs 2014; E. A. Thiry and Rosson 2012). This worry suggests that current technologies can help capture and store a memory, but they are insufficient for sharing or transmitting what is shared to its intended recipients. Part of this insufficiency, I will argue, lies in a failure of existing media to account for the characteristic uncertainty of family memory sharing as an ongoing collective process.

I focus then, on how families deal with the "family mysteries" that arise out of the ongoing collective practices of family memory. These stories were *ungelöst* (uncertain, unresolved,

unsettled); details were missing, questions would not be answered, unexplained inconsistencies arose, and claims about the past were contested by counter-narratives and alternative interpretations. I will show that the set of intergenerational practices that give rise to this uncertainty are key elements of the productive accomplishment of family memory, including preparatory anticipation of future generations, continual negotiation of different values, and contextual curation of the stories to be told.

Grounded in the experiences of 21 interview participants drawn from a range of ages and generational roles (Table 1), I lay out a descriptive account of the practices enacted between generations to share memories of the family and how they make sense of and respond to perceived disruptions when they occur. I will place these perceptions in conversation with the practices of keepers (or "tellers") identified in the first study. The theoretical framework of collective remembering used to frame this analysis is described in Chapter 2. Details of the participant selection and characteristics are described in Chapter 3.

In my discussion, I synthesize the findings from this chapter and the previous chapter on keeper's practices into lessons about narrative inheritance to guide future development of technologies for intergenerational memory sharing. Key characteristics of a narrative inheritance is that it is fragmented, conditional, and negotiated.

## FINDINGS

This account outlines the family memory sharing practices enacted across generations which result in and respond to *ungelöst* family stories, or what my participants call "family mysteries." In this section, I describe how family stories come to be perceived as incomplete, how my participants make sense of why this occurs, and how these mysteries were resolved when they were encountered. These findings are not meant to be an exhaustive account of how memories are shared, but will highlight common features and practices of intergenerational communicative memory sharing that can be disrupted in the midst of uncertainty.

My interview participants spoke about learning about their past and seeking out information about ancestors and events, a role I designate a "listener." They also discussed their goals in

passing their memories on to the next generation, a role I referred to as a "teller." All of my participants shared from their experiences as listeners, but only those with children had significant thoughts on their role as a teller. In describing my findings, I use the terms "listener" and "teller" to describe the role that a participant is referring to. Even with this caveat, I acknowledge that these role descriptions are simplifications of the interactive and multi-directional way that memories are shared across generations.

## WHAT MAKES A "FAMILY MYSTERY"?

First, I summarize several anecdotes to illustrate the kinds of stories which appeared in my data. While these anecdotes are highly individual to each family, they illustrate the kinds of doubts and suspicion that can arise in family memory sharing.

### *Unanswerable questions*

In some of his research about his family, Oscar discovered a branch of his father's family that he did not know about, and that his father had never mentioned before. Unfortunately, Oscar's father had died prior to this discovery, so he was unable to ask his father whether he had known about this branch of the family and why they had never been mentioned.

*And this, of course, is an intriguing family mystery. So, the intriguing mystery of all this was, did my father know that he had a nephew and two nieces in Poland, and not say anything ever about them? Or did he simply not know of their existence? And there's no evidence in all the research that I've done that he did know about them. But of course, there's no way to prove that he didn't. (Oscar)*

In Oscar's case, he had no way of knowing what his father knew, because his father had passed away before he could ask. The questions that he had about his family's past were unanswerable because the only person who would know had passed away. In similar cases, participants had a family member that was still present, but they *"won't open up"* about some unknown aspect of their past.

My participants also shared that they felt that some questions about the past were forbidden all together, making it impossible to even broach the subject. Tina shared that she was unable to talk about her father's side of the family or her ancestors after a recent feud:

*I think right now also my dad's side of the family recently had a family feud, and so family has become a very difficult topic. We're actively not talking about it. And that includes talking about the past, because everything is intertwined in his family. (Tina)*

The conflict in Tina's family led her father to stop all conversation about his past and his side of the family. Tina had no other people with whom to discuss her family, so she was left with an unresolved gap in her family memory.

In each of these examples, participants had questions for which they could not get answers. The mystery was not only in that there was some unknown, but also that under the current circumstances, there was no way to learn more.

### *Suspiciously missing details*

Lincoln shared that he had an uncle, Tom, who *"wasn't all there,"* and the explanation for his condition was hidden in a cryptic past. Lincoln had learned parts of his uncle's story from his parents, but only *"pieces."*

*So, Tom, my mom's brother, was in South America doing missionary work. This was in the 80's. First, I heard [about his past] from my mom and my dad. Just pieces of the story.*

Tom's condition had been explained to Lincoln as the result of some traumatic experience during his time abroad in South America. But this vague statement was the extent of what he had been told, which felt incomplete to him. When his uncle passed away, Lincoln learned that there was much more that he had not been told.

*My uncle [Tom] had seen something that shook him up… when he came back, he was no longer emotionally all there or mentally present. Something to do with PTSD or something like that. But I didn't really get the full story about him having to deal with stuff that he had witnessed. (Lincoln)*

The original vague description that Lincoln received from his parents of this life-changing period in his uncle's past was unsatisfying. The knowledge that he did have pointed to the likelihood that there were some details that were known to others but left out in the versions he was told. In contrast to the first set of anecdotes, where only the person whose past was in question knew the answers to emerging questions, in this case, the knowledge was available but selectively shared. As I will explain in later sections, participant's like Lincoln had strategies to seek out this information from others when possible.

### *Unexplained inconsistencies*

One participant, Karen, recounted finding a family portrait of her great-grandparents with a stranger present in it. After asking around, she learned that this person was adopted by her great-grandparents; however, the custom in that period was to adopt within families. So, Karen was still curious how this person could possibly be related since he did not look like any of the family members that she knew.

*There was a person that my great-grandmother and my great-grandfather adopted, but I never heard how he was related. And the reason why I question it is because in my grandmother's side of the family, everyone is very fair... So, there's a picture of my great grandmother and this very, very tall person, very, very dark… So, who is this person? (Karen)*

Karen sought an explanation for why this relative, who by custom should be somehow blood-related, looked so different than the other members of her family. The *"mystery relative"* remained a topic in her family for years, but older family members who knew him personally would not talk about how he came to be in the family. Because of this Karen "*never could get to the bottom of how he was related."*

In prior work such as Petrelli, van den Hoven, and Whittaker (2009), people often keep mementos precisely for the purpose of evoking some story about their past. In these cases, people also imagine themselves personally conveying the significance of what they passed, giving verbal or written explanations of why these pieces of their past were important. In the absence of these kinds of explanation and silence from those in the know, recipients like Karen could be left wondering.

### *Embellishing, Rumors, and Lies*

Family mysteries also came about when people were not quite sure what to believe. For example, Evan recounted his grandmother's story of being forced to work in a war munitions factory as a child, where she recalls sabotaging the equipment in defiance.

*One that sticks out is Grandma would always—and I never knew how much she was embellishing—there was always this story that she was forced in one of the factories to build ammunition for the Germans.*

Evan thought this story *"had some credence"* because he had heard of similar experiences. However, he doubted the details that his grandmother recounted.

*… She claims that she would load things backwards so they wouldn't work. I doubt that's true of a young kid, [they are] probably just doing what they're supposed to do. (Evan)*

In this example, there was a *"kernel of truth"* that Evan believed, but he was left with unresolved doubts whether events of the past happened exactly the way his grandmother said. Dudukovic, Marsh, and Tversky (2004) note that sometimes storytellers exaggerate for effect when recalling an entertaining memory for their family. However, for my participants, storytellers in their families with a penchant for embellishment were generally known to be "*theatrical."* Their stories, while not strictly veridical, were enjoyed for what they were. In this case, however, Evan was not quite sure whether stories he had been told were intended to be faithful depictions of his grandmother's past.

In another example, the details of the story changed so much that it shifted to a wholly different narrative. Vivienne shared that one of her ancestors was said in her family to have participated in an important battle in the U.S. Civil War. However, upon looking up the details of this ancestor's service, she found that the story wasn't true.

*The other [story] is another grandfather that fought in the Civil War, he went on Sherman's March through the South and ended up on the coast. Well, he didn't quite make it that far. He got sick and was shipped up to New York.*

Vivienne was motivated to investigate this heroic family story because there so much suspicion in her family that it was not true.

*That story was always, kind of, nobody knew quite what had happened. Until I got his pension papers and then I knew exactly where he was at what time. (Vivienne)*

Vivienne's grandfather had indeed been a part of this historical moment, but as he shared his experience and as the story was passed from generation to generation, the details about the extent of his participation in the march *"got lost in the passage."*

Finally, there were some stories told by a member of the family about their past that other family members denounced as completely false. For example, Barb recounted a time when her mother

disputed the accounts that her father had made describing his work experiences. Barb had been working with her father before to describe and record the kinds of jobs he had held growing up as a record for her family. However, after he passed away, her mother discovered the written notes and declared them all to be unilaterally false.

*I had [the notes] out and my mom's always nosy about my dad. …She saw this and she says, "What's this? This is full of lies! This didn't happen! He didn't do this!" (Barb)*

Although Barb's father's accounts were plausible, her mother, a person who presumably had first-hand knowledge, challenged the veracity of the accounts. Without her father present to defend his recollections, Barb had to come to her own conclusions about the veracity of what he had shared.

In summary, **I** share these anecdotes to show how participants across different generations had *ungelöst* stories in their families with unanswered questions, missing details, inconsistencies, and dissonance accounts. The unresolved nature of these stories both intrigued and concerned my participants. They were intriguing as an opportunity to discover more about their family. Yet, for tellers especially, these stories were concerning because they did not want to pass on these same questions to their descendants: *"And having all sorts of unanswered questions about my ancestors, and I would like it that my great-great grandchildren don't have those same questions." (Caleb)* Thus, when these family mysteries were encountered, participants tried to make sense of why they occurred. With this in mind, I turn my attention to unpacking how these uncertainties emerge through memory sharing practices.

## How do these mysteries come to be?

Family memory was passed down in many different contexts in my participants' families, from formal storytelling occasions to casual conversation. I focus in this section on drawing out examples of ways that the shared narratives became suspect in these interactions. I found that uncertainties can result from chance, specific intention, and active resistance.

### *Chance: A Lack of opportunity*

First, puzzling inconsistencies can result from untold stories—memories that tellers have not yet had an opportunity to share. Untold stories could be substantive pieces of a narrative, such as the story of how a person came to be adopted into the family. They could also be relatively unimportant alone, but contain explanatory details that bring clarity to other stories. In the absence of these stories, critical information is lost.

Several participants felt they lacked the opportunity to share because they had difficulty finding a mutually convenient time to share their memories with their children and grandchildren. Oscar, for example, had adult children with their own families and thought they would not have time to sit for hours to listen to him share about the family's past. Yet this dearth of time pointed a deeper worry, which was that his children and grandchildren did not have sufficient interest in what he wanted to share to take the time to listen.

*How many times do you corner your kids and have them sit down for an hour or two to talk to them? They lead busy lives… so there's not much time to do that. And I don't think there's the interest. The grandkids aren't old enough to be interested. (Oscar)*

Gloria, a mother of a young child, echoed Oscar's sentiments, worrying that her son would never take an interest in learning about her life or their family history until after she had passed away:

*I'm hoping that [my son]'ll outlive me by a long time, so maybe he won't get interested in this stuff until after I'm gone. Maybe he'll get interested because I'm gone, and can't talk about it anymore. So, I have to figure out a way to preserve it. (Gloria)*

Gloria's comment brings out one of the paradoxes of intergenerational memory sharing—the misalignment of availability and interest. She worried that her son's interest would only pique in her absence, not by coincidence of time, but *because* she was gone. It is precisely this scenario that spurred keepers in the last chapter to start recording and preserving their memories in some more long-lasting format. Older generations needed to somehow preserve their memories so they could be shared in their absence. However, the dilemmas of significance, survival, and privacy that I discussed in the last chapter could undermine these efforts.

### *Intention: Crafting a narrative*

A second source of uncertainty arose when participants felt that their family members selectively chose what aspects of their past to share in order to craft a particular image of the family. In line

with this sentiment, Wertsch (2002) refers to some acts of collective remembering as performative, drawing on Irving Goffman's impression management theory. He theorized that "a memory performance may reflect the desire to present oneself in say, a desirable light as much as the need to arrive at an accurate view of the past." I see in my data that a shared narrative might be "intimately performative", shaped by family members' efforts to present the family to themselves and other members in a particular way, or "publically performative," an attempt to present an ideal image of the family to the broader public. I will give an example of inward performance in this section, and outward performance in the next.

In one example of an intimate, or family-facing, performance, Barb found a photograph of her father dressed in a suit when he was young. It seemed *"odd"* to her because it depicted him dressed differently than how she remembered he typically dressed. She surmised that the photo, taken just after he emigrated to the U.S., was "*probably a picture that he took to send back to [his country] to demonstrate to his family that he was successful."* This photo was a way for him to present a literal image of successful migration to his family at the time, and became iconic to Barb's family of this period of transition.

Older generations could also selectively pass on certain memories and stories to shape how future generations came to think about the family. Lincoln, in reflection on the secrets that his parents had kept about his uncle (which I shared in the first section), assumed that the details were edited out in an attempt to create an image of his family that was more in line with their moral views.

*I get the sense that we like to just paint a picture of our family as having it all together. I don't know if that comes from our Christianity. Wanting to kinda be a perfect family or to be the model citizens. (Lincoln)*

Lincoln thought his parents had hidden what they knew to reshape the family's past into one that was more ideal. The selectivity inherent in shared memory is a defining feature of collective memory (Wertsch 2002), but the decision-making was often opaque to listeners. Barb and Lincoln were able to make a reasonable guess about the value frames that influenced the stories they were told, but these supporting narratives are not always obvious.

### *Resistance: Suppressing incongruent memories.*

In addition to the ways that tellers could selectively present a certain version of their own past, a person in a listening role could choose to change or reject stories they inherited. For some of my participants, conscious decisions to change a narrative were to resist the family identity that was handed down to them and re-construct their own narrative for their descendants. For example, Gloria realized that her father was actively working to suppress family stories that transmitted the memory of his own father, who was notoriously regarded as *"a terrible person,"* to avoid being considered of similar character through the family relationship*:*

*And my father just hates to talk about [him]. My father was a minister… he took it so personally, the way his father lived. And I never understood why, and I asked him, and he said, "Well, I would hate it if people thought about me that way." (Gloria)*

Gloria's father avoided discussing aspects of his family's past that were incongruent with his own identity. Although it was not his own behavior that was being judged, he still considered it a personal shame and sought to maintain an image that more closely fit his own character. In this way, a family story could also be silenced by younger generations to avoid association with members of a previous generation. This was an example of an publically performative reaction to a family memory.

These interpretative acts could be seen as "assertions of narrator's authority" (Layman 2009), as each generation takes on (or rejects) successive ownership of the narrative inheritance passed down to them. Yet, these interpretations could be contested by family members with a different interpretation of the past, especially those who wanted *"everything that's remembered to be as accurate as possible" (Alina).*

The re-constructive practices of collective remembering in these families were shaped by a number of personal and social motivations. In all of these examples, the *ungelöst* stories could be the result of the teller or the listener's intention to convey a certain image as well as to re-construct family memory to reflect an identity that was congruent with their ideals. The findings from the last chapter showed that keepers indeed shared family memories with an agenda behind them and had stories that they wanted to convey. Yet there were also times when keepers were just overwhelmed, lacked opportunity to share, or had chosen a narrative medium that did not

quite survive. It was at times impossible for listeners to tell why uncertainty existed; the intentions that shaped a narrative might be known, or it might only be suspected or inferred by listeners (i.e. *"I get the sense that…").* When the purpose behind the shape of a narrative was obscured, it could cause suspicion, doubts, and questions which could culminate in the perception of having received an incomplete narrative inheritance.

## How do families resolve mysteries?

My participants described a wide variety of strategies for investigating and resolving the mysteries they encountered. I focus on the resolution scenarios that provide insights to guide design when face-to-face resolutions may no longer be possible. Some mysteries resolved themselves over time as the tellers found suitable circumstances and people with which they were comfortable sharing the full story. In other cases, situational triggers prompted revelatory conversations. As well, people with a sense of obligation or different perspectives provided alternate viewpoints to help resolve dissonance in narratives.

### *Waiting to gain distance from the past*

Participants described waiting for the 'right' time to share sensitive memories. Time allowed tellers to gain the necessary distance from that period of their lives and the story that would be told. This distance might be reflective, giving them a different vantage point on which to interpret the past. Time also lent an important level of emotional distance, enabling my participants to come to terms with more negative memories.

*Some things that are not so fraught with emotion or negative feelings, those things are easily shared. And I guess maybe it depends on the passage of time. I'm much more open on things that happened way in the past, centuries ago, but if it happened to my grandparents or even great-grandparents I don't share that kind of stuff much. (Vivienne)*

When tellers finally gained the temporal distance they needed to share, the story could come out suddenly, without warning or context. Maggie gave the example of her grandfather, a veteran who had been tortured as a prisoner of war (POW), who one day suddenly decided to talk about his experience to his family and others more widely after that.

*He actually originally opened up about it to all of his sons about 10-ish years ago. … That was the first time he ever talked about it at all.… Because he was tortured, he didn't ever really wanna say anything about it. (Maggie)*

Maggie and the other members of her family had avoided talking to her grandfather about his POW experiences and had assumed that he never wanted to revisit those traumatic memories. But at a family gathering after a wedding, he suddenly revealed what he had experienced to all the family present.

*… He's like, "Let me tell you a story." They're like, "Oh my God." And then after that, he just gave talks about it all the time. It's like he didn't open up about it, and then once he did, he would literally go to schools to talk about his past. (Maggie)*

Maggie did not know for sure why her grandfather suddenly decided to open up about his experiences. Cultural attitudes towards veterans from his period had changed in the interim, and there were a number of documentaries that had been released featuring veterans with similar stories. These changes created a more open environment for him to share about his experiences, connect with other veterans, and contribute to broader conversations about the past beyond his family. The distance gained from the events in the past gave emotional space to memories to be shared, and also saw cultural shifts that changed the broader perception in society of events of the past. In this case, Maggie's grandfather was available for face-to-face interactions. However, there might also be a case where the story was pre-recorded at some point and only revealed when the time was appropriate.

### *Finding a preferred audience*

Another way that mysteries were eventually resolved was when the tellers found their preferred audience. Some participants described very specific groups with whom they envisioned sharing a family story. Vivienne, for example, would only share controversial family stories with her daughters. Maggie also only wanted to share some of her early memories with young women who shared a similar identity and experience with her. Other discriminating characteristics participants described were the age of their intended audience, the closeness of their relationship, and the gender of the listener. These preferences could be quite clear-cut and articulable in some cases, however many of my participants—across generations—had only vague notions of how and to whom they would want to share about their past.

Besides a particular group, some tellers preferred to share some stories, or parts of them, for when their descendants came to a certain level of maturity. Some of my participants described being rebuffed as children when they wanted to know more about their family history. When their questions were ignored, they thought they had been judged too young to hear the full story. However, several of my participants described gradually discovering more about their history as they aged. Marie reflected on this process with her mother, who gradually began sharing more details about her life that had previously been vague or omitted completely.

*I think my mom is a little hesitant to tell me, sort of about her growing up … She's at the stage where, like, you don't know whether you can tell your kids about the bad things that you did. So, you miss out on little portions. But it's starting to come out. I think we're at a point where she can tell me some things that she wouldn't have told me when I was younger. So that's kinda cool. (Marie)*

Marie started to gradually find out more about her mother's life as she got older. Participants as they got older also gained more background knowledge, were able asked more pointed questions, and their older family members came to regard them differently as peers and friends. Alina, a parent, explained that she was waiting to share some of her memories with children, *"when they're older and more appreciative" (Alina).*

Participants also described learning more about their family as they went through similar experiences or progressed through different life stages. Lincoln, for example, reflected that his parents tended to share more about their lives as he reached certain milestones that they remembered in their own lives.

*I'm finding out as I progress in life, as I come to grad school that... My parents met in grad school, and so as I go through more life stages that they also have gone through, I get to hear more of their journey. …So, they're sharing things with me, just as my life stages are matching up with stories from when they were at that point. (Lincoln)*

Age in many cases was not really a number, but more of a shorthand for referring to a condition of maturity or some life experience. These temporal markers were points in a person's life when their experiences lined up with some salient memory or prepared them to share in their parents or grandparents' lives.

### *Seizing an opportune moment*

Memories could be hard to draw out because the tellers lacked the context for recall. In these cases, prompts like occasions or locations, could bring stories and details to mind and create opportunities for families to share. While many of these opportunities could be serendipitous, my participants also shared ways that they strategically looked for opportune moments to share.

Significant family events, like weddings and anniversaries, were common and traditional moments in which to share memories. Sometimes these occasions allowed families to discuss weightier topics than would otherwise be considered inappropriate for everyday conversation. For example, Janine recalled that her parents' divorce provided a rare chance for her to dig deeper into family relationships on her mother's side of the family that she was normally not able to enquire about.

*Since then I've spoken to my mom more about family dynamics and just, familial relations. Those kinds of conversations, I think, open up after a divorce happens, or any kind of traumatic event. (Janine)*

Janine found that an event that changed the shape of her family, like a divorce, also carried with it the chance to open up otherwise difficult conversations. Different occasions provided opportunities for memories of different emotional weight to be shared.

### *Revisiting a bounded memory*

My participants were well-aware of the evocativeness of certain locations in their lives. They leveraged these strong associations to draw out memories and stories from older family members that were not tied to a particular event or answerable in response to a question they might normally ask. Further, locations could be used to bound and ground a particular important or sensitive memory. In one example given by Robert, his parents took him on a family vacation to a place his father had worked in his youth. There he learned unexpectedly that he was not his parents' first child; they had a son who had died as a baby while his mother was visiting his father in this town.

*In 1946, my mother delivered a son prematurely who died a few days after he was born in Harrisburg, Pennsylvania. …The premature birth and death incident were never shared with me until I visited Harrisburg on a family vacation. My parents took me to the gravesite and it was then my mother told me the details. (Robert)*

Robert had never been to Harrisburg with his family before and found this was not a casual trip down memory lane. His parents had taken him to revisit a place where a memory was contained, bound by geography and left behind when his parents returned home. Contextual factors, such a location could be used to bring up memory, and they also enabled family members to leave memories behind. Leveraging the boundedness of location was one way that "forgetting" was incorporated into family's remembering practices in a highly situated way. The location was a place where a memory could be symbolically left behind and removed from the everyday (or forgotten), but also revisited (or remembered) at will or when the occasion warranted.

### *Fulfilling an obligation*

Some of my participants recounted painful aspects of their past that they did not want to revisit, but had shared with a select few as a confession or as a helpful lesson. This sense of obligation was primarily expressed by participants with children and grandchildren. Alina, for example, reflected that "*There's some things that I'd really just as well pass over"* but she felt nonetheless obligated to share for her children's sake.

*There are some things that don't necessarily need to be passed on. I mean, it's a tricky thing. You want kids to be able to make sense of where they've come from and what they've experienced in life and to understand their parents as much as possible so that they can understand themselves. (Alina)*

Although she would have liked to avoid difficult memories, she thought passing them down to her children would help them gain a better idea of their own identity. However, Alina and other participants with a similar sense of obligation did not want to share these aspects of their past widely, and were *"circumspect"* in who they told.

### *Learning alternate interpretations*

A fourth way that mysteries were resolved was when participants sought out alternative perspectives from others. In some cases, participants sought out other family members who shared an experience or knowledge to confirm the details of particular story. Also, similar to collaborative recall, where multiple people recount a particular shared event and help to remind one another of missed details, some participants sought out the stories of other family members to help fill in missing details that had been forgotten or distorted.

Returning to my earlier example, when his Uncle Tom passed away, Lincoln decided to ask his parents more about what had happened to him. Second-hand accounts were Lincoln's only source of information. When he could not get the whole account from his parents, he instead asked another family member, a different uncle, who was willing to share. This time, he got *"more straightforward commentary"* about what exactly had happened to his uncle during his time abroad.

*So, then I had asked my mom's brother-in-law, who I'm fairly close with, just more about that. And so he was being very straightforward… That my uncle Tom had been partially an informant, or he had witnessed some people be killed and, not that he was responsible for it, but he had been very close to it happening. (Lincoln)*

Some of my participants described searching for enough details about a hole or apparent secret in order to be able to have a conversation about it. When family members were *"hushmouthed"* about events of the past, motivated participants sought out a less reticent family member, or even an outsider, to learn more. Sometimes, already knowing some bit of the story was enough to gain access to the rest of the story. For Lincoln, for example, the seed information he gained about his uncle's mental trauma helped him pry open a carefully guarded secret. After learning some of the missing parts of the story from another family member, he *"felt more empowered"* to ask his parents for more of the details they had hidden.

An alternative perspective could also be valued not only for its information, but for its valence. Janine, for example, wanted to know more about her father's family, but preferred not to learn about her family members directly from her father. She thought his emotion would show them in a more negative light than someone who did not have the same feelings of resentment toward them.

*'Cause I feel like [my father's] lens, I think, has been colored by a lot of feelings of just resentment and time … I know that some things I can't really take at surface value from him. So, I'd like to know from other perspectives what my paternal family members were like. (Janine)*

The other perspectives that Janine sought out were not necessarily providing her with different information, but offered her a different viewpoint from which to learn about her family. Learning alternative interpretations of the past was similar to the practices seen in the last

chapter of keepers searching for and deciphering a story. However, in this case, listeners were also looking for an alternate version of the past, not just additional information.

These scenarios of resolving family mysteries show a combination of serendipity, intention, and negotiation as participants work through ways to resolve the unresolved and uncertain family stories that were passed down. Although I focus here on scenarios where memories were passed on, participants also shared about instances where resolution ended in a decision to by a teller to withhold information or a listener to *"respect [their] silence."* In these cases, the *ungelöst* stories were not resolved, but they were settled for a period. I return to these dynamics in later sections and again in Chapter 8 in my discussion of the asymmetry of control over how family stories are constructed.

