

Grief in the Digital Age

*Embodied Technology and New Grief Rituals for
Individuals Suffering from Complicated Grief*

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Program Statement on the Master of Graphic Design Final Project

This document details a final project, which in design is commonly referred to as a graduate “thesis,” at North Carolina State University. The work was defined in a 3-credit course in a fall semester, and executed in a 6-credit course in the following spring semester. The Master of Graphic Design is a terminal professional degree with a research orientation, but like the MFA and MDes, it is not a primary research degree. This is a discovery-based investigation. Cash (2018) describes the process of building scientific knowledge as a cycle between theory building and theory testing. The theory building mode includes (1) discovery and description, (2) definition of variables and limitation of domain, and (3) relationship building (pp. 88–89). This investigation is restricted to the theory building mode. The theory testing mode includes (4) prediction, testing, and validation, and (5) extension and refinement (p. 89). While experts may have been consulted, this investigation does not entail any testing with human subjects, and it does not endeavor to prove anything; all assertions are tentative and speculative.

See: Cash, P. J. (2018). Developing theory-driven design research. *Design Studies*, 56, 84–119.

Abstract

Social and economic shifts in American society have increased the number of unanticipated deaths, resulting in an influx of individuals experiencing complicated grief – grieving outside the conventional standards of bereavement. Despite extensive research confirming that grief is a highly individualized and phenomenological experience, traditional bereavement treatments continue to center around a standard, normative form of grieving. Additionally, current digital grief technologies focus on surface-level interactions and disregard the physical and intangible experiences associated with the complex grief process. Complicated grief is often treated as a trauma-related disorder, and together with the social stigmas and monetary constraints surrounding mental health treatment, it is unlikely that a complicated griever will seek professional support. This investigation speculates the potentialities for a system of designed, embodied objects, drawing from established grief therapy techniques, to help individuals develop new grief rituals while navigating the complex grieving process.

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Thank you to Aunt Susan and Aunt Anita. Your absences are felt every single day. We love you and miss you dearly.

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Introduction

Death and loss are a natural part of being human. Following a loved one's death, an individual experiences the complex coping process of grieving – an indefinite period often marked by noticeable physiological, psychological, and emotional turmoil. Grief and grieving remain a mostly private affair, one that is short, secluded, and lonely. Even with the acknowledgment and attempted acceptance of death, it is difficult to adequately prepare oneself for grief's emotional and physical turbulence and a new life