## Summary of Findings

In my findings, I unpack the experiences of family memory sharing from the perspectives of those passing on and those receiving family memory. The unanswerable questions, hidden information, and contested memories which pervade and complicate the narratives of my participants' families constitute what might appear to be an imperfectly transmitted social memory, or, an "incomplete" narrative inheritance. However, in making sense of listeners' perception in light of tellers' actions, I notice that much of the mystery in family stories is not in *what* was passed on, but *how* it was shared. Holes were the mark of memories that tellers were not ready to share or would be shared only under special circumstances. Conflicting narratives signaled when there were multiple ways to make sense of the past, and potentially guided listeners to discover these various interpretations. Even lies could reveal how the story was influenced by the cultural context and identities, and cause listeners to reflect on the goals of the tellers as it was passed down through different time periods.

Each of these practices are opportunities for design in their own right. Moreover, in light of perceived disconnect in memory sharing, these may serve as lessons to inform systems on how to handle some of the uncertainty that characterizes family memory sharing. A view of family memory as ongoing co-construction across generations helps to make sense of these practices. In the next section, I connect the work and practices of keepers creating a narrative inheritance with

the perception of descendants and listeners receiving a narrative inheritance to provide insights for future technologies.

## KEY LESSONS

The perception of incompleteness that resulted from the characteristic inconsistencies and uncertainties in family memory sharing signal some of the tensions inherent in this cross-generational reconstruction effort. Family narratives are always continual works in progress, where "storytelling is the site where we jointly, interactionally, collaboratively, and in a shared way make sense of the narrative we have inherited while simultaneously constituting who we are – our identity – as a family" (Ballard and Ballard 2011).

In the following section, I highlight some of the key lessons about intergenerational family memory sharing from my findings that are important for future technology design to consider. In particular, I contemplate the social-technical gap inherent in translating the highly situated resolution strategies I found in generalizable technical specifications. Towards my goal of facilitating narrative inheritance, I offer implications for mediating the artifacts, practices, and values of intergenerational family memory sharing.

### FRAGMENTED MEMORY

**Fragmented narratives are key components of a narrative inheritance.** Family stories are ongoing constructions, by nature partial and in-progress. For my participants, the partiality was often a matter of the teller's presentation and perspective. Wertsch (2002) argues that every story in collective memory has a "voice," a perspective that comes out of a particular context, and which may perform the speaker's desire to present themselves in a desirable light. Lindley (2012) also found that people creating memoirs necessarily foreground some aspects of their past and suppress others. My participants expressed that their primary goal in passing on their memories was to bestow to their descendants *their* view of the past, in *their* words, from *their* own experience. Additionally, in my findings, stories were often shared piecemeal in conversation, in response to some trigger, or gradually unfolding over time. Sometimes the holes and missing

details that listeners perceived were the result of a lapse, but often, and more importantly for design, they were stories not-yet-finished.

The resulting family stories included or excluded details for a purpose, such as presenting a particular image of the family, like Barb's father, or to be protective and circumspect about sensitive information, like Vivienne's circumspect nature. They unfolded over time as appropriate for the listener, based on judgements of maturity or "appreciativeness", or as the teller was ready to share. While it is tempting to conceptualize family stories as complete units that are created and delivered whole, it is perhaps more useful to think of them as packages pieced together for some purpose or assembled over time.

*Design Implication:* Systems which record and store stories should support fragmented narratives. Treating stories as collections of pieces allows both tellers and listeners more flexibility in how they choose to share and construct a narrative in a digital platform. Fragmentation also acknowledges the polysemous nature of memories, which may be incorporated as components of several different narratives. One way to represent fragmentation is through the affordances of material metaphors. This implication serves as the inspiration for the design discussion in Chapter 8 which used the fractured character of a mosaic to represent how narratives are pieced together.

## Negotiated Control

**Control is continually negotiated.** My participants recalled that memories were shared by the will and preference of the teller, but this sharing was often influenced by the demands and interests of the listener. Similarly, Lindley's (2012) participants expressed that while their memoirs were a personal legacy, they were shaped by the perceived wishes and needs of their intended audience. Stories might be "pushed," to use interaction language, where a teller decides the form of the narrative and the circumstances in which it is told, or stories might be "pulled," where a listener asks a question or requests some information when they want to know. The push and pull of these constructive practices shapes a family story as it is passed on.

However, in the absence of direct communication, this nuanced responsiveness breaks down. Without a known, definite listener (as is often the case in mediated memory sharing, like

memoir writing) the teller has complete narrative control. In the worst case, this may lead to a perception of incompleteness or irrelevance from listeners who had no input in saying what they wanted to know. For example, in my findings, Lincoln was dissatisfied with what he had been told about his uncle's condition, and could only reason about why the details had been kept a secret in hindsight. This is not ideal for tellers, who, in the previous chapter and in related literature wanted their stories to be engaging to listeners, and for their perspective to be known. On the other hand, given stories with no direction from a teller, the listener has complete control over what they do with what they have received or gathered. However, with a total lack of control, some tellers who have misgivings about how their stories will be received and handled might choose not to share at all, leaving future listeners without their unique voice as part of their narrative inheritance.

Working out issues of narrative control be outside of the capability of a mediating device. Grasso argues that controversy in a social system is not always solvable: "It is not always possible," she says, "and maybe not even desirable, to solve these kinds of conflicts, as they are subjective and linked to personal factors"(Grasso, Cawsey, and Jones 2000). The expectation and intent in these interactions are often implicit and hard to fully articulate in a way that a system could make use of, forming a "social-technical gap" (Ackerman 2000).

Yet, as I mentioned in Chapter 4, even if the immediate preferences of teller and listener are opposing, their motivations for sharing memories are likely to be aligned. In light of this, I offer that transparency might be the best way forward. All systems for sharing content will embed assumptions about narrative control in their design, and these assumptions must incorporate an awareness of dissonance and conflict that can occur in family memory. It might not be possible to fully represent the multi-faceted and multi-layered value systems of all users in a single system. In light of this, it is incumbent upon users to make a satisfactory decision for their context. While designers cannot solve these tensions, they can make the embedded assumptions of narrative control in the system visible to users.

*Design Implication:* The different perspectives and opinions of family members contribute to the rich "multi-voicedness" of collective family memory, but also complicate (perhaps impossibly)

design decisions about narrative control. Mediating systems alone cannot solve these tensions, but can make embedded assumptions about control apparent to users. I work through ways this might manifest in practice in the chapter on KidKeeper (Chapter 7) and in Scatter (Chapter 8). In particular, I focus on ways that the persistent, physical presence of material objects can offer some of the missing visibility and interactivity needed to facilitate negotiated control of a digital collection.

## Conditional Revelation

**Revelation is conditional.** Wertsch (2002) notes that shared memory "seems to be shaped more heavily by the conditions in which it is 'retrieved'... than by the conditions of its original formulation." This is an interesting point to consider as I contrast all the work that tellers exert trying to craft a narrative for their descendants with the perception of listeners upon receipt of these family stories. In my findings, I found that the conditions that influence family stories were content, audience, timing, and setting.

Considerations of content refers to the ways that family members changed their stories, for instance, by selectively adding or excluding details from narratives when they wanted to make it situationally-appropriate or to modulate the emotional intensity of the memory. Tellers were also influenced by their audience, especially those who imagined sharing their memories with a person of a particular relationship to them. Timing could be a challenge which inhibited memory sharing, such as when lifestyles or interests were difficult to align, or it could be leveraged for occasional, opportunistic sharing. Setting, such as the geographic location or the social situation, could influence which version of a story was told based on the norms and expectations of that setting. Each of these factors, considered singly or in concert with each other, create an engaging diversity in family stories as they are told and retold.

The factors form implicit and explicit conditions which could trigger memories and shape stories. But many conditions are not articulable or known in advance. Though it is technologically conceivable to detect a wide range of circumstances "auto-magically," using increasingly advanced novel sensing methods, there is a significant difference between context that can be humanly articulated and anticipated, and that which can be computationally detected

or recognized. For example, "when my son's first child is born" is a fairly simple situation for a person to articulate and to anticipate occurring at some point. But this statement can imply a complex mesh of timing, setting, audience, and content considerations that is difficult to disentangle and structure in a way that system could ingest and proactively prepare for.

While conditional revelation is difficult, over-reliance on serendipity and randomness can be an unfavorable middle ground for both tellers and listeners. The conditions in which and under which a story was told conveyed critically important information about the story (such as a story told only in an important location, like how Robert learned about his older brother) or context helped ensure that the teller and the listener had common ground to understand the significance of what is shared (such as a story told to a child approaching a life milestone).

One way forward is to consider conditions as meta-narratives to a story. When articulated, considerations of content, audience, timing, and setting can be interpreted, rather than concretely defined. In this way, systems can mirror and even take advantage of the existing meaning-making that each generation engages in to make sense of family stories in their current context. Stories evolve as they are retold, and the stories about stories may also need to be continually re-interpreted as each generation makes sense of what they received and decides how best to pass it on.

*Design Implication:* Systems which seek to mediate the recall of recorded narratives can leverage observable or inferred context to direct the ways that stories are shared. If this cannot be done computationally, the teller could be prompted, for example, to add this as a layer of the narrative. As a pre-requisite, such context must be 1) anticipated, 2) articulated, and 3) interpreted. Developing this anticipatory awareness constitutes one of the wicked problems in design for family memory. Yet in Chapter 7, I discuss on way that the nature of an object used to mediate a digital memory artifact (such a child's toy) can help scaffold inferences about the future context in which the artifact will be accessed.

## CHAPTER CONCLUSION

The findings illustrate how unanswered questions about a particular story, multiple perspectives of a memory, and changes in how a story is told over time can create uncertainty in family memory. Yet, these same features can create opportunities for reconciling family mysteries by making missing information apparent, providing alternative sources to seek out hard-to-find details, and unfolding a narrative over time as the context allows. Although there are tensions between generations, these might arise from a lack of awareness about the actions of the other, rather than any real conflict. I further explore the actual and perceived dissonances in subsequent chapters as they manifest in issues of control of the content, shape, and access to a narrative inheritance. Through an examination of the social-technical gap apparent in these findings, I proposed three characteristics of a narrative inheritance that can guide the development of future systems: 1) Fragmented narratives are key components of family memory; 2) Control must be negotiated; 3) Revelation of memories is conditional; 4) Temporality of sharing is both chronological and relational.

Mediating the ongoing, value-laden, collective process of family memory requires a nuanced interaction design. Yet, I acknowledge it is unlikely that any system can fully replicate the attention to internal, interpersonal, temporal, and environmental context that storytellers do naturally. I am asking a lot of design to intervene in the complexity of family memory, an assemblage of a process, and interpreted product, a set of practices, a mediated action— all of which change over time and are perceived differently by the many people involved. Nevertheless, there may be ways to "round the edges" off these problems, as Ackerman proposes in (Ackerman 2000). Chapter 8 of this thesis describes a design framework based off the lessons generated in this and following chapters to facilitate the development of systems which are responsive to the negotiated values in the construction of a narrative inheritance.

# CHAPTER 6 – CURATING MEMORY IN AN INFINITE BASEMENT

## INTRODUCTION[6]

This chapter looks in-depth into overload, a challenge created by the wicked problem of curation at scale. Previous chapters focused more on the social interactions and practices of passing on family memory, especially the practices engaged in anticipating future audiences. This chapter moves to a more focused study of memory artifacts, which highlights situations people might face as they move from face-to-face storytelling to mediated, digital forms of sharing memories. Memory artifacts, digital and physical, informational and cultural, help to convey a narrative inheritance through time and across generations. They also help ground and give weight to family stories and help to convey the significance of a relationship or past event.

Marshall (2008) and others have found that currently many, if not most, users find themselves in a state of overload due to a lack of curation. The "benign neglect" users fall back on with respect to their personal digital content allows it to accumulate at a rate and scale that makes it difficult for them to effectively manage their digital artifacts, when management is even a thought at all.

Digital memorabilia are even more difficult to handle than other digital content because of their idiosyncratic and highly personal nature. Golsteijn et al. (2012) found that while personal digital artifacts had unique affordances beneficial for memory, they were less likely to be considered cherished possessions. They were not treated with the same regard and value as their physical counterparts. Relatedly, Petrelli, Whittaker, and Brockmeier (2008) note that a key problem for the design of digital mementos is that digital artifacts are not easily integrated into the spatial "topography" of the home along with other physical memory objects.

[6] Adapted from J. Jones, M.S. Ackerman, "Curating an Infinite Basement," in Proceedings of GROUP 2016

To integrate the digital more fully into the home, researchers have proposed creating devices that merge some of the interactivity of physical objects with digital mementos. These prototype systems do appear to make digital content more accessible and interactive for their owners, from augmenting physical objects with digital contextual narrative (e.g. Memory Box (Frohlich and Murphy 2000)), to lending tangibility to digital content to allow for more natural interactions (e.g. FM Radio (Petrelli et al. 2010)). Additionally, Odom et al. in recent work (e.g., (Odom et al. 2012)) have explored how to more carefully use the material affordances of the physical to more skillfully tie digital materials into a combined world. However, physical devices with embedded memories, while promising, rest on the assumption that there is readily available content upon which they can draw that has been preselected to contain meaningful and valuable memory triggers. That is, they assume that curation has already occurred.

While there are efforts to create automated and semi- automated content management systems (e.g. Gulotta et al. 2015), many activities in selecting and categorizing content, maintaining that content over the long term, and considering what to display – the core of what is called "curation" (Yakel 2007)– remain human-driven tasks.

Yet, little is known about the everyday practices of people involved in creating and maintaining collections of important memory artifacts. I wanted to better understand people's motivations and strategies for curation, and what might enable and inhibit it in the digital realm. To do this, I examined the curation of collections of sentimental artifacts in the physical world as a useful analogue for how people might usefully engage with large collections of digital mementos. My work started with Peesapati et al.'s (2010) arguments that memory should be conceptualized as an activity integrated into the lives of people, and that digital "memory triggers" should be embedded into everyday life.

I conducted a study investigating the work of people overloaded by collections of physical sentimental artifacts. I examined 2,405 posts on two subforums of a public website, UnClutterNow.com, devoted to "uncluttering" one's life, that is, getting rid of excess belongings and other objects. The goal of this study was to establish a foundational understanding of what people do *now* to manage their current collections and integrate them into their lives. I

developed the metaphor of "an infinite basement" to translate these findings from the physical into the digital. I will briefly discuss this concept and then return to it to frame my discussion.

**The Infinite Basement.** In large physical collections, the limitations of space usually motivate people to engage with and manage their collections at some level to avoid an unchecked accumulation of things. The digital world, on the other hand, has comparatively unlimited storage, which leads people to regard it as a space needing no active management. In this "infinite basement," the problematic allure of virtually unlimited space means nothing ever has to be culled or gotten rid of due to limited space. However, I found that there may be other concerns that motivate people to curate their possessions. In particular, similar concerns which sparked the dilemmas of significance, survival, and privacy described in Chapter 4 as people looked to more mediated forms of memory resurface in my findings.

Thus, in my analysis I turn to consider the value-oriented motivations that people have to curate and maintain their collections, as these motivations can inform my understanding of how people relate to and interact with burgeoning digital sentimental artifacts. My analysis uncovered the unseen and taken-for-granted processes by which users select, organize, and arrange the items in their collections of memory. A more detailed description of the forum, its participants, and the analysis can be found in Chapter 3.

Below, I discuss the social, spatial, and temporal dynamics that influence my participants' curation of their sentimental collections. I call out a number of "curation regimes" or patterns of curatorial preferences that people enact when arranging their sentimental collections. These practices are tied in some respects to the stewardship role that many family members take on when receiving inherited family artifacts. I will also examine the role of materiality in facilitating curation as memory artifacts are integrated into the memory practices that people engage in throughout their everyday lives. In my discussion, I will consider how digital mementos — with much larger amounts of content and with essentially infinite storage — might be learn from what people do with physical memory artifacts and what might be different in a digital context.

## FINDINGS

My findings are drawn from an analysis of discussions between participants in the subforums of UnClutterNow.com about issues regarding things that had been important to themselves or other family members, and which formed the basis of personal and family memories. I largely focused on posts in the subforum "Sentimental Clutter" where participants discussed what constituted sentimental objects, how to rid themselves of excess memory objects, what to keep and store, and what issues they were experiencing in the curation of their memorabilia. Many of the comments were personal stories and advice to others on the forum based on each participant's personal experiences. I refer synonymously in this chapter to sentimental artifacts as memorabilia, mementos, or "sentimentia."

## Understanding the Problem of Overload

I frame the issue of curation at scale as a problem of overload, based on forum participants description of their challenges. This section describes, in participant's words, why scale is so problematic with respect to memory artifacts. Participants in the forum were brought together by a shared experience of at some point feeling *"overwhelmed with our stuff."* The term "*clutter*" signaled for them that they needed to go through some level of curation, to decide how to manage their stores of memorabilia.

Things of sentimental value were designated as clutter by the participants when they interfered with their everyday life and activities and when their artifacts became difficult to engage with because of the sheer quantity. These points are illustrated in a post by LukeMatthew requesting advice on how to "*declutter*" a large paper collection:

*...I have accumulated literally thousands (maybe tens of thousands, I'm afraid to count) of pages of documents that contain information I feel is too valuable to just throw away. ... I don't want to lose all this information, but I simply can't have it around anymore in the form it's been in for the past decade. (LukeMatthew)*

LukeMatthew's collection was interfering with his way of living by the sheer volume of it in his limited house space. Yet, he valued the documents, and could not simply discard the collection en masse. Others on the forum had similar (if not as dire) problems with their collections of memorabilia. They struggled with too many books, photos, china, Christmas ornaments, records, clothing, love letters, journals, and the like that encroached on their lives, and in some

cases the lives of other members of their household, but were nonetheless "*too valuable*" to handle casually.

In the following sections, I outline the challenges participants faced in curating their sentimental collections, including the emotional and resource burdens, and their strategies for effectively handling large amounts of personally significant content.

### *The burden of curation*

While all clutter could "*take over your space*," unchecked accumulations of memory artifacts created an additional emotional and social burden for participants. A particularly poignant set of threads illustrating this problem came from participants seeking advice and support when trying to deal with sentimental collections related to a loved one after they had passed away. Glasscat6 wrote to the forum as one "*aspiring to be a minimalist*," meaning that she wanted to keep only a bare minimum of objects of any kind in her home. Yet, after the death of her brother, she felt unable to continue with the same curation practices she had previously held. She described the internal turmoil she felt at dealing with mementos she had of him.

*My own clutter problem was pretty much under control and I am aspiring to be a minimalist. Until 4 weeks ago. On November 30 my brother was killed in an auto accident. Now I am just awash in conflicting emotions. (Glasscat6)*

Glasscat6 goes on to give an introspective account of her conflict—while she wanted to *"be ruthless"* as a minimalist in paring down her material possessions, she was now faced with the reality that some of these artifacts were the only tangible things she had left of her brother. This had both present implications for her life at home, and also caused concern for how she would pass on memories of her brother to her children in the future.

*...I don't want to regret either missing the opportunity to allow my grown children to have a memento from their only uncle, but I don't want to open up a hornet's nest in my own home of items that would be full of painful memories. (Glasscat6)*

Participants like Glasscat6 grappled with conflicting desires to hold on to things that represented their loved ones, both for their own memory and for future progeny, while simultaneously desiring to minimize their collections. They also faced the possibility that the continued presence of the memory triggers in their home would serve as *"a weight and a reminder of the pain."* The

emotional toll in dealing with this conflict could be intense and there were no easy answers for those seeking advice. Many participants facing this difficult prospect chose to defer it for a later time, like SimplyJamie, who wanted to declutter after losing a spouse, but confessed in a post, *"I don't dare do it YET."*

The emotional burden of dealing with sentimental clutter was not related only to loss. For some participants, artifacts were not only memory triggers, they were symbolic links to an important part of their lives. UnstuffedLife wrote of his great distress after attempting to discard an old collection of music records.

*I have kept those records since my teens. ...I felt like someone had punched me in the stomach. I cannot seem to let it go and then tonight I realized why. That music saved my life... I was depressed in my teenage years and music pulled me through. (UnstuffedLife)*

Trying to let go of the records was so emotionally taxing for UnstuffedLife that he could not bring himself to completely cull the collection. Participants responded to his distress by recommending that he digitize the music, thereby saving the collection in some form while reducing the space it took. Although digitizing analog media could be quite time-consuming, participants in the forum would often recommend this format translation. Despite concerns of accessibility, they saw it as a valuable short-term way of relieving the physical burden of having too much stuff, but deferring the emotional tax that accompanied curation decisions.

I compare this strategy to the ways that participants in Chapter 4 talked about the survival of memory artifacts. In this case, participants were concerned with finding ways to incorporate their treasured memory artifacts into their own lives, and were not yet thinking about the additional challenge of ensuring these artifacts would live long enough to pass on to generations beyond them. I discuss more the implications of translating sentimental artifacts into different forms in later sections.

In addition to the time and resources consumed, participants struggling to curate their collections of sentimental artifacts, faced an emotional burden of dealing with the memories and associations linked to the artifacts. This burden was due to the emotional ties of memory artifacts to personal relationship, especially to those no longer present in a participant's life, and emotional ties to an important period in their past. Not all participants had this issue, with some

easily discarding highly significant artifacts. But those who did could struggle for months and even years to reach their goals to be *"clutter-free"*. Though curation was difficult, participants felt that it was important.

### *Attending to attention*

As participants described their curation issues and their reactions, an underlying theme emerged from their discussions: a need to provide attention to their artifacts. An important issue for participants, indeed the crux of designating sentimental artifacts as clutter at all, was that having too many made them difficult to attend to and interact with. Participants expressed disapproval of keeping collections hidden away and inaccessible over the long-term: *"it seems a shame to leave things of any sort boxed up, unused." (Cloud)* For them, simply having an artifact was seldom sufficient for the mnemonic purposes that sentimental artifacts served, they had to be interacted with, as articulated by one participant:

*Sentimental objects have to be in sight and touched every once in a while. They must be thought about so they don't lose their relevance. (Lenora)*

Many participants felt that artifacts tucked away in storage, out of sight and in a space where they would not interfere with everyday life, would eventually have their significance forgotten. This was not acceptable for these participants, and they sought ways to better attend to their collections. This urge mirrored the endeavors of participants' in Chapter 4 to maintain the significance of memory artifacts through interacting with it and treating it with special care. Participants enacted many different curation practices to organize and manage their artifacts. Through these practices, participants leveraged the spatial-material layout of their homes and artifacts to maximize the attention they were able to pay to items in their collections.

## Curation Regimes

In her work analyzing individual's practices with personal digital archives, Marshall (2008) noted that people tend to non-selectively keep everything when putting digital artifacts into storage. Some participants in my data had similar behavior with their physical artifacts, but I also found a range of strategic patterns of practices that participants enacted as a means of curating their collections. I refer to these management patterns as "curation regimes." In the forum,

participants discussed how they enacted these curation regimes to address the tensions they felt in trying to effectively manage their collections, while also accounting for the effort required by these management activities. I discuss the regimes in three parts, based on what people focus on as they enact the regime: *storage, attention,* and *display.* Though my analysis frames these as distinct aspects of curation, I note that participants talked about engaging in several of these activities at the same time, in combination, or under different circumstances. However, I found the separation to be a useful analytical distinction to further both analysis and design.

### *Storage regimes*

Two complementary patterns, "Keep It All" and "Deal With It Later," demonstrated participants' attitudes toward memory artifacts as manifested in how they stored it.

*Keep It All.* The "Keep It All" regime was often referred to pejoratively in the forum as *"hoarding,"* due to an underlying belief that quantity diminished quality. When dealing with large collections, saving everything, even when all the items had some value, made it difficult for participants to treat the truly special items differentially. Yet participants had a hard time getting rid of things, especially in choosing among all their valuable items. As an example, Kally wrote about her struggle as a *"pack rat"* fitting a large collection of heirlooms into a new, smaller home. For Kally, the social link provided by her heirlooms made it difficult for her to cull items, even when her space was limited.

> *I admit to being the family historian/pack rat. However, as we move to a much smaller house, I am in a battle with myself as to what to keep and what to abandon. Is rejecting my grandmother's china like disregarding her hopes for me? Will she call me on it when we meet again in the great beyond?! How on earth can I possibly get rid of the china hutch that was my great- grandmothers and my daughters [sic]? namesake? (Kally)*

For participants like Kally, though their collection was problematically large, they could not in conscience part with anything and opted to keep it all. As I noted earlier, digitization in this regime allowed people to keep some version of the artifacts in their collection, whether by taking a photograph of an object or scanning a 2D document or photo. This "Keep It All" regime, I note, is one seen and decried most often in critiques from personal digital archiving. Yet, this could also be a response to an inability to anticipate the needs of future audiences.

*Deal With It Later.* Relatedly, when managing a particular collection was too difficult participants would instead opt to "Deal With It Later." This regime appears similar to the "Keep It All" regime, with the slight exception that participants put away the collection with the express intention that they would return to it when they were ready. Claymouse elaborated on this regime in her response to the disquiet expressed by another forum participant, Ren, at the prospect of getting rid of a collection of children's dresses hand-embroidered by her mother.

*Ren, it doesn't sound like you are ready to part with them [handmade dresses]. Get some archival boxes and packing, and pack them away until you decide what to do with them. If you feel so strongly about them, you shouldn't do anything just yet. (Claymouse)*

Claymouse recommended that Ren keep everything, but only temporarily. Packing away her dresses in storage would give her time to figure out what she wanted to do. In this example, Ren followed the advice, and in a post a year later, she decided she was ready to let go of the dresses. However, in the cases where participants chose to digitize their item as a means of dealing with it later, action could be postponed indefinitely.

The use of digitization in avoidance of curation was, for my participants, a distinct move from purposefully digitizing content. Participant Ess, for example, recounted that *"digitizing was just procrastination"* when he reflected on how he handled his collection of 20-year-old journals. Digitization-as-procrastination was primarily focused on translating valuable content to a less burdensome form, so participants could still hold on to as much as possible.

Procrastination was not necessarily detrimental to participants. Having a temporary space was necessary for some participants as an *"intermediate stage"* between keeping and discarding that allowed them time to process through and decide which items had value to them. A participant commented that taking digital photos to preserve important pages of family Bibles, which were used as important genealogical tools in some families and could also contain handwritten personal notes, was more "*sensitive*" to the struggle of many on the forum than advice to simply disregard one's emotions in the process of getting rid of excess books.

*I especially love the suggestion of taking photos of the pieces you treasure e.g. the bible pages is such beautiful sensitive advice for someone having a hard time rather than the old "suck it up" routine lots of other people might do! (E.K.)*

Another participant, Jossie, recounted her experience digitizing her collection of photos, and using the time put into it to reflect on what was important to her:

*So I spent all this time digitizing. And now I realize that at least half of them I am not really interested in saving even in digital form (I probably will save them, since digital space is cheap, but you get what I mean). I think sometimes you need an intermediate stage to allow yourself to let go. (Jossie)*

For participants like Ess, Jossie, and E.K., digitization was a means to defer the active management of their collections to another time, but a time when they were ready to deal with it.

However, in the digital realm, "Deal With It Later" could become problematic when curation is deferred indefinitely. As in Jossie's case, her digital intermediate stage became a de facto permanent storage for her entire collection, whether she thought each item worth keeping or not. Because the focus at the beginning was on saving things to avoid dealing with them, participants might not take the same care in organizing and annotating the content they were saving as they might do for a more permanent arrangement. This can have ramifications later on, as the digital content that is not actively preserved may become more and more difficult to find, access, and revisit the longer it stays in storage (Van House and Churchill 2008; Bentley et al. 2016).

### *Selection regimes*

In addition to their attitudes toward storage, participants' curation decisions hinged on their relationships with artifacts in their collections. People either cherished individual objects that made up a collection, or valued the collection as a whole. When objects were individually valuable, participants evaluated them each on their own merits. However, when objects were valued as part of a larger collection, participants selected artifacts based on relative value in two ways: an artifact's representational ability and its quality.

*Keep Some Representative Examples.* Participants less concerned about specific objects, and more interested in maintaining a general memory or sentiment decided to keep a representative sample of a sentimental collection. In this case, the value of the collection was driven by a particular project, outcome, or general association, rather than the particular value of any one of the

artifacts. An iconic example of this was children's artwork, which parents in the forum discussed at length to try to find alternatives to keeping drawings, paintings, and school projects en masse. In one thread sharing advice on this issue, a parent suggested to *"find a way to create a keepsake product that showcases the kids' art – without the art itself being the keepsake because there really is too much of it. And, because you have a plan in mind, it makes it a lot easier to decide what and how you process all that amazing, oh-so- special art." (rockabilly)*

The collection was important for this parent, but any piece of it was sufficient to stand for the significance of the whole. By creating a product to incorporate some of the art, she created a way to keep some smaller sample that still fit her purposes.

This regime was also used by people who inherited collections from parents or grandparents that they wanted to keep in some way, but did not have room for. Participants would, for example, keep articles of clothing or a few plates:

*I've been hanging onto my grandmother's beautiful china for over 20 years. It has a classic design that still looks good today. I've used it maybe once or twice. It takes up so much cupboard space, I've been considering letting it go. I have begun to think I will keep the small plates as special dessert plates and donate the rest. (MsMonica)*

When participants chose to keep representative examples, they might select artifacts that were, in their mind, truly representative of a loved one or important time in their life. Others simply selected items that were good enough for their purposes – whether utilitarian or project-specific.

*Keep Only the Best.* For many participants, the reduction of a collection to *"only those I'm passionate about" (belle)* was a goal they diligently worked towards. This was very common for the forum participants. *"Weeding out"* those artifacts that might be less valuable, participants would *"ruthlessly pare down"* a collection of artifacts to only a few best or favorites, based on their own personal criteria, often repeatedly evaluating and re- evaluating the worth of an item to them until they could confidently say that it was certainly more precious to them than others, or as Terry put it "*I only keep the stuff that makes me really, really smile." (Terry)*.

Participants might also place artificial constraints on their collections to force themselves to carefully consider the value of the items. *"I chose a box and what didn't fit in the box, didn't stay."*

*(Koala)* The most simple and pervasive forcing solution was to use space as a constraint, limiting themselves to one small box of content, filled with only the best.

### *Display regimes*

Thirdly, participants curated their collections in order to arrange them for display. As I noted earlier, keeping things in storage was not ideal, and in response, participants were selective about what things they kept. But even when a collection had been honed down, at times it was too large to engage with all at once. In this case, participants used several strategies to gradually allow themselves to interact with their whole collection.

*Rotate Through Items on Display.* For participants with large collections and sufficient storage space, another strategy was to keep only a few items in active use at a time, periodically rotating through them. For Jasper24 who wanted to keep the objects on display in his home *"to a minimum,"* when he wanted to display a new artifact, either he could discard something else or he could display it among a continual parade of things.

*I want to keep the décor in my den to a minimum...Now, If I get a knickknack I do like, something else will have to go or I can simply display one item for a while, then take that down and display another. Ideally, I would like to just have one or two simple pieces in the room. (Jasper24)*

In this case, artifacts not currently on display were removed from notice, put in some out-of-the-way storage area such as a closet or basement. This allowed him to keep all his artifacts in his possession and enjoy each of them a few at a time while maintaining his preferences for space.

*Maintain a Special Collection.* In a more specialized curation regime, participants created sub-collections. Similar to rotating through artifacts in a collection, in this regime, entire collections were brought in and out of use. Some collections were localized to place in the house or a special container, such as an album, china nook, or a fireplace mantel. Others were local to a particular time, brought out only during particular occasions. This typically included holidays like Christmas where participants had dedicated material set aside to be interacted with only during that time period, as in (Petrelli and Light 2014). Participant MessHero described a special collection of sentimental greeting cards that were only brought out once a year after Christmas:

*... the one thing we have done is create a box for special cards. It's stored with our Christmas ornaments in a plastic tote in the crawl space. We take it out every year and on the day we take down our tree, we go through all the cards – mostly Christmas cards, but also special birthday and anniversary ones as well. It's a tradition... (MessHero)*

Creating specialized collections preserved the specialness of artifacts, as they would be accessed only on special occasions. As MessHero described, specialized collections might also acquire some ritual or tradition as participants further marked the specialness of the interaction with this distinct set of things.

In their study of family rituals, Petrelli and Light (2014) noted that putting up and taking down specialized Christmas decorations marked the beginning and end of the "performance" of a family's Christmas rituals. Putting decorations back into storage was a phase that transitioned families back into their everyday, "mundane life." Just as interacting with special collections enabled families to set apart a particular period for special activities, the ritual likewise served as a purpose and time for my participants to arrange and attend to certain of their sentimental artifacts.

In summary, curation regimes are, as I stated above, patterns of curation practices and everyday work for my participants. The regimes help explain how people choose to store, select, and display their sentimental artifacts. Again, I note that these regimes were often combined or enacted differently across various collections. These patterns reflected a participant's attitude towards the artifacts and the memories they represented.

While I have described these regimes as participant's own curatorial preferences, there were several important additional factors that influenced how and why people curated their content: the social context, materiality, and temporal changes.

## The Influence of Social Norms

Adding to their personal values and situated needs, people were deeply affected by their social arrangements. In addition to their own emotions and introspection, participants often had to consider their familial context when making curation decisions. As Kirk and Sellen (Kirk and Sellen 2010) noted, many different family members might have an emotional attachment to the

same artifacts. When that sentiment differed among individuals, the handling of the sentimental artifact could cause family tensions and disagreements. These tensions reflect the agential pulls of givers and receivers of inherited memory artifacts.

Participants described curation as a process influenced by social pressure, subject to social expectation, or dependent on others to fully carry out. I explicate these social tensions through three kinds of situations: dealing with artifacts that symbolize important social relationships, managing inherited artifacts still under shared control, and handling artifacts that are distributed socially.

### *Relationship symbols*

Artifacts that symbolized important social relationships were often a contentious topic for participants. A perceived lack of regard for the artifact and what it symbolized could cause tension. For example, Scout recounted her difficulty in curating a collection of mix tapes her husband had given her while dating. For Scout, the mix tapes had lost their original sentimental value. She had preserved the content, which was important to her, but she no longer wanted to keep them in physical form. However, her husband still assigned meaning to the physical objects, and discarding them seemed to him like a disregard for the past of their relationship.

*...I have a bunch of mix tapes he made for me in high school. It was a sweet gesture, and I appreciated it, but it's time for them to go. All my music is digital now, these are duplicated, and we longer have a tape player anyway. They serve no use. You'd think I was shooting him through the heart by mentioning this. He says things like "Doesn't our past mean anything to you?" (Scout)*

When interacting with a collection that holds shared sentimental value, Scout could not make curation decisions based on her sole preferences. She had to account for how her husband would perceive and react to her handling of the mixtapes. Scout found herself to be a steward of this collect, rather than an owner. For some participants, the sentimental artifacts might ostensibly belong to themselves solely, but nonetheless, they could feel pressured by family to give account for their curation actions.

### *Inherited artifacts*

Another common example of the social tensions around sentimental artifacts were the negotiations around handling heirlooms. One generation might attach value and significance to an object, and, as part of their curatorial processes, gift it to another in their family. However, the recipient might not have the same regard for the object.

VickiC recounted the history and burden of a cherished heirloom rocking chair that had been passed down from her grandmother, to her mother, and now to her. VickiC's mother cherished the rocking chair and expected it to be similarly valued by her daughter and handled with special care.

*I have a rocking chair that my grandmother rocked my mother in when she was a baby. My mother gave it to me...I couldn't say no. Even as a little girl, she talked about giving it to me when I had my own home. (VickiC)*

From the giver's perspective, it might appear to be an act of generosity to *"bless"* other family members with their excess or unwanted artifacts. However, the inheritors might not share a sense of the value of the artifact or agree with how it was to be handled in their care, if it were to be kept at all. VickiC continued her story, sharing that she only planned to keep the chair until her mother was no longer around to care what she did with it.

*I resent that chair. ...I wish I could have sold it ... but I was too afraid she'd want to see the chair again. (VickiC)*

Tensions arose as people in a shared curatorial relationship, by choice or not, disagreed on how a sentimental artifact was to be handled. In some cases, the artifact featured in several people's memories and each of them had opinions on how it should be considered a symbol of a relationship or continuity within a family, but held particular significance only to one member and not to others.

### *Distributed collections*

A third social situation arose when multiple people had parts of the same collection. In her post, Kim described her strategy of giving away some of her antique items inherited from her grandparents to some of her family members. For her, giving away some of her heirlooms to

other family members allowed her to reduce some of the burden of keeping a large collection, while not actually having to discard the item.

*Much of what I have is antiques and they really are lovely but I just have too many dishes, figurines, etc. I do know there are other family members who don't have any tangible memories of our grandparents and so sharing these items not only reduces my load but blesses them as well. (Kim)*

In some cases, this strategy worked out fine. Yet in other cases, as I pointed in the examples above, the coordinated care of this distributed sentimental collection comes with its own, primarily social, costs and challenges. Participant Sulim summed up the tensions in navigating this shared handling of a distributed collection of sentimental artifacts, saying "*The fault doesn't really lie with the objects or even with the question of keeping them, but with the uncomfortable family dynamics that get brought up when one person is designated keeper by the other people who 'want' the stuff but don't want to be inconvenienced by dealing with it.*" *(Sulim)*

Sulim referred to being "designated keeper" as an inconvenience of unwanted responsibility. Curation can be an individual and personal process, but it can also be bound up in social norms and familial expectations, becoming a negotiated process. The reality that younger generations might not value or want to inherited family memory artifacts was a key worry of older adults in previous chapters, and in the literature. When these conflicts arise, the survival of the artifacts often depended on the ability of the object to be repurposed or somehow integrated in some other way into a recipients' life.

## The Importance of Materiality

### *Focusing interaction*

Physical items appeared to have two important characteristics that helped people place and attend to their memories. First, physical objects have affordances that enable interactions important for people's reminiscing. Second, physical objects serve to focus one's attention on specific times, places, and people. In the following excerpt, Marge describes interacting with a box of her deceased grandfather's old clothes:

*…my grandfather passed away a couple years ago. I have a box of his clothes that I cannot bear to part with because when I open the box, it smells like him. (Marge)*

The box of clothes did not contain a particular memory for Marge, but drew her into the remembered presence of her grandfather. In keeping the box of clothes, she was not holding onto the clothing per se, but the sensory experience that could only be evoked when coming in contact with the clothes. She goes on to explain that she kept the clothes in a very specific manner in order to maintain the evocative smell and to shape her encounters with it:

*I don't go looking for the box, and when it is out of sight it is out of mind. However, when I do come across it, I always open it.... In fact, I've kept them boxed up all this time so that they wouldn't lose his scent. I know it might sound strange, but it is comforting to me. (Marge)*

The sensory experience of going through the clothes, as well as the locality of the box containing, and at times, obscuring the collection all came together to create a unique memory for her.

Having a physical item can bring back additional memories and facets of those memories, as opposed to relying solely on recollection. In addition to being more evocative, the physical nature of memory artifacts can serve to focus one's attention on specific places, times, and people, as MadeleineM pointed out:

*There are a few other things that I've kept that remind me of him strangely (like the car emergency kit he gave me when I turned 18). (MadeleineM)*

Participants found foci in a variety of their material artifacts, from dishes that reminded them of their mother, to baby books and infant boxes from their children. Some people had general memory boxes, which stored a variety of memorabilia. Still others had specific collections, like Christmas boxes that contained family mementos such as old Christmas cards and ornaments.

The visibility and locality of a physical object drew attention to memories that those participants wished to foster, reminisce about, or honor. Placing memory artifacts, therefore, is part of the curation process for these participants.

### *Repurposing the Material*

As well, sentimental artifacts with an additional purpose were more likely to find a place in participant's homes and lives. When participants appreciated an artifact and wished to keep it despite its lack of purpose, they would often transform it, either in whole or part to give it a

renewed purpose. The process was an attempt to reshape artifacts that were un-keepable in their current state, to fit them into the material environment of a home and into the life of the owner.

For example, Wendi shared how her partner's mother melted down some sentimental jewelry into new pieces that she and her daughter could wear and be reminded of her grandmother often.

*My partner's mother had some inherited jewelry that was unwearably old-fashioned but had a lot of sentimental value, so she took it to a jeweler and had it all melted down and refashioned. The best stones went into bangles for her and her daughter…[We] wear the new jewelry regularly. It reminds her and her daughter of the grandmothers they loved. (Wendi)*

For this family, being able (and willing) to use the jewelry in their everyday lives was more important than maintaining its current form. They prioritized the sentimental value attached to the jewelry and decided to use the material to create a new set of items that they could share and wear often. In this case, they created items with a similar purpose to the original by creating more fashionable jewelry. Another participant trying to reduce a large collection of souvenir t-shirts amassed from all her life experiences and travels decided to reuse the cloth material of the t-shirt to create completely different objects:

*I have 3 strategies 1) get fewer souvenir t-shirts 2) make shopping bags from the old t-shirt and 3) I am currently making a Gee's Bend/modern style quilt with my old college t-shirts. (greenGal)*

Creating new artifacts out of old ones was a popular strategy that craftier participants employed to make a collection more manageable. Many appropriated long-standing re-use traditions, such as quilting, to guide their renovation efforts. In addition, having a concrete goal of creating a keepsake helped participants distill their collections by providing a set context of use.

Repurposing an artifact or collection was a strategy participants enacted to add functional value as well as to compress large and unwieldy collections. These material practices were in some cases more preservative that digitization. While both changed the form of a memento, digitization kept only the trace of an artifact's existence, retaining a shadow of its physical form and none of the physicality that made it useful. On the other hand, in repurposing, artifacts were re-envisioned as a useful item or set of items, intimately linked to the original memory through a

shared material base. Further, materiality afforded for flexibility in use and appropriation even as the memory associated with an artifact changed over time.

## Curation Changes Over Time

Participants' personal valuations of their memory artifacts were not constant. They changed over time, and this in turn changed their view of how these artifacts should be handled. The dynamics of shifting identities and the evolving meaning of sentimental artifacts was most salient in the forum when participants described rediscovered artifacts they had kept from their psychologically earlier selves. Participants continuously re-assessed the value of their memorabilia against their changing life history, current identity, social contexts, and activities.

### *Changing emotional valence*

Curation might shift because of the changing emotional valence of an artifact, for example negatively with photographs containing people who had harmed them or with shared sentimental objects after a divorce. Alternatively, some participants reported growing closer to memorabilia after deaths in the family.

Change was very common for participants. To refer to my earlier findings, many participants enacting a "Deal With It Later" regime demonstrated this shift. When they were unable to deal with emotionally charged artifacts, usually those with negative valence, they would wait for some time until the intensity of the emotion faded or the valence shifted into a more positive memory.

### *Reflecting Past and Current Identity*

Participants' current identity was also an important consideration in their curation, as participants juxtaposed their current self-identity against the memorabilia of their earlier lives. As I discussed in Chapters 4 and 5, shared memories were often shaped by an agenda that was externally or intimately performative. This data shows that keeping and discarding memories could even be a performance of identity to oneself. In a particularly illuminating set of posts about how to deal with old diaries and journals, participants discussed their tensions with keeping things of sentimental value that they felt no longer represented their personality.

Some discussants preferred to purge their sentimental artifacts of anything that was not currently representative of their identity. For example, participant Alten found 20-year old diaries that had been stored away, and felt immediately obliged to destroy the contents, since his younger perspective was different than his current way of thinking:

*I recently rediscovered 10 years worth of paper diaries I had kept through the 90s, and was filled with horror realising I still had them. A brief glance through the pages caused me to cringe at my former perspective, and I immediately wanted to shred them. (Alten)*

The thoughts of Alten's younger self were an unwelcome stowaway in his home. Participants like Alten were uncomfortable with contradicting their current identities and worried that others would misinterpret these anachronisms. Alten continued:

*I keep thinking how I'd hate to die and have these diaries left behind as a record of my thoughts – and that's because thoughts evolve and old diaries are no longer an accurate reflection of my thoughts and feelings. (Alten)*

Those who preferred to purge felt that their "old history" was no longer an accurate representation of their current personality and state of mind. They preferred to keep only those artifacts that were an accurate reflection of their contemporary identity.

Not all participants reacted negatively to encountering their past identity. Some, like Zigzag, thought it was important to keep the journals of her youth, as they served as a record of her past:

*Oh, I could never get rid of my own journals!... It's a fascinating document of my late teens through university. Some of it just makes me cringe mightily, but I could never throw them away. (Zigzag)*

Although the juxtaposition of her past and present was uncomfortable, the value of Zigzag's journals did not change. Whether choosing to purge or to keep a record of their past identity, participants considered the audience that would be privy to what they left behind. This awareness echoes the tradeoffs of privacy that participants grappled with in Chapter 4 as they weighted the cost of baring their intimate thoughts to unknown descendants against the value these memories might have for the future.

## SUMMARY

In summary, in my analysis of the major themes and insights into curation behaviors that characterize how people react and respond when they have "*too much stuff*," I found that curation of sentimental content is effortful, not only because of the time, but also because of the emotional burden of curating memory. Nevertheless, participants felt it was an important process to continually engage in, even when they were not overwhelmed by excess, because the purpose of sentimental artifacts could only be fulfilled when they were given the proper attention.

To curate their collections for an appropriate level of attention, participants enacted curation regimes based on their attitudes about storage, relationship to individual artifacts and the collection as a whole, as well as the intended display and use for their artifacts in their homes and lives. When unwieldy collections that participants wanted to keep did not fit into their current home, they might also repurpose the artifacts in ways that integrated it more naturally into their lives. The material nature of the artifact was often used to facilitate re-purposing.

Interwoven throughout participants' deliberations were decisions about how to deal with the changing sentiment associated with their collections over time, as their identity and circumstances changed, as well as how to account for other social and interpersonal influences that directed their actions.

In the following section, I discuss curation as a set of attention-directing processes and provide implications for designers of next-generation digital memory artifacts and curation support systems.

## DISCUSSION: CURATING ATTENTION

In my findings, I outlined a number of ways that people select, arrange and adapt their large collections of sentimental artifacts and their underlying reasons for doing so. I note that with an "infinite basement" of digital storage, curation decisions need no longer be based on limited space, but instead are based on the need for attention. As Simon (Simon 1971) pointed out, when space is unlimited, it is attention that becomes the scarce resource. Participants put their effort into maximizing the attention they were able to pay to the artifacts in their sentimental collections. Attention was the focus, whether they were strategically leveraging their storage

spaces to hide or put away things that were not appropriate or needed, or carefully selecting artifacts to hone down a large collection, or crafting meaningful ways to display and interact with their collections in their homes.

## Leveraging the "Infinite Basement"

For physical objects, storage and attention are often intertwined. Objects that can be attended to must also have storage, and deciding about limited storage is based on what is worthy of attention. For digital objects and with an "infinite basement," this is no longer true.

One way to reconsider the relationship between storage and attention, is to consider that for some participants, storage served as a background staging area, allowing them to bring things in and out of attention. When some participants needed time to process the emotional significance of an artifact, storage was intentionally short-term and served as an intermediate place where they could defer dealing with highly charged artifacts. For others, storage was a temporary but indefinite holding area as participants struggled to find an appropriate means and timing to discard artifacts they did not want to display or keep. Yet others, with enough storage and large enough collections, rotated important artifacts in and out of storage, bringing those selected artifacts into display.

Artifacts intentionally kept in storage were not simply "*boxed up*" and unused. This is hopeful for addressing the problems of digital storage found by Marshall (2008). I see that storage can be a useful waypoint for enabling and encouraging curation. For designers, a challenge then is to conceptualize digital storage both in design models and in users' mental models as more than a convenient dumping heap (which it might be for some collections), but also as an active and dynamic repository of artifacts destined for display and interaction. In Chapter 8, I explore how tangibility can lend interactivity and flexibility to facilitate the construction of a narrative inheritance.

## Placing and Arrangement

Other researchers have noted that the arrangement of sentimental artifacts in people's homes symbolizes participant's personal and familial identity and their relation to others (Petrelli,

Whittaker, and Brockmeier 2008; Kirk and Sellen 2010). I call out this notion of arrangement, and propose that it is not simply an aesthetic or symbolic practice but also one fundamental to how people order and manage the artifacts themselves.

The ways participants were able to place, arrange and re-purpose artifacts in their collection stemmed largely from the materiality of the artifacts they worked with. I believe this finding opens a promising new design space for digital curation systems. In previous research on creating "*cherishable*" digital artifacts (Golsteijn et al. 2012) and technology heirlooms (Odom et al. 2012), physicality was shown to be beneficial for artifacts for reflection and reminiscing. However, the value beyond the simple evocativeness of embodying collections of digital mementos has yet to be explored.

Translating "born digital" traces into a physical form can enable people to better engage with their large sentimental collections to curate more meaningful memory artifacts by taking advantage of users multi-modal and multi-sensory abilities, lending corporeality to digital traces, and providing a platform that merges into the material environment of their homes. It is quite possible that learning how to "place" digital memories will be a necessary step in understanding how to deal with the onslaught of digital capture and the expansion of digital storage in constructing usable memory artifacts. In Chapter 8, the design of Scatter leverages the affordances of materiality to help participants make sense of large collection of digital artifacts through the placement and arrangement of representative physical tokens.

## Navigating Shared Ownership

While arranging artifacts around their homes was a way for participants to enact their own identities and relationships, it could cause tensions when their perspectives were not aligned with others. In her study of grandparents, Lindley (Lindley 2012) noted that people with heirlooms and other memory artifacts in their possession considered themselves as stewards and caretakers of certain sentimental artifacts, and thought that the family shared ownership of these items rather than any individual.

In many contexts, a person in possession of a physical artifact is accorded the most privileges and an assumption of final authority. However, I saw that participants could be heavily influenced in

how they handled their collection by the opinions and desires of others, even against their own preferences. A person's curation behavior regarding a family's shared artifacts could be markedly different than how they treat other, more personal artifacts.

Dealing with physical artifacts in situations of stewardship and shared ownership, where no one person can lay exclusive claim to a particular artifact, has necessitated extensive social practices to establish ways of dealing with conflict in the material world. Explicit permissions are rarely defined, although as I saw in my data, implicit expectations can be articulated. Tools to help people with the curation of digitally mediated memory will have to consider how to translate this stewardship model suitably to a digital context, where digital artifacts can be easily distributed and even duplicated in ways no feasible in the physical realm.

In my future work, I will further explore the tensions in shared and collective memory as it is mediated through in representative artifacts, in an endeavor to develop a design approach sensitive to conflicting values inherent in shared ownership. In Chapter 7 and 8, I pay special attention to how the dynamics of control become embedded as values in digital mementos shared among multiple users.

### Responding to Changing Sentiment

Participants repeatedly emphasized the dynamic nature of curation. Though they might arrange the artifacts in their home and navigate social dynamics in a certain way at present, their curation strategies were not static, but shifted and evolved as they and their social worlds changed over time.

Memory researchers in HCI and CSCW have begun to adopt the perspective that memory is a dynamic process, an ongoing productive accomplishment as people by themselves and in groups reinterpret the past in light of present circumstances and identities (Lindley 2012; Olick 2008). This perspective allows me to account for the dynamics of memory and emotion in curating large collections of sentimental artifacts, especially in considering how and why the sentiment of artifacts changes over time.

A key challenge in incorporating change into the design space is that sentiment does not change for every person in the same way. People may have different impressions of a shared past experience (Zhao, Schwanda Sosik, and Cosley 2012), and my data show how these impressions may also evolve differently based on each individual's changing context and personality. A shift in sentiment may also signal a shift in the valence of the memory itself, and can be dramatic – for instance a happy memory might suddenly become quite painful after a loss – and this shift in sentiment may not be shared among all the people who share a particular memory. Systems that facilitate communal recollecting from traces of the past will need to consider tailoring experiences for people with mixed and at times conflicting preferences.

As designers work to create technologies active in an emotional design context such as memory, they must take into account not only differences in sentiment, but also how sentiment changes over time and for different people. Systems designed to create and enhance shared digital memory must be able to address diverging perspectives, both internal to an individual and among different users, to adequately support and mediate these complex contexts.

## CHAPTER CONCLUSION

In this chapter, I addressed the question of how people deal with an overabundance of sentimental artifacts. A key difference between traditional, physical mementos and digital mementos is the scale of abundance. With digital media, people can and do keep thousands—even tens of thousands—of artifacts with some sentimental value to them. The huge amount is often overwhelming, and thus many of these artifacts are never revisited, or rarely so. This analysis provides several lessons for designers to help people begin to usefully manage their large collections of digital mementos.

One of the main lessons learned is a better understanding of why curation at scale is a wicked problem for design. Curation practices of participants in this study revolved around shaping collections to focus attention. People's decisions about where and how to focus attention were predicated on an understanding of why an artifact was significant, a personal judgement by the current owner, and how it might be used. But as I saw in this study, each of these judgements were situated: they happened at a particular moment in a person's life when their perception was

influenced by their knowledge, experiences, and current identity at the time. Curation is further specialized by purpose. The organization and selection decisions that shape a collection are activated and directed by the memorial project in which a person is engaged.

Materiality is a central enabler of many of these curation practices. I argue the stronger point: that materiality is essential to manage collections of memory artifacts to prevent overload. The properties of the object itself, from its aesthetic to its function, influence how it was regarded and how it is incorporated into participants' practices of selection, storage, and display. Prior work, such as Kirk and Sellen (2010), Banks, Kirk, and Sellen (2010), and Golsteijn et al. (2012) among others, clearly point to the importance of physical object features for helping people fit memory artifacts into their daily lives. In Chapter 8, I further explore ways to both leverage the physical object features of family memory through the use of tangible design.

The attention-directing curatorial management of memory artifacts is difficult, because these practices are what Suchman refers to as "situated actions." Their articulation is dependent on the context in which they are enacted. As such, they are difficult to fully account for through design because there are practical limits to what aspects of the social situation a design can incorporate in its model of the world (Suchman 1985). To make matters more complex, the wicked problem of anticipating the needs of future audiences interacts with the problem of curation when the "project" is to prepare a narrative inheritance for future generations. The design framework presented in Chapter 8 discusses a potential strategy for accounting for the needs and preferences of future users in unknown contexts, even when interactions are asymmetric.

A second lesson is that individual models of personal digital archiving are insufficient to account for the social dynamics of managing digital mementos, especially when these are part of a narrative inheritance. Curation decisions are complicated by social considerations, and can be understood under a model of stewardship rather than ownership. In a stewardship model, curation is not only an internally motivated decision. A model of inheritance expands the shared-ownership dynamics of stewardship to consider the actions and preferences of past and future stewards. Curatorial decisions in this model can be in response to another's curatorial decision, rather than one's own preference. Further, the dynamics of giving and receiving are influenced by

the attitude of the participants towards the interaction. It can be perceived as privilege (to the recipient), reflect trust (from givers), or become a burden (if unwanted).

The complexity of curation and its constituent practices and values presents a strong case for considering it a distinct activity of memory, rather than a sub-process or preparatory step to other activities. Yet, it is also an activity that is rarely motivated and carried out for its own sake. A challenge for future work in family memory technologies is to develop curatorial systems for the infinite basement that acknowledge the shared and social nature of digital memento management decisions and help people to effectively direct attention within large amounts of highly emotive and temporally dynamic artifacts. A key takeaway from this study that informs my future work is the importance of materiality in lending a socially recognizable interactive platform to help draw attention to, select, place, arrange digital memory artifacts in a collection.

# CHAPTER 7 – KIDKEEPER: EXPLORING INTEGRATED CAPTURE OF CHILDHOOD MEMORIES

## INTRODUCTION[7]

Previous chapters have outlined a number of challenges for technologies which mediate a narrative inheritance. One of these challenges, understanding and designing for multiple users, highlights that family memory is a collective endeavor, but not necessarily collaborative. The study presented in this chapter proposes and evaluates a design, KidKeeper, which aligns the interests of multiple users, parents and children, towards a common activity: capturing moments of everyday life. KidKeeper, a toy developed by David Merritt, presented an intriguing opportunity to interrogate the tacit values that families enact when trying to capture candid moments and how these might translate into design.

The everyday life of a young child contains moments both quotidian and remarkable to their parents. The impromptu moments in a young child's life can be difficult to anticipate and often sensitive to the disruption of recording. Even parents who are vigilant and quick enough to reach for their favorite recording device may find the child not being their natural self, instead acting for the camera. On the one hand, turning on recording devices often interrupts impromptu playful and other memorable behavior. On the other hand, while capture technologies may reduce the burden on parents by passively capturing everything, they also come with the accompanying baggage of privacy and surveillance concerns as well as content overload (Sellen and Whittaker 2010).

[7] Adapted from J. Jones, D. Merritt, M.S. Ackerman, "KidKeeper: Design for Capturing Audio Mementos of Everyday Life for Parents of Young Children." In Proceedings of CSCW2017. Because this chapter represents collaborative work with David Merritt, I will use "we" to discuss the research findings and analysis.

To examine the potential design considerations for a solution, we designed KidKeeper, an audio recording and playback system embodied in toy-like form (Figure 4) to augment and enhance a family's "spectrum of capture possibilities" (Mols et al. 2015). In a weeklong deployment study and interviews with seven families, we sought to understand what intrigues parents about the everyday moments of their young children's lives, and parents' and children's reactions to the design of a system embedded into their everyday activities.

Our study of KidKeeper provides two main contributions for the design of collaborative systems for family memory. First, it provides the design and evaluation of system solution that offers what we call "integrated capture," to preserve these kinds of everyday family memories. Second, our study provides an understanding of the design considerations and challenges in aligning the interests of multiple users of a system and preserving "the moment."

**Figure 4. KidKeeper in use by two cute 4-year olds. (Photo courtesy of David Merritt)**

In the following sections, we will briefly introduce related work in HCI on unobtrusive capture and audio memories that informed our design. We then describe the KidKeeper system, our design assumptions and rationale, and findings from a week-long deployment of KidKeeper. In our discussion, we examine the values at work for parents capturing memories of their young children and consider the implications of the design approach of integrated capture for families capturing new memory artifacts for their future.

## RELATED WORK

## The Importance of Everyday Moments

Particular attention in HCI and CSCW has been paid to understanding the sociotechnical context of technology-mediated family memory. In a study asking families to build time capsules for themselves in the future, Petrelli, van den Hoven, and Whittaker (2009) found that mundane, everyday traces of life were just as important as significant events for families to keep for themselves for the future. In an in-depth study on everyday memories, Mols, Hoven, and Eggen (2014) argued that everyday life should be a focus in designs for remembering, because the everyday could become "special", not only pre-determined special occasions. Further, "unanticipated memories," those unpredictable moments in daily life that grow unexpectedly significant over time, would not, by definition, be intentionally captured by families. Therefore, specialized design would be needed to create mementos of the everyday due to this hidden, emergent value.

In this work, we explored preserving these unanticipated memories by embedding a device into the everyday fabric of children's playtime with a toy-like device. We then had parents reflect on the content created by their children in these playful interactions to better understand what parents seek as they capture the everyday lives of their children.

## Previous Attempts to Capture the Everyday

Sellen and Whittaker (2010) differentiate two main classes of capture technologies for people trying to unobtrusively capture memories of everyday life: total capture and situation-specific capture. An example of a total capture system is SenseCam (Hodges et al. 2006), which is a wearable camera that passively (without direct user input) takes pictures to a collect a visual log of one's everyday activities. The idea behind SenseCam, and market technologies that draw on it (e.g. NarrativeClip[8]), is for wearers to capture continuously and "never miss a moment." While Sellen et al. (2007) found that SenseCam's passive capturing was an effective memory trigger on par with manually-captured pictures, the sheer amount of footage, variable quality of the stream, and lack of indexing made it difficult for users to return to significant memories. Thus, Sellen

[8] NarrativeClip website, http://www.getnarrative.com. Accessed 28 August 2017.

and Whittaker argue that designers should avoid total capture and, instead, to be more selective by focusing on areas users want to remember the most.

The second class of capture systems is situation-specific. These capture systems attempt to incorporate more of the intentionality of manual capture into passive logging systems, while still ensuring that significant events are not missed. In one example of a situation-specific capture system, designed for caregivers of children with autism, Hayes et al. (2005) incorporated active input to a passive recording device by requiring caregivers to declare when they wanted to save logs. Users had to activate saving, and the system retroactively saved the last few minutes of footage. This type of design approach is still inappropriate for the context of impromptu family memory because it requires people to anticipate what is about to happen or to immediately recognize that something of interest is occurring. As we saw in the chapter on curation, it is very difficult for families to anticipate a future circumstance and to evaluate the future value of a memento in the present.

We build on these approaches by proposing an "**integrated capture**" strategy, where interaction with objects that are a natural part of the activity initiates capture of that moment. This combines capture with the approach of "unremarkable computing" which theorizes that embedding systems into existing activities and practices is the key to seamless integration of technologies in everyday life, especially in the home (Tolmie et al. 2002). Our design of KidKeeper demonstrates this strategy by combining two activities of families – children who want to play with an object and a family goal of capturing memories of everyday life – into an integrated capture mechanism.

## Audio-based Mementos

Prior research has shown that audio is an engaging medium for mementos and could be especially useful for parents of young children. In a study on the value of sound in the home, Petrelli et al. (2010) found that audio evoked deeper reminiscence and emotional response that other sensory experiences because sound drew the listener more into the recorded moment. The activity of capturing audio is also less likely to intrude and disrupt the moment than other forms of capture, because devices can remain unobtrusive, even hidden, and require minimal interaction

to operate fully (Mols et al. 2015; Oleksik, Frohlich, Brown, and Sellen 2008). Oleksik and Brown (2008) found that among audio recordings of home sounds, the recordings of children were "prized the most highly of all recordings"(ibid, p. 167), but parents in their study were unable to effectively capture them. Thus, much of the valuable soundscape of the home was found to "have some special meaning, yet are rarely recorded, and as such are 'lost'" (Oleksik et al. 2008, p. 1425).

Our study adds to this work by recasting the creation of family audio memories as an enjoyable activity for young children, and thereby lowers the burden for parents who wish to preserve valuable everyday moments in their young children's lives. While there are several audio-based toys and commodity audio capture and playback systems on the market, none are specific to family memory. The popular *Talking Tom*[9] mobile app records audio that is not the user's actual voice. *Hello Barbie*[10] uses only guided conversations for interaction, which we felt would unnecessarily limit the types of recordings children might make, and it does not provide easy access to archived content. *Cloud Pets*[11] requires parental involvement to share or play back audio messages, which we believed would limit the amount of spontaneous, independent play by children.

## SYSTEM DESIGN

Imagine the following scenario:

*Sarah is four, and her parents are listening to her playing, spinning her characteristic fantastic tales of adventure with her stuffed horses. Her mother remarks that she wished that they had some way of preserving these everyday fleeting moments to look back on later.*

Using this scenario, now Sarah interacts with KidKeeper, a stuffed frog (see Figure 1), by holding the frog's tongue while telling her story. Sarah releases the tongue when she is done, and the stuffed toy plays back what she just recorded. Pleased with her recording, she is eager to hear other ones she has made. She presses and releases the frog's tongue quickly, which plays a

[9] http://talkingtomandfriends.com/tom/
[10] http://www.mattel.com/
[11] https://cloudpets.com/

random audio snippet she made yesterday. This gives her an idea for another recording, and she proceeds to make another.

In order to capture these moments without disrupting them, an integrated capture approach is needed. Underpinning KidKeeper's implementation decisions are design rationales informed by prior literature and our intuitions. KidKeeper was designed and constructed according to three design assumptions:

1. Children can spontaneously and independently create their own content,
2. Parents can enjoy this content with minimal effort, and
3. The technology can mitigate the risk of privacy breaches that might concern parents.

We therefore designed a custom system, with the second author carrying out the system design and implementation. The two main components of the KidKeeper system are a child-facing toy and an Internet-connected cloud server. A stuffed toy houses a Raspberry Pi (rPi) with wireless network connectivity to an Amazon Web Service cloud server running Ubuntu. Audio is recorded using an USB microphone. We used a capacitive touch sensor to initiate recording and playback, and an USB-powered speaker plays the audio. This system receives wired power from a wall outlet.

We have already presented our general approach of integrated capture, combining embedded interaction with capture. Below we detail some of our specific design assumptions and considerations and the requirements that these design assumptions imposed on KidKeeper.

## Promote Spontaneous, Authentic Play

### *Design rationale*

Our intention was to enable very young children (ages 2-7) to create unmediated audio recordings themselves, because we felt this would reduce the parent's burden on capturing these moments, especially the need to anticipate these moments. We believed this activity would be encouraged if children could record audio spontaneously, without help, and in a fun way. Oleksik and Brown (2008) found audio to be ideal for this situation, noting that children are "less likely

to show off or get shy if an audio recorder was used" instead of video. Helmes, Hummels, and Sellen (2009) discovered that children were willing to interact with a capture technology when it was embedded into a *life-like* object. Petrelli et al.'s FM Radio (2010) project also found that *embodied* digital mementos were an effective way for families to access 'sonic souvenirs' from previous recordings. We wanted to draw on this idea of having a *tangible* way for the family, especially children, to access audio recordings, even if the access is limited to *random playback*. If such a life-like embodiment is *simple* to use, *interactive*, and *engaging*, then we expected children to accept it and integrate it into their natural playtime activities.

### *Implementation*

KidKeeper is embodied as an oversized stuffed animal that is friendly-looking with visible facial features. The touch sensor is embedded in the animal's tongue. The fabric enclosing the touch sensor is of a different color to emphasize where to touch, and the location of the sensor is easy to grab with small hands, making KidKeeper simple and intuitive to operate. Since children have to be within arm's reach to make a recording (by pressing and holding the sensor), it forces them to be close and almost face-to-face with the toy. Not only does this promote a sense of talking to and hearing from a friendly, life-like object, but it also ensures that young children are close enough to the microphone to be heard. Audio playback, combined with the life-like embodiment, help make KidKeeper interactive and engaging.

## REDUCE PARENTAL EFFORT TO ENJOYMENT

### *Design rationale*

We believed that constraining the recordings to a short duration would make listening to them less time-intensive and therefore more accessible for parents. Oleksik and Brown's work with Sonic Gems (2008) supported this intuition, where they concluded that users like *short* but significant audio 'snippets', or 'gems'. We also assumed *pushing* audio content to parents in a non-obtrusive way might be an effective delivery mechanism, similar to how Hsieh et al. 'pushed' sound media via phone calls to users of their SoundCapsule system (Hsieh, Liang, and Chen 2011). As well, Peesapati et al.'s (2010) Pensieve system emailed memory triggers (i.e., text

questions) to users once per day, which they found to be an effective delivery method and reasonable frequency for memory triggers.

### *Implementation*

We limited KidKeeper recordings to a one-minute maximum duration. Oleksik and Brown (2008) concluded that users like short but significant sonic 'gems', but it was unclear how short they meant. In our own preliminary studies, we found a vast majority of child-generated recordings were less than a minute. From this, we assumed a one-minute cutoff on recordings would be long enough to result in valuable snippets of sound but short enough to be engaging to the parents listening to them. Building upon Peesapati et al.'s (2010) emailer strategy, KidKeeper automatically emails one audio recording to parents each day. The cloud server keeps copies of all recordings (sent from the toy via secure copy), and a Python script on the server emails one audio recording once per day. From a pre-study, we determined that longer-duration recordings were more likely to contain interesting content, so we decided to email the longest recording that had not yet been sent; in our field study, this worked well. The auto-delivery of email is meant to be a "free" benefit to parents—they exert no effort to capture audio, yet they receive an audio recording created by their child. The delivery mechanism also acts as simple filter to select higher quality content, an important feature for accessing potentially large collections of digital content.

## Reduce Audio-based Privacy Concerns

### *Design rationale*

Naturally, recording children's activities, especially without adult supervision, brings forth privacy concerns in the form of accidental disclosure of private information, either from background speakers or the children themselves. We did not believe that we could eliminate all privacy concerns with child-generated audio content, but our intention was to significantly reduce these concerns. We assumed that enforcing active recording, where it takes a deliberate act to initiate a recording, would substantially mitigate privacy concerns parents might have, and also give children more agency in recording only when and what they wanted to. By preventing always-on, surveillance-like recording, we believed we could avoid many scenarios where people are caught

unaware or have forgotten they were being recorded. Lastly, we tried to mitigate concerns by giving parents complete control over what was sent to friends and family, and by securely transmitting the audio to a private server. Prior work has suggested that parents might assign less risk to recordings when content is not shared or publicly available (Dib, Petrelli, and Whittaker 2010).

### *Implementation*

KidKeeper records audio only when the touch sensor is pressed—the physical interaction makes the act of recording or initiating playback a deliberate one, thus decreasing opportunities for accidental privacy breaches. Two other design decisions, which have already been discussed, should mitigate privacy issues as well: limiting the length of recordings to one minute, and playing back the recordings. Limiting the length would reduce the amount of exposure, and playing back the recording would give the user an opportunity to recognize that such a recording occurred. Storing the audio files on a cloud server meant we had to secure the data transfers, as well as general access, to the server. All transmissions from the toy to the server were encrypted using Linux's secure copy utility, and we restricted access to the server to the research team only.

## FIELD STUDY FINDINGS

We deployed KidKeeper to seven households, each with at least one child between the ages of 2-7. These seven families participated in a weeklong deployment, with semi-structured interviews at the beginning and end of the deployment. The goal of this field study was to evaluate the efficacy of the design—whether KidKeeper was able to proactively preserve the everyday moments of young children's lives—as well as to draw out the underlying values of parents who wanted to capture "everyday" memories of the children. More details about participant selection and characteristics and data analysis methods can be found in Chapter 3.

The foundation of KidKeeper's design as a means to capture unprompted and unscripted audio recordings is that children would relate to our device as a toy rather than as a capture device. On this point, KidKeeper appeared to work. In Table 1 we see that the children in each family

recorded a number of audio clips. Parents noted that their children's interactions with KidKeeper were *"like most toys"*.

In the following sections, we report and discuss the findings drawn from interviews about what parents want to capture about their children, and what we learned about designing to support parents in capturing authentic memories of their children.

## Getting an Authentic Glimpse of Their Children

In our pre-deployment interviews, our parents described many forms of keeping memories of their children, from taking photos, to filming videos, to saving artwork sent home from school. Parents primarily kept artifacts that represented some aspect of their child's personality, and wanted to be able to capture a candid, "*authentic*" view of their child at that time in their life. The children's recordings from KidKeeper were captured during playtime, an ideal setting to capture candid audio, because children were "*just being themselves*." This perspective, which KidKeeper enabled, was difficult for parents to catch, or even be aware of otherwise, because it was often imperceptible or occurred when no adults were present.

*It was cool to hear them recording themselves when we weren't around...You know, the things that they would say, because you don't really get to hear that when kids are playing. (M1)*

Hearing audio snippets that were created independently by their kids, our parents felt like they gained a glimpse into their children's everyday interactions and conversations they had been missing.

### *Getting memories of shy children*

The low-key nature of the recording also helped parents capture children that could not normally be caught on camera or video. Parents recounted that some children enjoyed performing more than others, while others would only show their true personality when they were in familiar company or unobserved. One mother was excited to be able to capture her daughter singing, because, while her daughter sang all the time, she was too shy to do so for an audience or a camera.

*I love when she sings, but she won't do it for a lot of people, so I love capturing that, getting that either audio or video. I only have one other video of her singing, and it was at least a year ago, because she won't do it. That, she was cool with it, because she wasn't even looking at me, she was just holding his hand and looking at [the toy], singing to [the toy]. She totally had no fear, it was awesome. (M4)*

Since some children were less self-conscious when playing with a toy than being asked to perform for the camera, they acted as they normally would, enabling parents to capture elusive candid moments.

We note that not all children's staged recordings were interesting to parents. For example, in Family 3, an older child recorded herself and a friend taking turns reading a book aloud. Her mother didn't think much of this recording as a memento. Yet there were numerous clips of her reading the book, indicating it was something this child had spent significant time recording. For most of our parents, their own interests drove what they viewed as worth saving rather than their children's interest. We return to this point in our discussion about aligning the different interests of multiple users.

In summary, while parents had many different capture devices, putting this embodied audio recorder in their children's hands allowed them to glimpse more of the elusive, uncontrived and unprompted moments where their children's full personalities came through.

## CAPTURING THEIR LIFE STAGE

Parents hoped their kids would create more *"meaningful"* content on KidKeeper that would *"capture that stage that they're at."* Two families had audio-based games their children played, and recalled, *"they love to record their own voice and then play it back and laugh at whatever silly things they say."(M1)* While these other games encouraged silly play, parents wanted to capture conversations, storytelling, or self-reflection from their children as well: "*[I want] to see if they do record more meaningful thoughts rather than just things that are funny words to them…like…talk to it or share feelings."(M5)* All the parents expressed a desire to hear their children's innermost thoughts, to gain *"insight into how their little brains work,"* especially since many of the children were pre-school or early elementary age and just beginning to express themselves using speech.

### *Discovering more about their child's personality*

One example of meaningful use that emerged was when parents discovered unknown aspects of their children's personalities that only came up as their children recorded things they themselves wanted to hear. For example, in describing the differences in what her three children liked to record and playback, one mother shared that her more introverted son would talk to the toy when he was alone.

*I would say that one of the boys, Billy, would play by himself with it. He would tell it affirmations about himself. Like, "I like you Billy." Then the other two would always play together with it, they would always just gargle, make noises. (M2)*

This mother confirmed that her son normally talked to his stuffed animals, and it was not new behavior. But now she was able to hear that while his siblings made silly noises with the toy, he would say encouraging words so the toy would repeat it back to him:

*It was interesting that Billy did the self-affirmation. Compared to a story or music, Billy just kind of told himself things that he wanted to hear. That was very intriguing because we didn't know words were important to him until we heard him say things he wanted to hear. (M2)*

This unintended use of KidKeeper's features created a new dynamic for this parent. Listening in became useful beyond its amusement value as children created "*meaningful*" content. While these were not originally something she thought of as a memento, they were something she might keep as a marker of his personality at that moment in his life

## *"It's who they are"*

While there were notable exceptions, the majority of the recordings that children created were silly sounds and sayings that they thought were funny. Yet, in addition to capturing developmental milestones, some parents also found that these simple snippets of their children playing around, for example *"making fart noises,"* also captured aspects of their children's personality that they wanted to preserve. Although the clips were not of meaningful content per se, *"They were cool, because they're not something we have." (M2)*

We note here that although most parents thought some bit of idiosyncratic playful noises were entertaining and even nostalgic to have, only two parents (including M2) elected to *"save them all."* Most saved only one or two of these from each of their children, possibly enacting some curation regime. In a follow-up with several of these parents, we discuss their process of deciding

what and how much content to keep. These findings are reported in our study on Kurator (Merritt et al. 2017).

## Enjoying the Accessibility and Surprise

Recordings from KidKeeper also elicited curiosity and surprise from parents. Parents described the daily experience of anticipating and listening to their children's audio snippets *"as exciting for us as it would be for them getting a new toy." (D4)* In looking more deeply into parents' experiences, we discovered that the enjoyment of KidKeeper for parents came from two factors: the accessibility of the clips and the unpredictability of the audio content.

### *Accessibility: "It has to be easy"*

Parents primarily listened to the clips they received daily via email. The alternative—the random playback feature enabled by squeezing the toy's tongue—was entertaining and accessible for the children, and, as parents reported, a primary reason the children kept returning to it. However, only one parent reported going to the toy to listen to the recordings. Initially, parents were enthusiastic about the potential of having a physical marker of memories present in their home, thinking, *"at the end of the day, you walk by and you'll be like, "Oh, what's the kid caught today?" (D4)* However, email turned out to be more accessible for parents. As one mother recounted, she preferred email:

*Probably because I'm addicted to my phone, and it's constantly in my hand, so...I'll see if something pops up, or I'll get a notification if there's an email. That's pretty immediate. It doesn't matter where I'm at or what I'm doing. (M4)*

Although the idea of a leisurely evening at home browsing through the day's clips appealed to parents, in reality, they had busy schedules and could more easily listen to the audio pushed to their phone. The feature of KidKeeper to select and deliver audio content directly to parents made the content more accessible and more likely to be listened to.

### *Surprising Content: "A fresh sense"*

Being able to access everyday moments remotely provided a further benefit to the parents who had to work long hours outside the home or while traveling, and who cherished hearing their

children's voices when they were missed. In one example, a parent who worked long hours recalled listening to the emails of his two sons' recordings every day at work on his phone.

*I got some email every day, that was so interesting. It was a fresh sense for me, I just listen, like a phone, I just listen to their voice. And I think if I'm very, very busy, then it's very nice. Like for instance, if I'm very busy for work and I cannot go back until they are asleep or I am at business somewhere in another country, in that case it is more helpful to listen to their voices every day. (D7)*

The experience of being able to listen to his children's voices made it difficult for him to discard even the "*stupid*" recordings of his sons screaming into the microphone. Although some days the clips he received were non-ideal from an aesthetic perspective and far from "*meaningful*", his total experience throughout the week was enhanced *because* of that variable quality. Although he did not like receiving *"just noise",* especially given that he only got one "*voice*" a day, the fact that he had no idea what to expect when he listened to the recordings created a more engaging emotional experience for him that was *"maybe better than a picture*." In comparing the unpredictable content of the recordings with the weekly school emails of pictures that he received of his oldest son, he mused that while the delivery method was the same, he found the audio more interesting as a snapshot of his children:

*"[With sound], I had more of a feeling, of up and down, surprising and disappointing. For pictures, [the school] catches his best picture, so I can see how he works well. But with sound, the difference in quality, the gap, is interesting… I think a picture from school will not surprise me. Maybe satisfy me, but not surprise me." (D7)*

The delivery feature also served as a digest for parents, sending only a few of the best clips their children had recorded. However, two families were dissatisfied with their digest, one where the majority of the high-quality clips delivered by our algorithm were different takes from a single child's self-staged recording session (Family 2), and another where all the clips featured music and ambient sounds the children had recorded rather than themselves talking (Family 3). These parents described these recordings as *"boring"* although they thought their children had fun making them. Like the earlier example of the child reading a book, these cases of mismatched interests are important to consider, both as breakdowns of our mediation attempt and as inevitabilities in these types of shared systems. We return to this in our discussion.

Our parents' interactions with KidKeeper and reactions to the content that was recorded by their children illuminated some of their unarticulated desires: accessibility was a primary driver in listening, and variability created interest through surprise and novelty.

## Sufficient Privacy Features

Although other cloud-connected recording devices have caused concern about children's privacy (e.g., *Hello Barbie* ("'Hell No Barbie': Social Media Campaign Targets Talking Doll - NBC News" 2016)), KidKeeper was perceived as secure by our parents. Our participants reported that a combination of three main features made them feel comfortable: manual capture (*"they had to intentionally press the thing to make it happen" (M1))*, secure storage *("it's just contained" (M6)),* and innocuous recordings *("It would surprise me if they said something that I wouldn't want anybody else to hear" (M4))*. Though parents were aware of privacy concerns, they perceived little risk of a privacy breach with KidKeeper. Privacy had two aspects for our parents: the privacy of the family with respect to the outside world, and the privacy of children from parents.

### *Privacy from the outside world*

A feature of KidKeeper was that all the content was kept on a private, secure server, but individual clips could be shared with others outside the family via email or another media messaging service. When parents were presented in interviews with plausible scenarios of accidental disclosure of content, such as an audio clip being sent to an unintended audience, our parents felt that the content that their child was capable of generating was not sensitive enough to cause alarm.

However, there were several instances in which parents realized that their children were actually recording *them*. While there were no privacy breaches in this study, this did cause consternation as parents realized their children might intentionally or by happenstance record them without them noticing. For example, one dad only realized that his daughters were recording him playing the guitar in a different room after receiving several emails of himself playing. In this instance, we see that children's creative use of the toy could catch activities in the background, leaving the recorded party unaware. Although the unknown recordings largely contained innocuous content, one could imagine private phone conversations recorded inadvertently and emailed out, a

concern reported by families in (Dib, Petrelli, and Whittaker 2010). All the parents rejected the idea of adding continuous capture into KidKeeper without a host of controls to regulate how and when the stream could operate.

### *Privacy between children and parents*

In addition to parents' privacy concerns, children could have privacy concerns as well, particularly in wanting to keep some things they said hidden from their parents. In our study, our parents did not think their children cared about what happened to these voice recordings: *"Cause they're so little, I think they don't really give a cr-p. Cause we're parents right? They think we can see and hear and know everything." (M1)* As this mother expressed, our parents thought their children at this young age were indifferent about disclosure through these recordings, because they already associated a certain omniscience to their parents. *"They're too little to know that we don't really see and hear every single thing."* Whether this is a good view or not, many of our parents echoed this sentiment regarding their children in our target age group. They also pointed out that this would certainly change as their children got older.

As well, privacy between children and parents may have been less of a concern because most parents set up KidKeeper in a public, common area of their home where their children usually played together, and where there was generally little expectation of privacy. Thus, the toy was situated as an observable plaything, shared among all the children in the home and easily accessed by parents. Even so, some children did record things that they were normally forbidden by their parents to say, such as "*language we discourage*" (M7), rude words, and insults to their siblings. When our parents observed this behavior, they said they responded as they usually would when they heard such language during playtime.

In summary, none of our parents appeared to be concerned about KidKeeper and the privacy of their children. This was due to both the features of the system, their own views about the sensitivity of the content of the recordings, and their relationship to their children. As privacy is a recurring issue in new capture technologies, we discuss the implications of these findings for integrated capture technologies in our discussion.

### LIMITATIONS

Several limitations in this field study are important to note. The number of families in our field study was small, and these families no doubt self-selected into the study because of their interest in family memory. Furthermore, the study was only a week long. In our study, parents were largely uninvolved in their children's use of KidKeeper. However, we might expect parents to have to encourage children to use the system over a more extended period, or to introduce more prompts to gather more of the content they want.

### SUMMARY OF FINDINGS

In our study, we proposed and demonstrated KidKeeper as a means for embedding capture technologies into an everyday environment to record hard-to-capture moments without disruption. We successfully integrated a toy-like capture device into children's everyday activities, and children generated hundreds of audio clips during play. As parents reflected on their memory practices and on what they wished to capture about their children during the study, they shared that they wanted to capture and save token moments that exemplified their child's personality, gain insight into how their children were thinking and feeling, and hear snippets of life that they missed. KidKeeper helped some families achieve this goal, while others were less enamored with their children's playful recordings. In the next section, we discuss the implications of these findings in designing technologies to support families in capturing memories of everyday life and the tradeoffs of an integrated capture approach.

## TRADEOFFS AND CHALLENGES OF INTEGRATED CAPTURE

KidKeeper demonstrates "integrated capture," an innovative approach to capturing family memories in the home. The key feature of such systems is that they embed capture technologies into artifacts that are normally used in everyday activities. This approach addresses the current limitations of capture and access technologies, while incorporating the benefits of unobtrusive and candid total capture, the purposefulness of situation-specific capture, and the ethos of unremarkable computing. KidKeeper is toy-like to capture authentic, everyday moments of young children's playtime, a time valued by parents but difficult to capture otherwise.

As a research prototype, KidKeeper addresses the current limitations of capture and access technologies for family memory that create tensions between privacy and disruption. In this regard, KidKeeper worked. Families used it and obtained what they considered significant mementos hard to obtain otherwise. Its features appeared to also reduce barriers to access recordings by providing content delivery mechanisms which automatically prioritized which recordings to send, albeit simply. It also mitigated privacy concerns using private secure cloud storage, ceding all sharing control to parents, limiting the length of recordings, and increasing awareness of recording activity. Further, in deploying KidKeeper, we came to understand what parents seek to capture when documenting the everyday lives of their children. These insights, we believe, will help designers create more directed and purposeful systems that support families in capturing and creating mementos of this important period in their children's lives.

Through this process, we learned that integration in design was not only about building an unremarkable device, but also about aligning different interests of family members towards a family goal of capturing memories. Yet the alignment achieved by KidKeeper was not perfect. We discuss some of the tradeoffs and challenges of integrated capture (too much content, capturing meaningful content, aligning interests) and how these might be addressed in future work.

## Too Much Content

The children in our study generated hundreds of recordings in only a few days, with diverse content of variable value to parents. Over time, the accumulation of digital artifacts could very well become overwhelming, especially if there were multiple capture devices in a home. Family memory keepers in prior chapters predicted this as well when comparing the amount of content they captured of their children with what their children were currently capturing of their own families. While the strategy of automatically prioritizing and delivering content to parents reduced the effort in listening to the audio clips, this will not automatically translate into easily accessing large numbers of recordings. Further, winnowing down the number of clips, such as in creating an audio album, would be tedious, and, as we discussed in Chapter 6, there is evidence

that users just will not do it manually (Marshall, Bly, and Brun-Cottan 2006). As with many CSCW systems, too much use brings its own problems (e.g., (Horowitz and Kamvar 2010)).

Because KidKeeper is a situated device, its context could be used to help to organize the content it records for future reference. As we saw in Chapter 5, context is an important determinant in how other family memories are shared and could also help interpret content later. KidKeeper's audio recordings carry inferred information such as the event (playtime), the subject/owner (the children), and the location (home) information, in addition to some higher-level context that might be important at a family level, such as the approximate age of the child. The added context that can be inferred from an integrated capture system could help to better inform accompanying systems that automatically structure and organize a family's collections of digital mementos, further lessening the burden of overload to the users. Having additional context automatically included in the metadata of saved clips could also help parents decide how to revisit the content later, whether in accessing the database manually or using a delivery system like KidKeeper's to select content for them to enjoy.

Robust organization schemes are critical for digitally captured moments to become useful for family memory. While gathering more content may be desirable, the work required to shape that content into a usable form may be a barrier to effective use. As the Chapter 6 on curation shows, organizing sentimental artifacts can be a significant burden due to the expended time and effort, emotional investment, and social dynamics. Systems which include curation help in their ecosystem, we argue, are more likely to be used in the real world.

The level of editorial assistance offered by a system might depend on the anticipated use and value of the artifacts it creates and collects. KidKeeper's assistance is limited by the unfamiliar content medium and vague use case that would enable the development of more robust services—a "killer app" if you will. Therefore, it takes a "filter" approach to curation by offering a simple quality check and placing most of the value-assignment responsibility on the user. In related work, Merritt et al. (2017) built and evaluated a semi-automated curation system using a combination of crowd support and machine learning to create a more robust way to help parents find the "treasures" in a large collection worth revisiting as digital mementos.

While it is clear editorial assistance is needed to handle the large quantity of content that these types of embedded capture devices generate, the value judgments that need to be made rely on cultural norms and expectations that new media often does not have. This could be an obstacle for new technologies to overcome, yet it also presents an opportunity for artists and designers to shape cultural practices around new media and create new forms of memory.

## Tradeoffs in Capturing Meaningful Content

From our interviews with parents about what they save, and in their reflections on the audio clips their children recorded with KidKeeper, we drew out key goals of parents when trying to capture the everyday lives of their children. We found that parents valued most highly audio clips that portrayed the authentic and unfeigned personality of their children just being themselves at their current stage of life. These token moments had been difficult for parents to anticipate and capture with existing technologies, and thus were new and fun to hear as they were recorded through KidKeeper. These new glimpses also helped parents gain insight into how their child was thinking and feeling.

However, our children (and likely most children in our age range) were not attempting to capture audio for memory sake, as their parents were, but just amusing themselves. Our rudimentary content filter ensured that there was a minimum audio quality to the clips sent to parents, however, not all parents got as much highly precious and meaningful content as they hoped. As children made recordings that they found amusing, their parents sometimes had different reactions—at times similarly amused, and at times bored and uninterested.

Fortunately, in our study, the variability in content which manifested from this imperfect alignment of interests was generally accepted as status quo by our parents. It was even a positive point for some parents. Although parents expressed a preference for more valuable meaningful content, getting an occasional dud was not necessarily a bad thing for them. Hsieh, Liang, and Chen (2011) and Odom et al (2014), among others, have intentionally employed randomness and spontaneity in their timing of delivering sentimental content to users to positive effect—the anticipation induced more joy in users when they eventually received their memento. Our findings suggest that variable quality might also create a similar interest in our parents.

However, finding the right balance between meaningful content and randomness is a challenge. Even if parents become more discerning, there remains an open question about *how* they might get only the content they want from an integrated capture system. One strategy, such as the one currently employed by KidKeeper, might implement better filters that take into account sophisticated knowledge of parent's desires to select the most interesting content for them, without affecting the capture process. Another strategy is to actively change the activity itself. Changing what content is captured would require cooperation from both parents and children, as KidKeeper's full functionality cannot be realized by only one group of users. It would be difficult for parents to co-opt their children's playful use of the system without disrupting its fit as a toy. Thus, in order for parents to capture more meaningful content with the toy, whether it be their children's thoughts, singing, or just more content from a particular child, they may have to engage in their children's play and actively change their child's activity.

For KidKeeper, we chose to prioritize the playfulness of the system because it is mostly integrated into children's activities. A further outcome we noticed is that because KidKeeper looked like a toy, it was treated like a toy by both parents and children. Parents put KidKeeper in their children's play area, avoided interfering with their children's use of KidKeeper, and even in responding to participate in the study, primarily saw it as something meant for their children.

This was a boon for KidKeeper in light of the ambivalent value of what it recorded. The meaningfulness of much of the captured content could only be determined in retrospect, perhaps only years in the future. Yet, the system was positively received because it at least was fun to play with in the moment. Other studies, such as Odom et al. (2014) and Lee et al. (2014), have advocated a "slow," reflective approach to designing memory technologies in response to the long-natured emergence of value for memory artifacts. However, these kinds of systems can lack an incentive to use. In this case, the ludic design of KidKeeper helped it find purchase in family life even though the value of its content was not yet known.

## Aligning Different Interests of Family Members

Capturing meaningful content with an integrated capture system requires careful attention to the interaction dynamics between all the users in the system. When designing memory technologies

for families, viewing the "family" as a like-minded unit has proven in the past to be problematic. In the Family Archive (Kirk et al. 2010), for example, involving children in the memory artifact preservation process, while democratic, resulted in a breakdown in the parents' careful organization scheme, eventually resulting in abandonment of the system all together. This result showed that systems designed for close-knit groups such as families must be careful not to assume that a common activity is undertaken for a common purpose.

One approach to addressing dissonant mental models or modes of use is to apply persuasion, as advocated by Grasso, Cawsey, and Jones (2000), to encourage all users to adopt a similar model of the system. This approach privileges one "right" view of the system to which all others must conform. KidKeeper, however, was designed to serve multiple purposes for different users. Therefore, in our system, we attempt to align the cross-purposes of parents and their children towards a family goal of capturing memories difficult to achieve otherwise. Similar strategies of aligning incentives have been adopted to create useful organizational memory (e.g. AnswerGarden (Ackerman and Malone 1990)). Yet in balancing these interests in KidKeeper, a significant area of uncertainty remains regarding privacy.

The issue of privacy between children and parents is a complex and dynamic issue (Yardi and Bruckman 2011), especially in the context of capture and access (Kientz et al. 2007). Technologies which mediate social interactions, such as family memory capture systems, engage with existing power and agency dynamics. Yardi and Bruckman (2011), referring to these dynamics as the "politics of technoparenting," note that most conflicts between parents and children occur with respect to personal values. Yet, as we noted in our findings, due to the age range of children in our study, the parents in our study were primarily concerned about privacy in relation to the outside world, rather than within their home. Some of our parents assumed the perspective that anything their children did was subject to their scrutiny, and that their children were young enough that eavesdropping on their playtime was unproblematic. On the other hand, children's rights advocates have argued that children deserve the right to privacy and agency (Henning 2011). Our system brings up a further question about the age at which "privacy" is truly possible for children in a home where capture technologies and their databases are chosen and managed by parents.

To address immediate issues of negotiated privacy and control, two features of KidKeeper might be useful for consideration in this and other capture scenarios for parents and children. First, KidKeeper can only be used "up close." While its physicality was originally intended to facilitate play and ensure that children could easily use the recording capability, it turned out to also make it almost impossible to appropriate KidKeeper for clandestine recording. This means children have primary control over what is recorded. Parents could, of course, step in to intentionally record something, but then their presence is known to the child.

Second, clips were intentionally short and neither parents nor children could intentionally access a specific recorded clip. Access was either random (through the toy) or automatically selected by the system (email). The database was completely restricted to access by one of these two means. This, too, was not intended to be a privacy feature, but it disrupted the kind of purposeful search and retrieval affordances that characterize effective surveillance systems.

Nonetheless, neither of these features are perfect solutions, and it remains an open challenge to create shared capture and access systems that respond to competing disclosure preferences of multiple users. Technologies that mediate family interactions around memory will need to negotiate the immediate and long-term privacy concerns of family members, especially with respect to how relationships and perceptions of content might shift and change over time. The issue of negotiated control over content access is an intriguing area for future work to address, and we return to it in our next chapter.

## CONCLUSION AND LESSONS LEARNED

In this chapter, we introduced our system, KidKeeper, a kid-driven, audio-based, "integrated capture" system to help parents capture everyday moments in their children's lives at home. We described and qualitatively evaluated the design assumptions for integrated capture during children's playtime that we implemented in this context, namely:

- Encouraging spontaneous and authentic play,
- Reducing the effort for parents to enjoy content their kids created, and

- Mitigating privacy risks that might arise from using an embedded audio recording device.

In a deployment with seven families, we gained insight into our approach to designing for family memory and our design assumptions. Overall, there were a number of families that showed the kind of use that would successfully lead to a new kind of family memory artifact. Yet, although parents were able to capture the authentic personality of their children at a particular stage in their life, the integrated capture approach sparked issues from the same wicked problems identified in the introduction to this thesis: 1) capturing too much content to be actively managed (curation at scale), 2) capturing and recognizing meaningful content (anticipating future audiences); and 3) managing system and content access and control (negotiating dissonant values). A foundational understanding of each of these issues as relates to building family memory has been worked out in previous chapters. KidKeeper demonstrates the importance of taking these problems into account through design, and demonstrates an approach to addressing them. The lessons learned from this prototype, which are summarized below, will be iterated on in future work discussed in the next chapter and in the conclusion.

Editorial assistance is a necessary usability feature of new capture devices. Capturing a digital trace is only one step in the process of creating a memento or media narrative. Additional quality and value judgments are needed to avoid overwhelming the user. Many of the ways that people made sense of and managed their collections of memory artifacts in Chapter 6 was predicated on some basic assumptions about quality and use. However, media without strong cultural norms about its quality, value, and use as a memento is difficult to design for. Audio, although not a new media, has not been widely used as a memento. This made design regarding its quality difficult. As everyday devices capture more divers media and contextual information, like location and activity, the possibilities for engaging media artifacts enrich and expand. However, accompanying this expansion, there must be efforts to craft new ways of interacting with and drawing meaning out of these media artifacts. In the next chapter, Scatter explore ways to develop a pipeline process for turning diverse captured media, representing fragments of everyday life, into meaningful memory artifacts.

KidKeeper and other memory capture devices will eventually contribute significantly to a family's narrative inheritance. Now, designers are faced with many of the complexities of multi-user and collaborative systems for memory, even for devices that may have only one dedicated user. Leading up to a multi-generational view, KidKeeper shows that the person or people who capture content may not be the sole or even primary consumers of this content. Often content that becomes an important memento for someone may have actually been captured for someone else's benefit. This mirrors efforts we saw in previous chapters on preparing memory artifacts for future descendants. These intentions complicate design-led judgements of what is quality or what is valuable content. After all, in Chapter 6 we see that inherited memory artifacts must fit into both the giver and recipient's lives. These two parties may have disparate preferences about what they value.

Further, issues of ownership and privacy arise when memory is considered as a stewarded resource, subject to the demands of others. The power dynamics involved in these interactions will especially affect systems shared in a family context, where some family members wield unequal influence over what is recorded, preserved, and shared. This idea of narrative influence is further explored in the next chapter through the development of a power-conscious design framework for a narrative inheritance. While not problematic in KidKeeper, the issue of privacy and control in family memory technologies bears continued examination across diverse situations and distributions of users. As new computing devices proliferate and disappear from notice in home environments (the goal of unremarkable design), the expectations and norms around their use will be continually renegotiated. KidKeeper illustrates an approach for parents and children in a household, and, in the next chapter, Scatter demonstrates another approach for multiple generations in a family spread across many households.

# Chapter 8 – Authority, Entitlement, And Courtesy: A Design Framework For A Narrative Inheritance

## Introduction

Following a research-through-design approach, I designed and developed Scatter, a platform which allows multiple users to use tangible icons to craft a narrative from a collection of audiorecorded family stories. I synthesized findings from studies discussed in previous chapters to direct the interactivity, form, and supported social interactions of Scatter. Given its importance, difficulty, and pervasiveness in family memory, I used curation as a foundational activity through which I systematically work through the tensions in a narrative inheritance as they manifest in how a narrative in co-constructed. With Scatter as an analytical device, I conducted a reflective analysis of its implementation in order to develop a design framework for technologies which mediate a narrative inheritance. Details about the research-through-design process are discussed in Chapter 3, and I will discuss the concept development and implementation throughout this chapter.

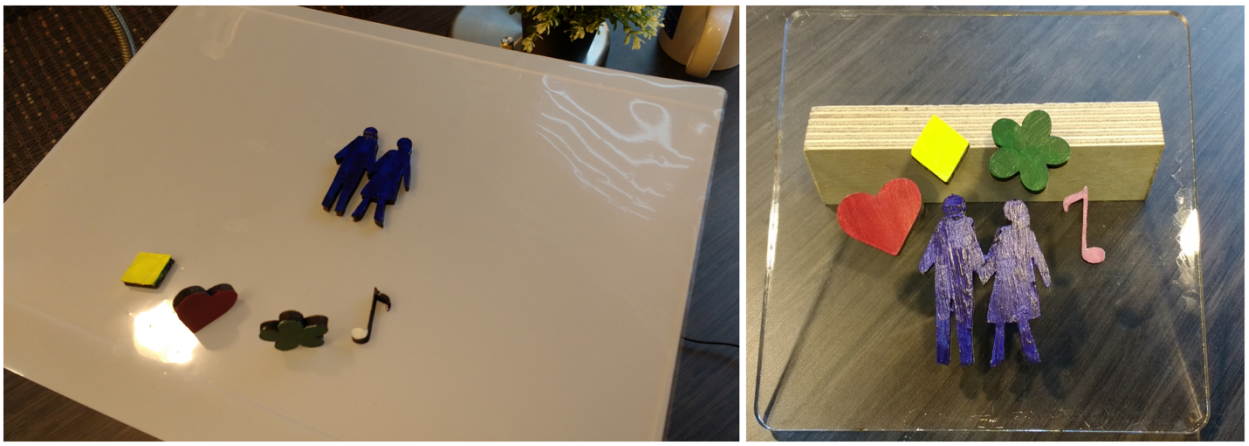

**Figure 5. Scatter Arrangements: The left depicts an arrangement in progress on the Scatter platform, and the right shows a possible finished gift.**

## Curation as an Interaction

Scatter synthesizes efforts to craft a narrative effort as "curatorial interactions." In doing this, it implements implications from Chapter 6 that curation might be broken down usefully a set of activities around selecting, storing, displaying and arranging artifacts that can be supported in design. Further, I argue in Chapter 7 that editorial assistance (i.e. curation) should be considered a necessary usability feature for digital memory capture systems. Curation encourages regular interaction with a collection, which lends the familiarity and emotional significance needed to turn digital content into digital mementos (Golsteijn et al. 2012). However, curation is still largely a human-driven activity. In family memory, where artifacts are shared and management decisions must be negotiated, it can be especially burdensome. Curation is itself a wicked problem at the scale of digital content, but it is complicated by the inability to anticipate future audiences (which precludes purposeful selection and organization) and the need to navigate a variety of social expectations.

The processes of curation help focus attention on a memory (Chapter 6), and are also part of how tellers craft a narrative to pass on (Chapter 4), and make sense of the past in light of their present identity and circumstances (Chapter 6). The marks of curation help convey information to recipients about the purpose and context of the story—the way a story is told, with parts

missing, embellished, or changed can tell a listener more about the personality of the teller, and also reflect the circumstances under which the story was told (Chapters 4, 5).

Curation, as I discuss in Chapter 6, consists of practices, often unseen and taken for granted, by which people select, organize, and arrange the items for attention in their collections of memory artifacts. While I focus in Chapter 6 on a traditional view of curation, a shared narrative can also be thought of as a curated memory. In this chapter, I consider curatorial interactions more broadly to include the practices of creating and shaping a narrative from a collection of stories. The curation frame works well with the conceptualization of a narrative as fragmented (drawing from Chapter 5), with pieces of the story selected and arranged together for some purpose, according to some agenda, and for some audience. Further, I have reiterated across the various studies in this thesis that a narrative inheritance is co-constructed through negotiated processes in which both tellers and listeners are actively involved and exercising some agency. The curation of family narrative, as I showed in Chapter 6 and in findings from Chapter 4 and 5, is an ideal set of activities to work through issues of narrative control, even as they complicated by negotiating dissonant values and anticipating future audiences.

## Creating a Frame: Scatter as an Analytical Device

I approached the design of Scatter from a research-through-design approach (outlined in Chapter 3). A research-through-design approach helps frame a design problem from the indefinite complexity of a social setting, and reveals the balance researchers make between conflicting and intersecting perspectives at work in the setting (Zimmerman 2007). In this chapter, conceptualizing and building Scatter was a process of creating a frame for operationalizing a narrative inheritance. The design artifact that I developed and discuss serves to ground and focus the synthesis the many insights and implications for design generated through ethnographic and design work of this thesis, as well as lessons learned from prior work. The design prototype I discuss in the next section serves as the central analytical tool in the process of developing a design framework for technologies which mediating the values and practices in the social construction of family memory.

Scatter is similar to KidKeeper (described in Chapter 7) in that it is a generative design artifact, intended to open up questions and elicit a clearer articulation of the values at work in a family memory. However, KidKeeper differs in that it served as a probe to be deployed into the "wild" as an enquiry into family values in practice. KidKeeper was built with a clear design rationale, and goal to facilitate exploration and disentanglement of paradoxical values in a real-world setting. Scatter, in contrast, was built as a means to concretize the conceptual framework of a narrative inheritance, which theoretically unravels the values driving the negotiation of control across generations in a narrative inheritance. The design rationale of Scatter was developed as a focusing mechanism to develop the basis of a design framework which embeds these values.

There were two major intellectual design challenges that I address through Scatter. First, I address how to translate these abstract values of control of a narrative inheritance into design qualities. Second, I inform designers about how to decide which values to embody when navigating tensions between tellers and listeners.

To walk through this process, I will first describe the Scatter prototype, including the system overview, scenario of use, design rationale, and implementation. These details ground the later discussion of the values at work in design for narrative control. Next, I describe the design framework and process of deriving it. I start with the detailing the value tensions in the conceptual framework of narrative inheritance, namely authority and entitlement. I then show how these values are realized in the design of Scatter, and translated into design dimensions. To conclude, I will discuss the concept of narrative courtesy as a way of addressing the social-technical gap in mediating narrative control across generations.

## SYSTEM DESIGN

### SYSTEM OVERVIEW

Scatter is a system to build tangible "narratives" out of collections of audio mementos. It leverages tangible interaction design, to enable people to assemble, organize, display, and share artifacts out of a large collection of digital audio recordings on a physical platform (Figure 1, Figure 5). It is envisioned as a multi-lifespan system through which users in each generation can

interact with a gathered collection of stories, in digital and physical form, passed down from one generation to the next.

The design of Scatter is inspired in part by the design claims in Chapter 5 that family memory is fragmented and conditionally revealed under negotiated terms. When thinking about family stories as pieces of a larger narrative, the metaphor of a mosaic came to mind, where each piece is fit together to form a whole. How this mosaic narrative is created, modified, and accessed reflects an orientation to the power dynamics involved in building a narrative inheritance. I discuss these dynamics in more detail in my conceptual framework and design rationale.

Secondary design goals that informed the design of Scatter include leveraging materiality and physical objects to find a place and purpose for digital mementos in the home (Chapter 6); having an ability to survive for multiple generations (Chapter 4); being a minimal burden to its users (Chapter 7); ascribing to a stewardship model of content management (Chapter 6); and mitigating future generations' perception of incompleteness of a crafted narrative (Chapter 4).

Scatter further learns from the design and evaluation of KidKeeper, presented in the last chapter. In KidKeeper, the interests of multiple family members are brought into alignment through a common artifact-generating interface. Scatter embeds stronger assumptions about multi-user interactions by explicitly incorporating rules and features that allow different sets of users to control how others interact with the device and access the content. Yet, in building a narrative inheritance, not all family members will agree on these control decisions. Scatter provides a platform for working through scenarios where the interpretive organization and access to memories is collectively worked out among family members, each with values that are potentially dissonant and perhaps unknown.

I note here that Scatter does not support authoring new content. This is intentional. By separating out the features of recording new content and organizing existing content, I gain focus on issues of control separate from issues of inherent ownership that might come from personally recorded stories. Nevertheless, I explore how Scatter fits into scenarios where people are authoring their own memoirs (perhaps using devices like KidKeeper) as well as interacting with memory artifacts from others.

In the following section, I present an illustrative scenario and a description of the system. I then discuss the design rationale, the requirements this imposed on Scatter, and how these were implemented in the prototype. These details help ground my later discussion of how this process helped me to reason through some of the tensions at work in intergenerational memory sharing.

## Scenario and Description of Use

Below I present a brief use case scenario to illustrate one way that Scatter might be used by a person preparing a narrative inheritance. This scenario was drawn from an actual conversation with a participant, Karen, who described her ongoing project to create a digital family narrative for her children and grandchildren using currently available technologies (a DVD). To create a realistic scenario, I replaced her mention of manual organization methods or current methods with Scatter. Following the scenario, I outline the technical implementation of Scatter, and discuss the design rationale as it relates to mediating value tensions in a narrative inheritance.

Consider the following scenario:

*Karen prepared Scatter to share an interesting narrative with her children, nieces, and nephews at their next family reunion. She is excited to share with them all the information about their ancestors she has gathered and compiled over the years. She really wants the young people to understand the personalities of people they never got a chance to meet and to connect with their family's past.*

*One narrative she wants to share is about their "mystery relative." She will share how she first discovered the mystery man in a photo and how it was hard to find out anything about him, then she will share what she found out about his adoption and his life with her grandparents, and then she will share about finding more information about this relative through another family that he married into. She still doesn't know how the mystery man is related to her own family, so she will have a small explanation about that, along with her speculations as to how he might be. Since she might find out later, she will update that part in the future.*

*Karen has already recorded several parts of the "mystery relative" narrative because she was planning to make a voice-over slide-show of pictures. She wants to pass on the pictures as a video, but she likes Scatter as a way to playback the audio because she can focus on the story and how she wants it to connect together. She thinks she could use Scatter to make a wall hanging for her daughter, like an abstract painting. This way, it also has a special place in their home, and won't get forgotten on a hard drive or require them to hook up the computer to the TV.*

*She is planning to make several copies of this Scatter narrative, one for each of her nieces and nephews. She hopes they can listen to it during family reunions and also when they are looking through the photo albums at home to understand the stories behind the faces.*

The prototype developed for this scenario enables users to create a unique composition of several different audio recordings by physically arranging bespoke icons on a platform (see Figure 4). Scatter's has three modes of interaction: narrative authoring, narrative playback, and narrative display. To author a narrative, users can create simple or complex shapes as icons, such as a heart, a star or a dog. These can be cut out of paper or molded out of clay. Users associate each shape with an audio recording according their discretion. Icons are arranged on a flat surface, which people can arrange spatially to make sense of and compose their collections. The arrangement of icons determines how the gathered audio recordings are played back. Icons in proximity to each other may respond to the characteristics of their neighboring icons as well as to internal rules.

The platform provides a surface for the collection of shapes to be spatially arranged, and also a simple interface to direct the playback of associated audio (Figure 6). Buttons line the front edge of the platform representing an array of audio recordings. There is also a "play" button, to activate playback of a recording, and an "image" button, to take a photo and save a visual record of the arrangement. An arrangement of icons can be saved and given to another person, who can then playback all the associated recordings as one crafted narrative. The tangible artifact can also serve as a means to for the recipient to display the "mosaic" of pieces and integrate it into their home as decorative piece.

The next section describes the design rationale for Scatter along with the requirements imposed on the system and how they were implemented.

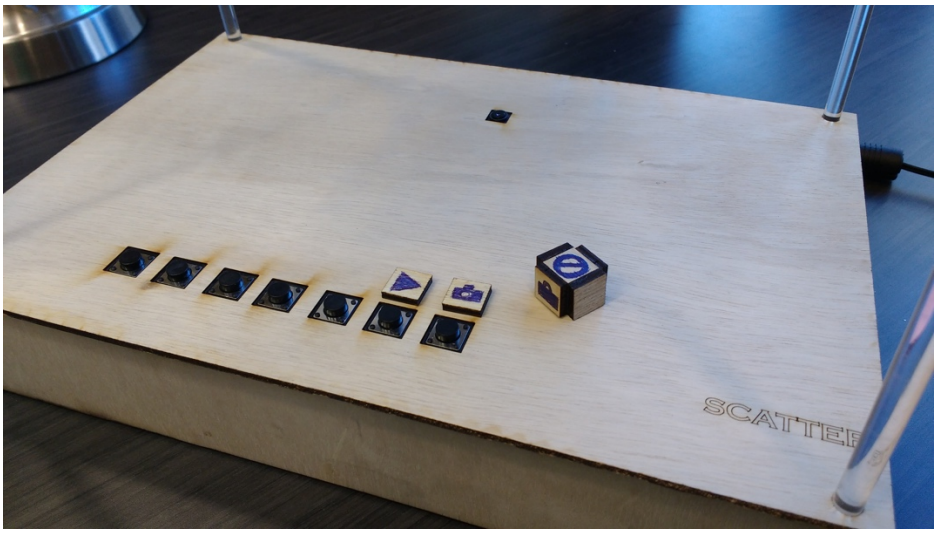

**Figure 6. The layout of Scatter's interaction mechanisms. The camera provides recognition of icons and arrangements, button enable moving recordings in and out of storage, and the "rule-block" facilitates articulation of authoritative controls.**

## Design Rationale and Implementation

I drew the design rationale for the form and features of the Scatter from the implications of previous chapters, including materiality to place the artifact, the use of storage as a staging area, supporting fragmentation of narratives, providing curatorial support, and integration of the artifact to fit into everyday activities in the home. I operationalized this rationale through iterative scenario building and storyboarding, combined with hardware and software development which also helped to refine the design. The components of the system are depicted in Figure 7. Eventually hardware restrictions constrained the final form of the prototype, however the basic interactivity was not significantly changed. Each part of the rationale is listed below and described in detail in this section with respect to the values embedded in the system.

1. Enable easy discovery of content in large collection.
2. Draw attention to certain pieces in a collection while guarding access to others.
3. Minimize the burden of curation caused by expending time, effort, and emotional energy.
4. Make the composed narrative accessible for multiple users and long-term use.
5. Allow the composed narrative to be given to another for their own use.

6. Illuminate the narrative decisions that led to the creation of the composed narrative.

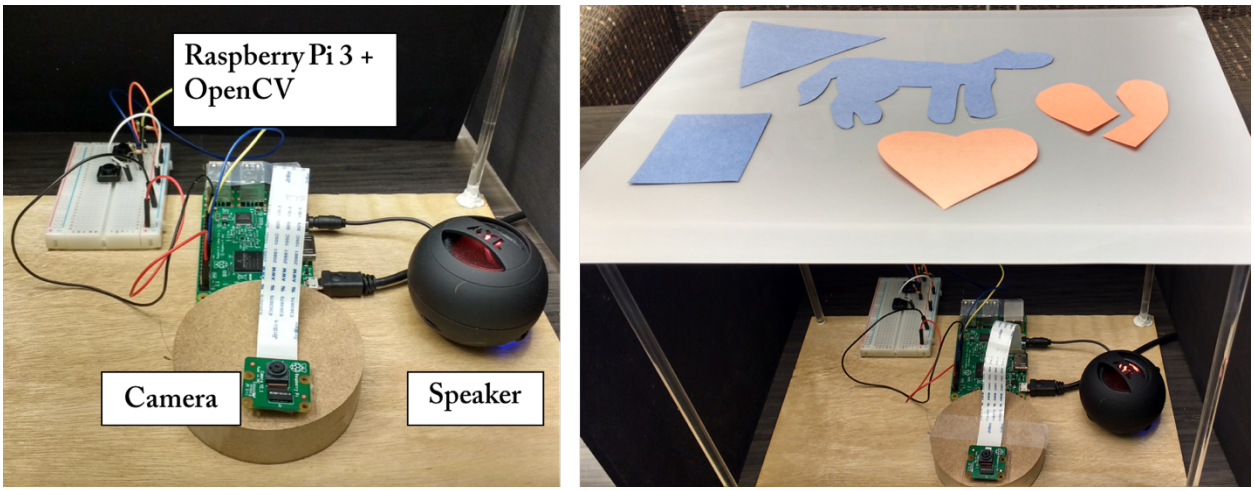


**Figure 7. Inside the Scatter (version 1) prototype: The system features off-the-shelf components, a Raspberry Pi 3 running Raspbian, controlled by a Python script built on OpenCV. Shapes are detected via a HD camera, sound is played through a mini speaker. An array of buttons serves to facilitate interactions with the stored collection of audio recordings and to access different system functions.**

## *Discovering content*

This rationale is two-fold. First, a "teller," or a person crafting a story from their own content, may have an overwhelmingly large collection of audio recordings from which they want to build a select narrative. The Scatter interface should enable them to make sense of a collection that may have no order in the course of their interactions. Second, a "listener" receives a subset of some collection arranged in some way. The interface should provide a way for them to explore the features of the content they have received, as well as enjoy the crafted narrative they are given.

*Implementation*: Scatter ingests a collection of digital audio recordings, and enables people to arrange them and set up interactions with the content. It does not require the user(s) to know what the collection contains. To discover what the audio recordings in their collection contain, users can listen to recordings by leaving the platform empty and pressing the play button to start playback of the entire collection. Users can skip through the recordings by simply pressing the play button again while the current recording is playing. The same exploratory listening can be

conducted with a collection of icons that may have been gifted to a user by a prior owner of the system.

### *Draw attention to some recordings and not others.*

To create an interactive sub-collection out of a larger collection, users can associate shapes to a recording, and then later use those shapes to manipulate the linked content and arrange it as desired. This arrangement serves to compose the associated audio into a particular order and to control the playback of recordings according to some limited context.

*Implementation*: To associate a recording with a particular icon, the users place their bespoke shape on the platform, press the "image" button, and then press the button in the audio array that corresponds to the recording they wish to select. If the shape is already associated with another recording, the old association is overwritten. However, a special "alt" block allows two different recordings to be associated with the same shape. When an alt-block is placed on the platform with the chosen icon, the newly associated recording is saved as a secondary hidden recording that can be activated by a specialized arrangement of related icons. A shape's associated recording can be played back by placing the shape alone on the platform and pressing the "play" button.

A narrative is created by placing icons in alignment on the platform. When the user presses the "capture" button, a camera takes a picture of the shapes as they are arranged. The software performs basic contour recognition to identify the shapes and link them with their associated audio. The software evaluates playback rules using each shapes' keywords and relative arrangement as input (see Table 1. Rules). Any rules associated with these shapes are evaluated according to the icon's position on the platform, starting from the top left, with row first transversal. When the user presses "play," the crafted narrative will playback as arranged.

### *Minimize the burden*

One approach to practically minimize the work and effort required to compose a narrative is to automate the generation of metadata needed to activate the rules. Our study in Chapter 7 indicated that this kind of editorial assistance would be needed to help people engage

meaningfully with large collections. A second approach, which draws from implications in Chapter 6, is to use device storage as an intermediate staging area for artifacts destined for display or interaction. The use of a staging area allows users to work gradually and intermittently on a project so they are not overwhelmed by the scale of work to be done. Scatter implements both approaches to minimize the burden of time and effort to users.

In addition to bespoke shapes to organize content, Scatter includes a small set of three-sided blocks that can be used to add simple playback rules to content. The rules are outlined in detail in Table 1. The purpose of these rules is to help minimize the emotional burden of curation, especially the uncertainty involved in considering how content will be accessed in the future by possibly unknown audiences.

*Implementation*: The array of buttons along the front of the platform can be used as a temporary cache to hold shortcuts to a subset of recordings that are not yet associated with a shape. To save a recording to a slot in the array, users simply press that button while the selected audio recording is playing. If another recording is currently saved in that slot, its reference is overwritten. When a button in the audio array is played, a short ten-second snippet of the clip is played to help users figure out which buttons correspond to which audio clips. The play button plays the complete collection of audio recordings associated with any shape on the platform according to their arrangement.

The audio recordings each have topic keywords associated with them. I assume for this prototype that all audio recordings contain speech that is intelligible and meaningful— they are recorded stories, conversations, or other spoken content rather than ambient sound recordings. (Scatter can handle ambient recordings, but the applications may be different, which we discuss in later sections). The keywords associated with each audio recording are automatically generated from the recording through a combination of speech-to-text and keyword extraction. These keywords may be generated by any program, and, depending on audio filetype, embedded in the file itself or kept in a data file.

### *Ensure accessibility for multiple users and for long-term use*

In my findings on memory practices and curation, I found that physical objects support a broad range of everyday uses and could be situated and arranged in the home in ways that facilitated users' meaningful engagement with the content (Chapter 4, Chapter 6). Related work has also found that physicality lends several affordances to technologies for memory: 1) Durability and longevity (Banks, Kirk, and Sellen 2012), 2) specialness (W. Odom et al. 2009), and 3) the ability to be socially embedded in everyday activities (Kirk and Sellen 2010; Gulotta et al. 2015). They are also relatively easier to appropriate in multiple ways beyond their original function, which makes them ideal for multi-user, long-term interactivity (Golsteijn et al. 2012).

*Implementation*: The physical interface of Scatter can enable simultaneous multi-user interactions (e.g. FM Radio). Scatter can also be used by multiple people in succession, such as when a narrative is given away to others. Further, composed narratives are intended to be encountered and listened to by multiple people, either in a group or solitary settings. More complex playback rules, such as those that are context-driven or temporal, can modulate access to a narrative based on the people interacting or the context of use.

While digital storage affords the perception of unlimited preservation, memories themselves do in fact fade, change, and disappear. It is an ongoing debate in memory studies and in HCI as to whether this effervescence is a good thing—and therefore necessary—or only the way things are at our current stage of human and technological development. Physicality is dual-natured in this regard—it can both enable and prevent absolute loss over time. A physical token (an icon or a configured narrative) that is used in a larger storage system like Scatter can be irreparably broken without compromising the entire system. This potentially allows people to destroy digital content, or references to it, beyond normal ability to regain access. Yet, physical tokens can also prevent absolute loss in the rather case of digital failure or obsolescence over time. A physical item can help people retain a symbolic link to their memories of the content even if the content itself is lost. Thus, a tangible token can serve both functional and sentimental purposes.

### *Able to give away to others.*

Tangible objects are more easily given to another person, and convey the significance of a gift, in comparison to digital artifacts (Kwon et al. 2017). Since these interfaces are designed for the use

case of narratives that are being bequeathed to another, I wanted to create a form factor that facilitated the activity of giving. The use of physical objects for this purpose reflects my finding that physical objects help to ensure that a story survives over time as it is passed from person to person.

*Implementation*: A narrative can be "saved" by double-tapping the capture button during narrative playback. All the arranged shapes on the platform are captured and saved as one image, and the final audio composition is saved as one audio file. The saved narrative consists of the image and file, which are linked. Users can choose to save their actual physical configurations as they choose—for example with paper shapes they can glue them down to a backing, or with clay shapes they can press them into a cement mold, or they can simply use the image generated by Scatter. Once saved, the configuration and composition can be given to another person.

In the prototype, once a narrative is saved, its image and audio file can be accessed via Bluetooth to be transferred to user's preferred playback device or to another Scatter platform. Only "saved" narrative images and audio are available for transfer. In future implementations, it is envisioned that a physical configuration will have its audio and audio playback capability embedded.

If transferred to another Scatter platform, whenever the same collection of objects is placed on the platform, even if not in the same arrangement, the saved narrative will become available for playback. In this way, recipients can playback the crafted narrative given the physical configuration used to compose the audio narrative, or given individual pieces of the narrative (the icons that represent constituent stories) without knowledge of how they should be configured. A third option is that only the composed audio is given away, and recipients can access it in their preferred audio playback device.

### *Make narrative decisions transparent.*

Tangible components can also be easily assembled and disassembled, and the normal function of the system does not require each component to be present. This supports and enables Scatter's function as a curatorial platform to allow people to easily make sense of a collection that may constantly change with pieces being added or taken away. This changeability makes more apparent the ways that narratives can be constructed even in spite of missing elements, and that

these missing parts can be removed or added at any time. The apparent construction of narratives from assembled pieces is one way that a mosaic or puzzle can communicate the structure of a represented narrative to each successive recipient. As I found in Chapter 4, the "shape" of a narrative conveyed important information about the agenda, preference, and goal of the teller who created it. Further in Chapter 5, narrative decisions became apparent by ways that stories were arranged, especially when there were holes from unanswered questions.

*Implementation*: The physical configuration of icons in Scatter gives a visual awareness about how a narrative was constructed. Scatter can playback a composed narrative given an unarranged collection of related icons as a trigger. This is primarily to allow for greater flexibility in how users appropriate the system. Nonetheless, I envision that the primary use of Scatter is to increase the transparency of narrative decisions by sharing not only audio compositions but also the components used to create those compositions.

However, Scatter's transparency is partial. It does not make visible the rules that control playback of the components of the narratives. This lack of transparency is important because combinations of rules are also a way to exhibit and negotiate narrative authority. Rules are authoritative, presentational, and curatorial. They are tied to spatial arrangements to leverage the ability of people to make multiple associations and connections to tie stories together. I return to this in the discussion and in future work.

| Playback Rules | Rule Activation | Additional Details | Rationale |
|---|---|---|---|
| PLAY<br><br>Priority = 1 | Upon some trigger, the recording associated with a chip is played back in its entirety. There is be some basic playback controls (play, pause, stop). | All recordings play by default. | Semantically, these are stories that might be "ready-to-tell", the kind that are well-formed, well-rehearsed, and rarely change. These stories are also easy to tell, in the sense that there is little controversy or sensitivity around them. |
| COMBINE<br><br>Priority = 2 | Two adjacent icons can turn their individual stories into one combined story.<br><br>The center icon makes a copy of the story of the adjacent chip, adds it to its own associated story. The | None of the rules associated with the shared piece of the story are passed. Thus, a divergent storytelling branch is born where a shared story starts to be told in several different ways. | Leverages spatial arrangement to start to facilitate some of the curatorial activities of listeners in digital space as well as real space |

| | | | |
|---|---|---|---|
| | adjacent chip is unchanged. | | |
| MORPH<br><br>Priority = 3 | When an icon is in proximity to another icon with a related topic, subject, or listener, an alternative version of its content ("B-recording") is revealed. | A discovery tool that can only be implemented when an icon is associated with multiple audio recordings. | MORPH rules are generally set by someone with narrative authority, rather than a listener. They represent instances where multiple perspectives or ways of telling a story exist, and are revealed when appropriate. |
| BLOCK<br><br>Priority = 4 | When a shape is adjacent to another chip with a similar topic or subject, that topic or subject is edited out of the original clips (computationally, the keywords are searched for in the transcript of the clip, and the volume at the point of the clip, as well as 5 seconds before and after is muted.) | If a BLOCKED Story is COMBINED into a new token, it cannot be unblocked— the changes made to the associated recording become permanent. | Allows a listener to block out mentions or parts of a story. This rule is presentational and is an "anti-rule" because it gets rid of parts of a story. |
| SILENCE<br><br>Priority = 5 | An internal rule that prevents content playback until a certain amount of time has elapsed (Timelock); or adjacent icons have "keys" in their list of topics | A chip can have multiple silence rules, such as a Timelock, which expires, and a topical lock which does not | A silence can be set by a teller to control when and how a portion of a narrative is told. This might be used primarily for content that is perceived as sensitive. |

Now that I have described the Scatter system, its design and implementation, I turn my attention back to the intellectual work that Scatter is intended for, which is to help define the dimensions of a narrative inheritance as it relates to mediating the value tensions of narrative authority and entitlement.

## DIMENSIONS OF A NARRATIVE INHERITANCE

Scatter's implementation, and possible variations, provided a platform on which to consider the values at work and how they are embedded into design. First, I describe the conceptual framework I developed to unpack the dynamics of control of a narrative inheritance.

### CONCEPTUAL FRAMEWORK: INHERITANCE, AUTHORITY, & ENTITLEMENT

Family memory, as a narrative inheritance, is composed of shared, unifying narratives which transcend an individual member's own memory and personal experience. They engender an

intersubjective relationship to the family's shared past by relating personal and second-hand narrative accounts of events and experiences as common memories. These narratives help each generation in a family incorporate this shared family memory into their own remembered past and embrace the corresponding social identity.

My participants in the family memory keeping studies expressed the importance of taking on a narrative inheritance as they explained why learning about their family's past was important to them, and should be important to future generations. Oscar, for example, explained that he wanted to learn all he could about his father's life before emigrating to the U.S., because *"I thought that experience was my experience."* Similarly, Vivienne also felt that the stories of her family were an important aspect of who she was. She extended her interest and connection with her ancestors even farther back into the past, beyond ancestors she knew personally. She explained that even if she had never known distant ancestors personally, she felt that the outcome of their lives shaped how she entered her own.

*I think that what happens even five generations back has an effect on my life today… It still impacts you, and I think it's important to know the family history. It's part of the DNA at some level, it's certainly part of who you are. It's part of how you enter the world, and I think it's important people have that knowledge. (Vivienne)*

The perspectives help illustrate the importance of family stories to my participants. For them, discovering more about one's family was equivalent with learning about oneself.

Narrative inheritance is part of the interactions of a social group, which consists of many members each with a diverse set of values, perspectives, and goals. Attention to the multiple agential pulls in the memory sharing process is a key consideration for technologies family memory. Next, I expand on the concept of narrative inheritance to characterize the values at work in these interactions.

### *Narrative authority*

Narrative authority is a concept taken from the field of oral history to describe the agency that a person has to tell their story in the way that they wish (Layman 2009). Acts of narrative

authority can create fluctuations in shared memory across a family because not all stories are uniformly shared with all members.

Relating this concept to my finding, I see a number of the dynamics that manifest across my different studies can be explained in terms of the expectations of narrative inheritance and the agential acts of narrative authority. I outline key findings from each of my previous chapters to serve as examples.

1. The motivation of tellers is to pass on a sense of the personality of the person depicted in the story.
2. Explicit permissions regarding the handling of content or artifacts is rarely defined, although as I saw in my data, implicit expectations can be articulated.
3. Curatorial decisions reflect identity management of current self in relation to past.
4. Multiple users will have competing disclosure preferences.

Each of these findings is authoritative because it represents a situation in which a teller wants to control the way a story is told. This control can be with regards to content itself, such as 1 & 3, or the handling of this content by others, 2 &4. The exercise of narrative authority helps to explain how multiple people in a family can disagree on the way a story is told, but have no easy way to resolve this disagreement (i.e. 4). In families, if two people have equal claim to a shared story, one cannot overrule the other. They must come to an agreement or understanding about how to proceed.

However, I see behavior in my data that suggests that family members do sometimes have the ability to overrule each other. For instance, consider the case in our previous chapters where listeners demanded information that the teller had, at one point, decided not to tell. Using narrative authority alone does not adequately explain these scenarios.

In these cases, listeners could refuse to accept a narrative as it was presented, questioning it or rejecting it wholesale. Listeners also found ways to circumvent the original teller by finding someone else who had a different way of telling a story. This was not seen as deviant behavior for our participants. Further, teller generations recall responding to these demands, such as when questions about a hidden past are asked by a listener and answered by a teller. This indicates that

this demand dynamic is recognized in some way as part of the memory sharing process, rather than seen as a disruption to one's narrative authority.

The concept of narrative authority assumes a top-down power relationship, but this falls through in light of instances where tellers are responsive to listener demands. I propose that there is a missing piece in this formulation of narrative inheritance and narrative authority that explains how family memory, however distributed, is re-constructed over time by each generation. Collective remembering has been framed before as a triadic exchange among the teller, the listener, and any previous tellers, each with their own demands: "The author (speaker) has his own inalienable right to the word, but the listener also has his rights, and those whose voices are heard in the word before the author comes up on it also have their rights…" (Wertsch 2002, quoting Bakhtin, 1986, p. 16). I draw out here the concept of "entitlement" to explain the "listener's rights" referred to in this passage.

### *Entitlement to a Narrative Inheritance*

Entitlement is generally defined in the English language as the desire to have something for which one has "the proper grounds to seek or claim" or "a belief that one is inherently deserving of."[12] While entitlement can be a semantically loaded term in the English language, I use it according to its original definition. Narrative entitlement is the idea that when family memories are conceptualized as an inheritance, then there is some notion that one who is a descendant *ought* to be able to hear and share in them. This is in contrast to when memories or stories about a person's life are viewed as just personal memories, with no inherent obligation or expectation that they are shared.

In my findings, this sense of entitlement for participants was most salient when it emerged to counter silence or reticence from an older generation. For example, as Tina thought about her father's silence about his family, she could not accept not knowing about that side of her family, and her children not knowing.

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[12] The first definition is from Merriam-Webster Dictionary, and the second is from Oxford English Dictionary

*… But I would like to know things, I don't know exactly what I want to know, but I do want my kids to know my parents, and my kids to know their grandparents, so I have to think about how to make that happen. (Tina)*

What exactly Tina would *"make happen"* was unclear, even to her. But whatever she could do to gain access to more information about her father's side of the family, she was justified in seeking on her own behalf and for her children, just because she wanted to know. Janine echoed this sentiment and added that perhaps this need to know more about herself and her heritage was even stronger as she grew up with technologies bringing information to her on-demand.

*I think with the access that I have now to a lot of other realms of information, there's still this kind of mystery, or shroud of mystery, around like heritage and family heritage. So yeah, I think especially for us millennials, it makes us that much more curious, or maybe feel like a sense of entitlement towards those histories. (Janine)*

The sense of entitlement towards information shrouded in mystery or the resolve to find out more about one's history despite an ancestor's refusal to talk illustrates this competing value of entitlement at work in intergenerational memory sharing.

While I highlight here the sense of entitlement felt by listeners to know more than what is offered, it also includes acts of refusal. A refusal, as I presented in my findings in Chapter 5, might be resisting an offered narrative or rejecting a proposed identity presented in a family story. I pose the dynamic of entitlement as a countervail to narrative authority, such that any narrative decision made by a teller may be challenged by a listener, who claims a right as a family member to do so. Erll and Kurian refer to this inherent parity as a defining characteristic of family memory, in which "Everyone is considered equally competent in remembering and interpreting the common past" (Erll and Kurian 2011).

From this framing of narrative inheritance, I draw out the values of authority and entitlement at work which shape family memory as passed across generations. It is important for researchers to recognize and foreground these dynamics as we move forward as part of a value-sensitive design process. On one hand, the value tensions that result from these opposing points of view can be interpreted as disruptive to efforts to build a narrative inheritance in a particular way. A design approach predicated on this view would frame these values as a conflict in need of arbitration. Yet, I showed in my chapter on family mysteries that the practices that arise out of these

contrasting dynamics are integral to the accomplishment of collective remembering in families. A listener asking for stories in the face of silence could serve as an important prompt for a teller and an indication that a listener is interested in what they have to say. On the other hand, a teller's decision to wait for an indefinite amount of time before telling a story helps ensure the listener has the life experience to understand and appreciate the story. Circumventing a taboo in order to learn more about one's family can reflect a feeling of obligation to learn and pass on as much information to the next generation as possible. These tensions exist, yet somehow families do somehow remember. As I noted in Chapter 4, a key unifying element in the midst of these power dynamics is that people across generations have similar motivations to develop a common, shared understanding of the past.

Thus, I align myself with the alternative view: that these tensions are productive, and without them, family memory could not be co-constructed across generations. I argue that this view is the best way to duly consider the values at work in all parties. With the view as my position, I encounter the final fundamental question. Can a shared system support the kind of rival values that characterize intergenerational family memory sharing? Any technology which mediates the practices of collective remembering must take into account the multiple agential pulls at work in the memory sharing process.

In my next section, I work through this question by laying out design dimensions of a narrative inheritance as they were illuminated by the design and implementation of Scatter. I developed six design dimensions through this process which provide a way for designers to simplify and untangle some of the complex and interconnected values of a narrative inheritance.

## Design Dimensions

Scatter implements values of narrative authority and narrative entitlement, enabling me to work through value tensions that present themselves through design and come to a grounded understanding of some of the design challenges inherent in passing on family memories. As part of the reflexive research through design process, the design rationale for Scatter was worked out through alternating considerations of the interaction design and the theoretical questions at hand.

I situate Scatter along the dimensions of a narrative inheritance that I laid out in Table 3 (full details in Appendix A). Its design and implementation foregrounds the fragmented nature of intergenerational family memory and allows users to think and talk about family stories, or narratives, as collective constructions. I discuss the model of a narrative inheritance represented by the Scatter system as an example of how these design dimensions play out in implementation to navigate tensions and power dynamics across generations. I include references to the given scenario to further ground and explain the social context behind the implementation decisions.

| **(Teller's Agency) Authority** | **(Listener's Agency) Entitlement** |
|---|---|
| Inviolate | Changeable |
| Complete | In-progress |
| Pre-prepared | Ad-hoc constituted |
| Standardized | Flexible / Interpreted |
| Singular | Multiple |
| Gift | Request |

**Table 3. Dimensions of a Narrative Inheritance. I work through each design dimension by discussing Scatter's use in a scenario to create an inviolate, complete, pre-prepared, standardized, multiple, gift.**

## *Treating narratives as artifacts: Inviolate, Complete*

The first question that this design and the presented scenario bring up is whether recorded narratives should be treated as objects, inviolate and self-contained, or as communications, unfolding over time and alterable. This question is determined partly by my choice to use a single, physical token to represent a single recording. Associating recordings with physical tokens, which are relatively unalterable, can carry a perception that the recordings themselves as unable to be changed.

In the scenario, Karen expected her crafted narratives to be passed on in the condition which she created it. This expectation carries with it a sense of reliability in terms of the information passed, because the teller can be sure that all recipients get what they intended. Recipients also have assurance that what they receive is as the teller intended. This reliability reflects a strong

emphasis on narrative authority, as the teller or person crafting the narrative would expect that their arrangement would stand on its own and not be altered in any way.

Alternatively, a system or scenario which frames narratives as communications would enable the constructed narrative to be altered over time, continually reinterpreted by each generation. This re-constructive dynamic reflects the trend in my findings for recipients of family stories to engage in interpretation to try to decipher and understand a story. At times, they would become tellers themselves, reshaping the stories they inherited in light of their own experiences. As an interaction, this might be implemented as an impermanent mosaic where pieces can be taken out, added, or substituted as desired. These physical interactions would also modify the content of the collection. Further, each recording itself could be envisioned as decomposable if the physical tokens associated are mutable. For example, in my prototype of Scatter, icons were simple paper cutout or molded clay shapes. The icons made from these materials can be easily changed or decomposed in meaningful ways, such as tearing a heart shape in half to slice a recording into two halves (such as a proposal and its answer) or taking each of the arms off a 5-point star to separate 5 speakers in a conversation. A future area of work could be to explore different metaphors for semantic physical interactions with audio recorded stories.

### *Authoring a narrative: Pre-prepared, Standardized*

Another dimension that Scatter draws out is whether a narrative is pre-prepared with its content and form determined by the author, or interpreted by the listener. In the scenario, Karen prepares the narrative herself, recording all the content and deciding how to best arrange it for her children and grandchildren. There is a high level of narrative authority and control in this way of crafting a narrative inheritance. This style of working reflects Lindley (2012) and Thiry and Rosson's (2012) findings, as well as my own, that older adults want to tell their story in their own voice.

The alternative is to present a story as co-constructed, inviting input from other tellers or the listeners. For example, Karen might have called on other members of her family to record their take on their "mystery relative" and even invited her children to add their thoughts about this

relative after they received the narrative. These perspectives could be added as pieces of the mosaic, or as alternative viewpoints, to complement her own stories.

Considering constructive input from people other than the author of the recording raised another distinction between who creates the recordings and metadata to be used in Scatter. This raised a key design decision that also mediates narrative authority, and was apparent during design implementation. While I propose in my scenario that the teller has recorded her own content herself, alternative scenarios were discussed just as often in my interviews, such as when a listener is actually the one recording as the teller sharing their stories. While my design is targeted for asynchronous scenarios where the assumed listener and the teller are not co-temporal, it is still possible for a teller to enlist the help of another family member or a third party to record their memories.

The added layer of control between story-teller and story-recorder in a digitally-mediated situation complicates the design of Scatter. In the scenario, Karen has total control and narrative authority—she tells her stories and records them herself, and she also assumes control in arranging the broader narrative that she wants to share. In this circumstance, designers can assume that content of the story, the metadata of the recording, and the interpretation of the narrative are all created with some unifying concept of "the story" in mind. But when these three distinct acts of telling, recording, and arranging are separated, in time and across different people, the designer can no longer assume such a unifying framework.

In my case, I wanted to choose a solution for Scatter that would handle this possibility of distributed creation while also carefully considering the possible control bias towards tellers or listeners. I considered two options, ultimately choosing the second for the current prototype design.

The first option was to associate metadata with the icon shapes, so that only at the point when a narrative is being created is any framing done. This option privileges the arranger/interpreter's framing, which is ideal for the interaction experience of Scatter, where the interpreter is doing most of the work. However, this option makes it difficult to share recordings across different systems. Effort invested in labeling an audio recording in Scatter would not transfer to other

systems, neither would metadata from other systems be transferred to Scatter. This would result in an additional burden placed on the user.

The second option was to associate metadata with recordings, with shapes inheriting this metadata when associated. This allows whomever creates the recording to set the foundational framing of the narrative. (All rules are evaluated based on this metadata.) With this design choice, recordings could carry information independent of how they are interpreted in a given narrative. This allows for the possibility of transfer across applications, and also make Scatter more flexible to allow for re-using the same recording in multiple narratives.

Recognizing the flexibility of distributing narrative control and interpretation across many different people is one benefit of a fragmented approach that can help overcome the uncertainty due to unknown audiences. We return to this in our discussion.

### *Sharing a unique gift: Singular, Gift*

The choice to create a gift incorporates two design dimensions: uniqueness and initiative. First is the question of how the narrative is to be regarded as it is passed down. I noted in my chapter on family memory keeping that a key dilemma for family heirlooms and mementos is whether they are specially treated, and kept a bit distant from everyday life, or used along with ordinary things, and thereby incorporated into daily life. While this choice is ultimately up to the recipient, the design can influence how an artifact is valued.

In Scatter, a crafted narrative artifact could derive value from its uniqueness as a singular object, or take advantage of the affordances of the digital and be duplicated for maximum dissemination. In the scenario, Karen chooses to make several copies of her arrangement, because she wants the information she provides to be as accessible as possible. In an alternative scenario, Karen could have chosen to create an arrangement and keep the original in her own home, only available to her children and grandchildren when they came to visit her. This option would be ideal for someone who was more protective of the content and wanted to ensure that it was only accessed under a specific set of circumstances.

The second dimension considered whether the initiative to create this narrative comes from the teller or from the listener. I refer to this dimension as *gift vs request.* As a gift, such as was envisioned in the scenario, the teller decides that she wants the listener to know something that she thinks is valuable. Thus, she proceeds to prepare some narrative for this purpose. In a request scenario, the listener may ask a question about the teller's life or inquire about some strange trace of the past, prompting the teller to craft a story in response to this question. The listener also might record the response instead, and then craft a narrative according to their own interpretation of this story in relation to others they have heard. When an inheritance is given by request, the listener has more agency in how they interpret the given story or narrative. This is in part because as Lisbeth recalled in Chapter 4, the question helps a story take shape. The question creates a basic mental model which fits the narrative into the listener's view of the past. In contrast, when a narrative is bequeathed with only the context provided by the teller, then the interpretive power primarily belongs to the teller.

A unique artifact might be more likely to be treated with regard and care, especially if its digital content is uniquely encoded as it is with Scatter. Likewise, an object given as a gift activates social norms around gift-giving, meaning that people are more likely to keep and display it rather than letting it lie forgotten in a basement. On the other hand, a person may be more likely to take ownership and responsibility of an artifact that was created from their own request. These dimensions of a narrative inheritance reflect attitudes towards control of a narrative but also have ramifications for how it is integrated into the user's everyday life.

## Summary

Not all the questions around how to handle inherited narratives are worked out through Scatter. The usefulness of Scatter is that it enables me to ask different kinds of questions about the creation and handling of an inherited collection of memory artifacts than I could in my ethnographic work. Insights from my prior studies provided a groundwork for understanding the tensions and power dynamics at work in crafting a narrative inheritance, while the design process gave me more purchase on the ways these values could be enacted through physical and digital interactions.

Inter-generational memory sharing is a multi-directional interaction with push-pull, request-gift dynamics shaping teller-listener roles and experiences. There are many ways that multiple parties can contribute to building a shared narrative such as adding their own knowledge, disputing an interpretation of events, or suppressing details they do not want to be widely shared. The wide and rich complexity of these interactions is far too great for one system to encompass, or even for us as designers to envision at this stage. To make sense of this complexity through this design process, I developed the framework of narrative inheritance which incorporated awareness for designers about the tensions of authority and entitlement.

In this section, I have explored ways of leveraging the conceptual framework of a narrative inheritance to guide the design of memory technologies which navigate the value tensions between teller and listeners in a family. Yet, as I found in my study on family mysteries, as family stories are passed on and on, if these decisions are visible but not explained to the *next* generation, they can give rise to a perception of incompleteness and unresolved mystery. Therefore, a key question remains: How should the interactions and changes that a previous steward of a gifted narrative be communicated to the current steward? How are these dynamics negotiated in an asynchronous, asymmetric, and anonymous interaction context? In the next section, I discuss the concept of "narrative courtesy" to navigate the tensions of a narrative inheritance and engender awareness of the preferences and decisions made by listeners and tellers.

## TOWARDS COURTESY IN BUILDING A NARRATIVE INHERITANCE

In the implications of the chapter on family mysteries, I suggest that the apparent dissonance between generations dealing with an incomplete narrative inheritance might be due in part to a lack of awareness about the actions, motivations, or preferences of the other. Implementing "social translucence" is a popular strategy to address awareness in other systems that mediate communication and social interactions among distributed users. I discuss the limits of this approach in an intergenerational family memory context and propose an alternative concept of "narrative courtesy." Narrative courtesy accounts for the social-technical gap of limited accountability in asymmetric interactions across users and over time.

## The Limits of Social Translucence

The design principle of social translucence (Erickson, Kellogg, and Watson 2000) could help designers think through ways to support intergenerational meaning-making through these systems despite the possible inability to communicate directly. Social translucence uses the design concepts of visibility, awareness, and accountability to enable social interactions between multiple users of a distributed system. This principle could also be employed to communicate the voices, preferences, and conditions that shape family stories and how they are shared. For example, in Scatter, the physical configuration of icons served to make the construction of a narrative more visible and to enable awareness of the fragmented nature of the family stories that were being shared. This transmission of reasoning is critical for systems that function as bridges between ancestors and descendants with different mindsets, opinions, information desires, and interpretative frameworks.

However, traditional communication approaches only enable interactions co-temporal or forward in time. For example, written text can easily convey the thoughts and wishes of a teller, and can be inscribed into any digital or physical material to be passed on with its shared content. In Scatter, sharing the physical configurations that were used to construct a narrative can increase the visibility of a teller's actions and can help recipients understand how a narrative was put together from various pieces. This can reveal some of the interpretative lens of the teller as well. However, this visibility and awareness is not mutual—there is no way for a teller, as a previous user of the system, to gain awareness of the preferences or actions of a listener who interacts with the system later. As a result, the third element of social translucence, accountability, is impossible. Yet, I still believe that it is important for the underlying value-driven decisions of both parties to be revealed to each other.

## Courtesy: A Response to Expressed Preferences

In the absence of accountability, I propose an approach that takes advantage of family relational norms to resolve dissonant values. In the midst of the opposite preferences between tellers and listeners in families, I observed a middle position, *courtesy,* that may be a useful way to bridge the differences for technologies which facilitate intergenerational sharing. Narrative courtesy is, in

essence, a decision by one party not to exercise their narrative power, whether it be authority or entitlement, in opposition to the other party's expressed preferences. This dynamic exists only when preferences are known, and has appeared in my data as actions from both listeners and tellers.

### *Listener's respect*

From listeners, narrative courtesy was enacted as *respect*. Respect is when a silence or other narrative act is observed as is. When a teller exercises the narrative authority to remain silent, keep a secret, or frame a narrative in a particular away, the listener can accept that, even when they know there is something being hidden or obscured. Consider these two examples:

*But I guess these stories... I kinda wonder about 'em but I also respect his privacy. (Gloria)*
*If they don't want to tell me, I leave it alone. (Karen)*

In these example, some curiosity is raised about a particular aspect of the past. However, when a teller exercised their narrative authority, the exchange was settled. The listener chose to respect the actions of the teller. *Respect is* different than a line being drawn by a teller *"and that's it" (Lisbeth)*. Respect is a courtesy offered by listeners to a teller when the teller has made it known that they do not wish to speak on a subject. Out of consideration for the teller's expressed or inferred preferences, a listener will avoid the topic or accept the given narrative. When the narrative courtesy of respect is exercised, the teller does not have to continually re-assert their authority. Their silence, or framing, is kept by the listener.

### *Teller's responsiveness*

The opposite courtesy exists for a teller. A teller's narrative courtesy is *responsiveness.* Responsiveness can be seen when, at times, tellers respond to a request by a listener, even when they may feel that the information requested is unimportant or difficult to share. Some participants described cases where tellers did not have a story but endeavored to "answer their questions." For example, Tina described interactions with a not-talkative grandmother:

*I think with my other grandmother, I would ask her a lot. For her to tell me stuff, because she grew up in Guatemala during a really interesting period… So, she would tell me stories, but for her it wasn't so*

*interesting, it was just how life was for her. So, it wasn't as fluid, she didn't have a story, she would try to answer my questions. – Tina*

In a courteous response, the teller attempts to respond to the requests of the listener, although there still might be some reticence or reluctance there. Responsiveness is in direct contrast to complete silence because there are some anecdotes or pieces of information that is conveyed, even if it isn't a full narrative.

Participants also discussed sharing out of obligation, so that future generations would be able to benefit from the knowledge they had. Obligation is a distinct dynamic from narrative courtesy. Obligation is often internally motivated by some perception of the teller. Courtesy on the other hand is a response to an expressed preference by a listener.

### *Courtesy in the social-technical gap*

Courtesy is easy to request and to recognize in hindsight. However, it may be hard to express preferences to a fidelity that makes narrative courtesy achievable in practice. This difficulty in expressing preferences is exacerbated by the temporality of the interactions around family memory. Generally, participants knew what their close ancestors wanted to talk about and what not to, and could act in courteous ways. This would constitute "reactive" courtesy. However, they did not have this information about more distant relatives.

Participants in older generations were very unsure about what younger generations would want to know unless they were directly asked. To overcome this uncertainty, they created personas based on their own ideals or told stories they themselves wanted to hear. For a teller to anticipate the preferences of their audience and try to respond would be "proactive courtesy."

The circumstances needed for reactive courtesy (from listeners to tellers) is much easier to achieve than proactive courtesy. A variety of communication mediums exist for people to express why they want their stories to be accessed in a certain way to a future audience. Digital legacy systems that enable sending messages from beyond the grave could even be employed for this purpose.

Designers can implement features into their systems that privilege a more authoritative or entitled orientation to content. Regardless of this, users who come to the interaction as tellers or listeners have a choice about how to engage with the content as it is presented and the preferences and decisions made apparent through the interface. A courtesy approach by definition cannot be enforced and instead depends on strong, densely connected relationships to ensure courtesy is observed.

Courtesy is necessary to negotiate the dynamics of narrative control in family memory. It is impossible to design systems that assume neutrality, enabling both narrative authority and narrative entitlement. The theoretical concept of collective memory is, for all its explanatory power, an abstraction. The power of research-through-design is that it helps identity these kinds of gaps in theory. The abstract idea of intergenerational family memory is able to support competing notions of narrative authority and entitlement because people are interacting with their intersubjective understanding of a story, not the story itself. On the other hand, a recorded narrative, when concretized as a digital object and a physical icon in Scatter, cannot support two simultaneous orientations of authority or entitlement. These cannot be both supported because they are value tensions— by definition they cannot coexist in a design. Scatter can support multiple simultaneous users, but not simultaneous dissonant values. Courtesy therefore, reframes the Scatter platform and the assembled stories it organizes as a scaffold for mediated control of a narrative, but returns the actual negotiation of this control to the users.

## PRELIMINARY REFLECTIONS AND FUTURE DIRECTIONS

Through the process of designing Scatter, I gained significant insight on ways to operationalize the findings from previous studies for the design of technologies to convey a narrative inheritance. I expanded my concept of narrative inheritance into a design framework with the concepts of narrative authority and narrative entitlement, and propose narrative courtesy as a sociotechnical design approach which acknowledges the inevitability of dissonant values and the impossibility of perfect foresight in family memory. I developed the dimensions of narrative inheritance along the lines of these tensions through storyboarding, scenarios and prototypes, all informed and refined by ethnographic work in prior chapters. To address tensions in a narrative

inheritance, I proposed courtesy as a sociotechnical design approach. The most intractable of the wicked problems I identified, anticipating future audiences, may be productively designed around with the concept of narrative courtesy. In future work, I will further explore ways to incorporate these features into design and how these practices play out in everyday life.

I have started gaining preliminary critiques and feedback about Scatter and will use this feedback to refine and further develop the design dimensions presented in this chapter. It is my aim to deepen out this work in the future through the development of a suite of designs that can be the basis for a design space for value-sensitive design of intergenerational family memory technologies. However, I believe these insights and refinements will develop over a longer-term research agenda than possible in this thesis. Therefore, to close, I will briefly describe directions for future work for Scatter.

**Implementing Courtesy.** While Scatter implements narrative authority through arrangements and *rules*, a courteous approach might be to employ arrangements and *suggestions.* Arrangements provide the fundamental shape of the narrative, reflecting what story should be told. Rules, however, are rigid confines that serve primarily to restrict access to a narrative or parts of it. Instead, those arranging a narrative might want to offer *suggestions* to future listeners about how best to listen to this story rather than directly controlling the playback. These suggestions could also serve to inform listeners about what they are trying to access, forming the audio equivalent of a digital photo thumbnail.

Suggestions, like rules, can be layered. Each recipient who chooses to pass on a narrative can add their own suggestions for listeners. Suggestions may be implemented in a variety of ways; for example, they could be rules that are easily overridden, or, as one respondent suggested, "preludes" that incorporate the teller's opinion or other contextualizing information. Rules, which were envisioned only for access permissions, and suggestions, which may be broader, are not mutually exclusive. Scatter, and other family memory technologies, could incorporate both, leading to a wider variety of authority and entitlement negotiations in families. Exploring ways to implement and evaluate narrative courtesy in a variety of different scenarios is a potentially rich, long-term area of future work.

**Signaling Emotion.** A characteristic of family memory is its emotionality. A respondent described her stories as "light" or "heavy" to describe the emotional weight of the story. The weight was not necessarily tied to positive or negative valence, but heavy in this case inferred solemnity. The weight of the recordings affected where they might be placed around the home, with "light" recordings taking more playful forms for display and "heavy" recordings placed more carefully to avoid inadvertent access. However, as I noted in the chapter on curation, the emotion associated with a memory artifact is based on perception as well as the character of the content itself. The valence perceived by a person can change over time, sometimes quite suddenly, as with a tragedy or significant life event. Moreover, multiple members of a family may not have the same perception of an artifact (in case of family feud, for instance). One area of future work is to develop artifacts with emotive forms that reflect the valence of the story associated with them. This would make artifacts more iconic and transparent with respect to the character of the stories they contain, scaffolding other interactions to place or arrange memory artifacts. While there has been research in design about emotionally expressive design in tangible computing, this has primarily been theorized in the abstract or a part of a distance communication tool (e.g. Petrelli et al. 2016). This work has not yet been applied practically to making iconic emotive objects, such as memory artifacts. Moreover, an open question remains of how to create emotive interfaces with some level of mutability to reflect changing valence over time or across different members of the family.

**Giving gifts.** Aesthetic and social uses like gift giving and unique home decorations provide two immediate benefits for organizing a collection of digital mementos. As I saw in my study on curating large collections, often the envisioned purpose, or "project," served as an important motivator for curation and influenced the form and content of a memory artifact. However, creative uses of inherited content might be restricted for those who are operating in a steward role and expected to handle their stories in a certain way. These expectations are often derived from cultural memory, adapted by each family to fit their specific purposes (Erll and Kurian 2011; Kirk and Sellen 2010; Petrelli and Light 2014). Yet, there is opportunity here. Because audio and interactive artifacts are not as familiar in cultural memory, in comparison to visual artifacts such as photos, designers have a unique opportunity to participate in shaping the ways

that these technologies become integrated into everyday life and culture. In design critiques, respondents had great excitement about using Scatter to create unique gifts for other family members (especially of recordings of children). Although Scatter was envisioned for weightier conceptualizations of a narrative inheritance, the design features lend themselves to appropriation for other lighter uses as well. As the chapter on KidKeeper demonstrated, even relatively "fun" design cases can reveal a great deal of insight for wrestling with the wicked problems inherent in family memory technologies. An opportunity for future work related to gift-giving is to future explore the design of a narrative gift. Prior studies on generating audio mementos show that rarely do people share their audio mementos with others. In my interviews with participants, only a few had ever even thought about sharing an audio recording they had created with someone else, citing it as an affordance issue. It is possible that the tangible approach and metaphorical fragmentation of Scatter sparked new ideas in respondents. This presents an open area of research that presents both theoretical and practical design questions.

## CHAPTER CONCLUSION

In this chapter I present Scatter as a design for narrative construction and an analytical device for reason through a design framework for mediating the value tensions in the social construction of family memory. Scatter itself represents a novel approach to the management of digital mementos. The design reimagines storage as a backstage area, an intermediate waypoint for content destined for display and interaction, rather than a passive resting place. It disintegrates collections of digital mementos into an assemblage of artifacts, and enables a variety of organization schemes, including spatial, topical, and chronological. It enables rule-based content access and uses public display as its primary content management tool. Scatter leverages tangibility to make curatorial selection and arrangement decisions visible to non-authors, as well as to enable curated collections to be embedded into home environments.

Scatter motivates its use through a combination of aesthetics, immediate and long-term functionality. It provides users with a polished, visually appealing narrative artifact that can be given away to others or displayed in one's own home. Crafted narrative artifacts also serve as long-term vehicles of digital narratives that can survive over time and across multiple owners. As

a research artifact, Scatter also provides a platform for continued investigation into values at play in social interactions with shared digital mementos, collaborative narrative authoring using collections of distributed content, and creative uses of aesthetic tangible audio displays.

The design, implementation, and interrogation of Scatter helped me to identify ways to identify and translate key value tensions at work in passing on a narrative inheritance. The design framework I develop provides awareness and direction for designers creating family memory sharing technologies that account for dissonant values among users. This framework outlines design dimensions which support narrative authority or entitlement in the negotiated control of narratives. Working through Scatter also helped identify and bridge the social-technical gap of negotiating control in asymmetric interactions through the concept of narrative courtesy. As conciliatory strategies, proactive courtesy and reactive courtesy create structures for people to articulate and be made aware of the preferences of other users of the system, even when direct interaction and communication is not possible. Courtesy relies on social norms and involves relinquishing some control of a story in response to other's preferences in order to better facilitate passing on narrative inheritance. In future work, I will further explore ways to incorporate these features into design and how these practices play out in everyday life.

# CHAPTER 9 - CONCLUSION AND FUTURE WORK

The goal of this thesis was to better understand the values and collective practices of intergenerational family memory in order to better design technologies that mediate memory sharing. I adopted a mixed methodology combining ethnographic study and a research-through-design, focused by the lenses of symbolic interactionism and value-sensitive design.

Through a series of studies, this thesis lays out: 1) a practice-oriented description of family memory sharing; 2) an analysis of the values at work and under tension in the social organization of family memory artifacts; 3) two design studies exploring approaches to embed and mediate the values and practices of multi-user, multi-lifespan family memory systems, and 4) a design framework of a "narrative inheritance" to bridge theory and design to navigate the value tensions in family memory as it is mediated through digital technologies.

To conclude, I will give a brief summary of each chapter and the lessons learned about passing on a narrative inheritance. Then I will reflect on the methodology used throughout this thesis and close with some directions for future work.

## CHAPTER SUMMARIES

The first study of family memory keeping characterized the motivations and challenges facing "keepers" or people in a family invested in building, maintaining, and passing on family memory to future generations. The findings also outlined the practices involved in creating an intergenerational memory "for the family," including *finding* the story, *deciphering* the story, and *passing on* the story. I highlighted that people had different attitudes towards their family memory, which influenced the ways that they participated in family memory sharing. I classify these attitudes by expanding the concept of "steward" to include "conduits." Conduits are people who come into possession of memories but whose handling of these memories is driven primarily by personal interests rather than familial expectations. People who have a stewarding attitude, in

contrast, act according to social values that reflected the preferences of other family members as well as their own. This dynamic emerges again in the chapter on curation. In addition to these storytelling practices, I noted that family memory sharing is already a mediated action, with concomitant dilemmas that will likely transfer as families turn to digital media. These dilemmas include how to communicate the significance of an artifact while integrating it into everyday life, how to ensure an artifact survives its passage through time and through the changing of hands, and how to navigate the tensions of knowing and privacy when deciding to preserve intimate personal accounts for future generations. This chapter brought out issues that were social, temporal, and material that were further explored in subsequent studies.

The second study dove deeper into some of the value tensions identified in the first study, especially those that work together to create uncertainty and doubt. I use the lens of an incomplete narrative inheritance to frame and explain the ways that family members, as listeners, respond to uncertainty when it was perceived in inherited memories. I argue that the problematic incompleteness of a narrative inheritance can, in many respects, be resolved over time. This temporality is not simply chronological; it serves to create distance from an emotionally wrought past, to ensure the readiness of a prospective audience, or to wait for an opportune and appropriate context for situated storytelling. From these findings, I show that perceived "holes" or narrative conflicts can result from listeners' lack of awareness of how tellers worked around the dilemmas of media or were actively shaping the narrative they wanted to share. The key lesson laid in reframing the notion of incompleteness from a disrupted inheritance to one that is gradually revealed and unfolding according to the same value-driven social, temporal, and material practices discussed in the first chapter. This framing yields opportunities for design work to serve as an executor of a narrative inheritance, responding to preferences of tellers passing on family memory as well as to the desires of recipients. This chapter synthesizes findings from the first and second study to characterize family memory as a mediated action. Through this, I propose three characteristics a narrative inheritance to inform design: 1) Memory is fragmented, 2) Revelation is conditional, 3) Control is negotiated. These claims are strengthened by findings in Chapter 6 and 7, and direct the design of the Scatter prototype in Chapter 8.

The third study examines the opposite problem, moving from a narrative inheritance that is incomplete to overabundance of memory artifacts. I use the metaphor of an "infinite basement" to unify social and technical concerns of overload and overabundance relating to memory artifacts and the challenges of curating digital content. Using this metaphor, I unpack "curation" into a set of motivations and practices through which people leveraged storage, selection, and display to draw attention to important memory artifacts in their possession and integrate them into their lives. With a focus on what people do with their memory artifacts, I gain critical insight into how the wicked problems of anticipating the future and negotiating dissonant values interact to create the problem of overload. I also note the attitudes that influence how and when people engage with family memory, which are characterized in the chapter as curation regimes. As digital capture technologies proliferate and people increasingly create and keep digital content that has some memory or sentimental purpose, it will be important for designers to support the value-laden ways that people approach curating their collections to ensure memory artifacts maintain significance and survive to be passed on to the next generation.

The first three studies answer my first two research questions: "How do families collectively create and pass on their family memory?" and "How do families effectively manage the memory artifacts- digital and physical- that they collect?" They also revealed some of the challenges that families face in these endeavors, including tensions in different attitudes across members of the family, tradeoffs of using mediated forms of memory, and control dynamics of family memory across generations. These challenges reveal more of the nature of the three wicked problems identified, curation at scale, negotiating dissonant values, and anticipating future audiences, as they interact and complicate family memory sharing.

The struggle to anticipate future audience pervaded each of our studies. Most of the decisions families were making to preserve their memories in some mediated form were future-oriented and thus directed to an ambiguous audience and context. Tellers satisficed by projecting some known person into the future, either imagining themselves as the recipient, or by anticipating that their children might gain an interest, or by disregarding the future altogether and doing what they liked. In this uncertainty, families who were keeping artifacts often held onto too much content to allow for the chance that someone might want it later, and were overwhelmed

with the prospect of making permanent decisions about what to keep or discard in the midst of this uncertainty. Anticipation of the future is a key feature of intergenerational family memory, yet the inherent uncertainty it introduces makes crafting a narrative inheritance difficult to carry out. However, this reality is inescapable. Anticipation of the future cannot be solved, but it can be accounted for. Therefore, the two design chapters explore further the interactions between the three wicked problems. They foreground overload and dissonant values as key sociotechnical issues for technologies which mediate a narrative inheritance and consider ways to help families relieve the burden of anticipation.

The fourth study, and first design study, KidKeeper, explored these issues for technologies that capture family memories. It implements a design strategy of "integrated capture" to embed capture technologies into everyday activities. Through this design study, I foreground aspects of negotiated control as it plays out in capture and preservation activities by parents and children and continue my investigation into the overload of digital mementos. Through a field study and interviews, I examine the values of families who are involved in creating digital content to save for future memories. I found that the values expressed by parents capturing memories of their children are quite close to the values expressed by tellers and listeners in prior chapters. Namely, parents wanted to capture and preserve the personality of their children as they grew. KidKeeper also demonstrated the power of design as a value mediator. KidKeeper's embodiment as a toy activated social norms around toys, including parents' surrender of control of the toy's recording capabilities to their children. Although parents discussed several ways they could have intervened to gather mementos that were more meaningful to them, they did not stop their children from using KidKeeper merely as a toy during the study. This could change over time, but it points to some strength of embedding memory technologies into things with norms of use already attached. Another important observation from this study was that parents wanted to avoid interaction with large collections of unfiltered content. Even though capture of "everyday moments" was their expressed desire, without some curatorial help for the volume of content generated, this captured content would likely never gain the significance needed to become part of a narrative inheritance.

My final chapter focused on the development of a curatorial platform to help families makes sense of and create narratives out of collections of digital audio mementos. This chapter synthesizes findings from the previous studies, including ways to tackle the wicked problems, into a design framework for passing on a narrative inheritance. With this framework, I translate the values of authority and entitlement into design dimensions which explain the cross-generational push and pull of a narrative inheritance. I laid out six dimensions in this framework to describe design values that are more authoritative, controlled by a teller's preference, or entitled, responsive to a listener's agency. I designed and implemented Scatter as a way to build out and refine these dimensions. Scatter features curation as its main activity, engages with the problem of overload by reframing curation as an ongoing interaction and a distinct activity from capturing and revisiting a collection. I also use Scatter to propose partial ways to address the negotiation of dissonant values through "narrative courtesy." Courtesy is a sociotechnical approach to negotiating the control of a narrative inheritance in the asymmetric setting of intergenerational family memory. This approach makes visible the interactions and expressed control preferences of prior contributors and offers current users opportunities to respond according to their social norms. The design framework and concepts reframe the wicked problems of anticipation and negotiation into dimensions of mediated participation in an ongoing co-constructive process. The development of this design space is an area of future work.

## Reflections On Method

Most family memory technologies have some underlying social value driving the design and implementation of the system. Yet, all of our ethnographic work points to family memory as an exercise of negotiating and reconciling values in conflict. Different generations have different socio-cultural values that influence their interpretation of the past and the present. Individual personality and experiences shape how people remember situations and people. While it might be convenient to treat "the family" as a unit, unified by a common identity and common values, in reality this unity is a social construction carried out *through* memory sharing.

The research process to unpack the values and behaviors in these interactions involved several oscillations between design and ethnography. Ethnography gave me context and motivation,

which I tried to answer in design. When I was stymied in my design work by a value conflict, I went back to ethnography to try to work through it. Sometimes a paradoxical value conflict was tackled in two ways at once, and the combination of insights helped me to make progress on deconstructing problem. For example, insights from both the Infinite Basement and KidKeeper studies about overload of sentimental artifacts led to insights about curation regimes needed to address the wicked problem of curation in large collections. These in turn became a key motivation for the arrangement activities supported by Scatter, and the obligate analysis of the power dynamics at play.

The last chapter illustrates a point where there were no more explicit questions to ask. As I pointed out in my introduction, the challenges that had to be addressed were examples of the social-technical gap, where technical features could not completely meet social requirements, and value tensions, where any embedded value in a system would counter another. The design framework of narrative inheritance that I propose emerged from synthesizing the findings of prior studies, in concert with trying to find a way to address the inevitability of situations where tellers and listeners were not always aligned. The designs reinterpreted all of the findings several times over, and each study contributed to complicating a particular design direction. After many ideas and prototypes, Scatter eventually became the design "with legs," so to speak. The implications for design that Scatter embodies could have been implemented a number of ways. However, unlike a reductionist design objective intended to create "the best design," each design decision carries theoretical and practical weight.

The goal of designing and implementing Scatter was not to arrive at a final solution, but to further illuminate and work through the tangled and complex sociotechnical scenario of family memory. Scatter embodies the reality of fragmentation, coupled with the need for curation, and the desire for embedded material interaction became the inspiration for this design idea. Thinking about how this platform surfed between tellers and listeners raised questions such as, "Who is it really for?" and "Who gets to craft the story?" These questions made the value tensions of narrative authority and entitlement salient. This lens allowed for reinterpreting the data in terms of listener and teller motivations and information and emotional goals, as well as arrangement and crafting activities.

I note my own value move in this thesis in turning to narrative courtesy as the “aha!” approach to design. Another opposite approach presented itself during my analysis: that of "Janus-face" design. "Janus-faced” technologies are conceptualized by Michael Arnold, a technology philosopher, as systems which are designed to do one thing, and may perform in such a way from one perspective, but in fact have opposite, “ironic, perverse, and paradoxical” effects (Arnold 2003). He gives car brakes as an example, where the evolution and advancement of braking technologies, which slow cars down, actually enable people to drive faster. His analysis focuses on mobile phones which are designed for increased closeness through constant connectivity and mediated communication, but, he argues, actually destroy closeness by destabilizing the very idea of distance.

This argument is similar to the cautionary tone taken by Sherry Turkle in her critique of the social distance created by constant social media and communication technologies in “Alone Together” (Turkle 2011). She argues, as does Arnold, that technologies reorient and structure our understanding of the world. Humans do not only simply use technologies in some objective “real life,” but rather technologies “enframe” the world, “such that the question changes along with the answer” (Arnold 2003). The tendency for technologies to restructure the user’s perception of the situation and perform paradoxically has already been levied at memory technologies, by the popular press and in research literature. For example, opponents of a positivist, preservationist approaches to memory critique ideas like “total capture” as inevitable loss (Bannon 2006). This rather dystopian view raises the question of whether memory sharing technologies, even carefully designed, could work against the values of families to pass on memories?

I think it is possible. What I call a “Janus principle” presented itself in the design process of Scatter (which shows that this contradictory character of technologies can be intentionally designed, it is not only emergent in-situ). The design of Scatter is predicated on the control of disclosure and the presentation of content. Supporting a Goffman-esque performance of memory sharing, it offers rules to users to determine what content can play when and prioritizes privacy by implementing a rule for complete silence. These features all work to restrict access to content. Yet, the driving value that I had for this design was actually to enable and promote access to

family stories. By offering all these protective features, storytellers would feel more comfortable opening up and telling their stories, sharing information and experiences that they might not otherwise discuss or record without such assurances. In this way, Scatter became an ironic design in which restraint engenders liberation.

However, intentionally following a Janus-faced design approach, by creating technologies which purport to do one thing while actually doing another, is rather unethical in my view. Instead, I proposed courtesy as a sociotechnical interaction to make visible the contradictory performance of a system and encourage social norms to develop in reaction to these tensions. Family memory is rife with dilemmas of this sort, and new technologies will not be immune, even those that are optimistically envisioned as objective mediators. Perhaps the takeaway of this dissertation in this respect is that design for socially complex, real-world interactions, like family memory sharing, must embrace the inner paradox of these mediating technologies and systems.

## FUTURE WORK

The sociotechnical space that this thesis enters into is significant and largely unexplored. The studies I presented begin to make inroads into understanding the complexity of family memory sharing and unraveling its wicked problems as it is mediated and moves into the digital realm. The design framework builds a conceptual bridge for designers to understand the dynamics and use existing technologies or to guide the design of novel systems for this context and its activities. The potential for future work is enormous, so in this section I will detail a few future questions that I envision working on to further deepen my understanding of design for a narrative inheritance.

**How do current authors of biographical mementos envision the narrative inheritance they are passing on to others?** A remaining question in the theoretical framework of narrative inheritance is how personal memories come to be regarded as family memories. Lindley has noted this process in her treatment of grandparent's memoirs about their lives (2010), and the studies of this thesis have added more detail to that note. In my data, I saw individuals preparing informational biographies from inherited stories on behalf of others, and also telling autobiographical stories about their family from their own memory. Yet, my participants were

not able to strongly articulate what about *themselves* they wished to leave behind, even as they worked to memorialize others. Whether they did not care or were avoiding the thought, unpacking the values of a personal legacy in the context of family memory is an intriguing area of future work. As well, this might be an area where the difficulty in articulating these values makes a reflective research-through-design approach more profitable than an ethnographic approach.

**What possibilities exist for discovery, revelation, and obfuscation when narratives are tied to artifacts?** My design studies lean more towards memory sharing as a revelatory interaction. They support information being shared and made more accessible. But my findings show that family memory also involves interactions like searching for a story or trying to hide some information from oneself or others. Future work would expand the design explorations started by Scatter to include other activities and dimensions of a narrative inheritance. Designing for discovery, for example, explores a more distributed idea of mediated memory, where audio recorded stories are not stored on one single platform but distributed among many pieces that can be integrated (or even hidden) in the home landscape as decoration, pieces of furniture, or other functional objects. On the other hand, a revelatory design relies more on timing than placement, allowing and disallowing access to a story according to current events or the passage of time. A contrast might be an obfuscation design which prioritizes the privacy and secrecy of a narrative, perhaps recorded as a confessional and only available out of obligation. In each of these modes of design, designers and users can negotiate a narrator's authority or a listener's entitlement. Future design work might include research probes and prototypes, like KidKeeper and Scatter, which explore the values at work or could also be more robust systems intended for long-term use.

**How can design for a narrative inheritance be translated to a larger community context?** This opportunity has raised quite a bit of excitement from lay people, archivists, and community historians searching for ways to preserve and tell the stories of their neighborhoods or social groups. Many small and large memory institutions (libraries, museums, archives) have collected and digitized oral and written histories from the communities they serve, ranging from large-scale efforts like the StoryCorps national folk history archive[13] to regional initiatives like the

[13] http://www.storycorps.org

Living Oral History Project in Washtenaw County, Michigan[14]. There is a rich area of exploration to make these archives more accessible and engaging to people in everyday life, and to encourage interaction with these shared narratives from people from the past. Though many of the practices may appear similar, community memory is a distinct theoretical concept from family memory. In particular, the strength of personal relationships, the emotional attachment, and the notion of egalitarian contribution in family memory may not be present in a community memory, and should not be assumed as a value for design. There have been some promising approaches to mediated community memory that could inform a transition between the work of this thesis and design in larger social collectivities. Smyth et al.'s development of the Liberian collective memory system MOSES demonstrated one approach to collaboratively building community memory that also foregrounded values in design (Smyth, Etherton, and Best 2010). MOSES was an interactive video kiosk envisioned as part of a neighborhood town square where people could come and record videos of themselves talking about their life and watch the videos of others. The MOSES kiosk travelled around Liberia, enabling people to hear the stories of people across the country. The design was intended to support peace and reconciliation in Liberia after a long civil war. Design such as these which support the value of the exchange as well as the social interactions in storytelling are open design space for future collective memory technologies.

## CLOSING

There are several different research threads that the studies of this thesis cover. I include a description and analysis of social practices around memory sharing from multiple generational perspectives, and I designed and investigated artifacts that embedded digital mementos into everyday life, introduced novel archival strategies for better management of digital mementos, and implemented unobtrusive capture of mementos from everyday life. Through these varied studies, I triangulate on ways to mediate the construction of family memory as it is passed from generation to generation. The metaphor of a narrative inheritance and the design framework developed through this analytical lens opens up many promising directions for future work

[14] http://www.aadl.org/aachmvideos

addressing the practices and values of the many people invested in creating and sharing intergenerational family memory.

## Limitations

This thesis was largely exploratory, delving into several different issues far more complex than could be exhaustively analyzed. These studies helped gain insight into a particularly difficult set of interconnected problems, and detangle them into more analytic problems that can be addressed through empirical or experimental work. For instance, the designs presented in this thesis could be refined and implemented on a larger scale, both with more people and over longer periods of time. This would further develop a more nuanced understanding of the dynamics of family memory that I identify, like a more detailed characterization of how memory sharing values evolve over time due to age, personal identity, and changing relationships.

A second limitation is my scope. The data collected and the design framework developed in this thesis is grounded in American sociocultural environment. Although American families are not heterogeneous, they share common cultural mnemonic traditions and social expectations that may not translate to other cultures. For example, while in this work "keepers" were self-appointed volunteers, in other cultural contexts the keeper of family memory might be a designated, socially-recognized role into which one is born into and trained for. Other work in HCI, like the StoryBeads project has explored design in these contexts with promising results (Reitsma, Smith, and van den Hoven 2013). Future work, especially moving into the realm of community memory can further explore these variances and help to build a more inclusive model of intergenerational family memory sharing.

## Contributions

To reiterate the contributions of this thesis, I have:

> 1) Identified the practices enacted by families sharing memories with future generations, especially navigating mediation dilemmas,
>
> 2) Developed an understanding of how recipients of shared family memories respond to and interpret the challenges of a narrative inheritance of incompleteness and overabundance,

3) Explored the design space of multi-lifespan systems for capturing, curating, and passing on a "narrative inheritance" through the development of KidKeeper and Scatter,

4) Developed a conceptual framework for the design of technologies for a "narrative inheritance" that navigate the multiple values involved in the social context of intergenerational family memory.

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# APPENDIX A – DIMENSIONS OF A NARRATIVE INHERITANCE

| **Inviolate** | **Changeable** |
|---|---|
| ▪ Exercise of narrative authority, absolute control from creator<br>▪ Versioning<br>▪ Reliability: each person that interacts can expect similar experience and behavior<br>▪ treated as an artifact<br>▪ heirloom: remain as close to original condition as possible<br>▪ prioritize origin | ▪ Exercise of re-interpretation, recipients/conduits have authority to revise the story<br>▪ As story evolves, still perceived as the "same" (linked to same object)<br>▪ Story reflects the most recent keeper / conduit's preferences |
| **Complete** | **In progress** |
| ▪ The "story" is conceptualized as a known entity with all constituent parts<br>▪ It's easy to tell when a part is missing (incomplete)<br>▪ Additional meta-behaviors can be related to the "story" as an entity | ▪ Many pieces come together into an ad-hoc defined story<br>▪ Sense of "completeness" is determined by the listener, no definite finish<br>▪ Allows for emergent associations between stories in light of new or changing information / relationship<br>▪ May not result in a coherent narrative |
| **Pre-prepared** | **Co - constructed** |
| ▪ All forms / rules / setting created at the point of recording (roughly)<br>▪ Allows more finished presentation, depict complete narratives<br>▪ Atemporal, allows for one party to complete the work<br>▪ Gives greater flexibility and authorship to "author" or originator | ▪ Creating forms, assigning rules requires conversation between generations<br>▪ Less uncertainty about what the other wants to say/hear<br>▪ Develop sense of shared significance from shared work<br>▪ Younger generation take more ownership of the story as their own<br>▪ More possibilities (creativity) in the narrative |
| **Standardized** | **Interpreted / Flexible** |
| ▪ There is an expected way that a narrative is passed, made apparent<br>▪ Enable some level of exchange about teller expectations and preferences<br>▪ Facilitate prescriptive interactions with more sensitive or socially complex stories | ▪ No expected structure, discretion of listener<br>▪ Enable more spontaneity and exploration<br>▪ Easier to access b/c not as many rules<br>▪ More amenable to building a subjective view of shared history<br>▪ Enables more personalized retelling |

| **Singular** | **Multiple** |
|---|---|
| ▪ One story, one object<br>▪ Simpler to change and recognize changes<br>▪ Maps symbolic object to story in a clear way<br>▪ Ownership and stewardship of a single item<br>▪ Duplication possible but limited<br>▪ More control possible<br>▪ More precious in its uniqueness<br>▪ Supports traditions and rituals arounds its use | ▪ Many duplicates, each person has a piece, a stake, a memento<br>▪ Each duplicate can be repurposed at will<br>▪ Easily rectified if lost (make/obtain another)<br>▪ More accessible to a broader range of people |
| **Gift** | **Request** |
| ▪ Something thought out, intentionally packaged to give to another<br>▪ Sense of completeness (to the giver)<br>▪ Significant gesture that can add value<br>▪ Ensures the content matches the audience<br>▪ Only includes what the teller/conduit wanted to pass on<br>▪ Can give something unanticipated or unexpected | ▪ Recipient can indicate what they are interested in<br>▪ Ask for answers to questions (but according to younger generations' mental model)<br>▪ Receive narratives that one expects, no extraneous<br>▪ Recipient more likely to value /take ownership since it was their choice to receive<br>▪ Question provides context |

# APPENDIX B – SCATTER STORYBOARDS

# Appendix C – Scatter Scenarios

**Scatter 1: Karen's Family History:**
*(Inviolate, Complete, Pre-Prepared, Standardized, Multiple, Gift)*

Karen prepared Scatter to share an interesting narrative with her children, nieces and nephews. She is excited to share with them all the information about their ancestors she has gathered and compiled over the years. She really wants them to understand the personalities of people they never got a chance to meet and to connect with their history.

One narrative she wants to share is about their "mystery narrative." She will share how she first discovered the mystery man in a photo and how it was hard to find out anything about him. Then she will share what she found out about his adoption and his life with her grandparents, and how she found more information about this relative through another family. She still doesn't know how the mystery man is related to her family, so she will have a small explanation about that, with her speculations as to how he might be. Since she might find out later, she will update that part in the future.

Karen has already recorded several parts of the mystery-relative narrative because she was planning to make a voice-over slide-show of pictures on a DVD. She wants to pass on the pictures, but she likes Scatter as way to playback the audio because she can focus on the story and how she wants it to connect together, even if it is not linear. The physical design of Scatter is interesting for Karen, and she thinks it could be wall art for her daughter, who likes to collect abstract paintings. This way, it won't become forgotten on a hard drive or require them to hook up the computer to the TV.

She is planning to make several copies of this Scatter narrative, one for each of her adult children, nieces, and nephews. She hopes they can listen to it during family reunions and also when they are looking through the photo albums with their own children to understand the stories behind the faces.

**Scatter 2: Tina's Grandma:**
*(Changeable, In-Progress, Co-Constructed, Interpreted, Multiple, Gift)*

Tina spent a year living with grandmother in Guatemala to learn more about her heritage and to get to know her grandmother better. While she was there, she recorded lots of her grandmother's stories. They were so interesting, and she wanted to share them with her parents back home and her future children too. Plus, she was a historian, and every good historian preserves these things!

Her grandmother passed away a couple months ago, and now Tina is trying to think of way to preserve all the stories she's recorded.

Her grandmother really liked flowers, and always had an optimistic personality, so Tina orders dozens of Scatter pieces that looked like glass-pressed flowers. She imagines making a window hanging that can reflect light through it, filled with her grandmother's stories. She uses the Scatter utility on her computer to quickly upload and save the many recordings she has to each of the glass Scatter pieces.

Over the next couple months, when she has some free time and wants to reminisce about her grandmother, Tina chooses a few flower pieces and hangs them on her Scatter board to playback the stories associated. She marks a couple keywords on the back with a silver pin so she can remember which one is which— she has almost 50 of them! Sometimes her 5-year-old daughter Anita comes to listen to the stories with her. They like to sit on the couch together and listen to them with their eyes closed. Even though Anita was too young to meet her grandmother, she can recognize her voice when she hears it now.

Eventually, after going through most of them, Tina decided to attach jewelry hooks to the edges of each piece and hang them, 10 to a string, from her curtain rod in the kitchen, a constant reminder of her grandmother's presence and her stories, in her favorite place.

**Scatter 3: Alex's Memorial**
*(Inviolate, In-Progress, Pre-Prepared, Flexible, Singular, Gift)*

The Lee's daughter, Alex, drowned suddenly while she was studying abroad in Spain. She had been there for over two years, studying medieval Spanish religion and Latin philosophy. She had many friends from the college and dorm there, as well as at her university back home. Her parents travelled to Spain, and while they were there, they decided to dedicate a jacaranda tree to her on the campus where she had so many great experiences. A few of her friends from her dorm got together and ordered a Scatter kit with purple acrylic flowers as pieces. During a memorial service, they each recorded a few words of their favorite memories with Alex, saying things that made them laugh, or adventures they had with her. After each person spoke, they saved their recordings to their flowers and hung them in its branches. On Facebook, a few of Alex's friends and family back home heard about the memorial and decided to contribute. They got different colors of flowers (white for the family, pink for her friends), recorded and saved their memories, and then sent them to Spain to be hung alongside others. Since Alex had no children or siblings, the tree will serve as a way for her story to be told to future generations.

**Scatter 4: The Firstborns in the Family**
*(Inviolate, In-progress, Co-constructed, Standardized, Legible, Singular, Request)*

This crafted narrative tells a brief history of all the firstborn family members in each generation. Starting from the oldest son and daughter of the Hopewell children, Robert and Rose, to the oldest grandchildren, to the oldest great-grandchildren, and so on. The tradition of the family started when the 5th generation grandchild was born, leaving 5 living generations of the family at once. One of the grandchildren asked if parents of the "firstborns" could share their memories of their first child— especially how they came to be and their early years. All of the parents agreed, and some of the older generations decided to use StoryCorps to make their stories public and part of the area's history. Others recorded privately using the Scatter utility app, and reflected on what the preferences for sharing this story would be. On the 5th generation baby's first Christmas, the stories of the "firstborns" were collected through the Scatter app by the lead grandchild, with external sources downloaded with open preferences, and uploaded to a collection of Scatter pieces embedded into quilt squares. The matriarch of the family was a quilter, and she stitched all the quilt squares together in a spiral, with the 5th generation, inscribed with a muffin depicting her baby name "Muffin," as the last square in the outer loop of the spiral.

The quilt was hung in the family room of the Hopewell's house. Every time the family gathers or someone comes to visit, the matriarch grandma encourages them to listen to some of the stories that she's so proud of.

Not all of the squares play all of the time. Some of the stories that were privately recorded have specific preferences around when the story can be played back. These silent squares have specials symbols to indicate whether there is an event, an audience, or a specific time that it is waiting for.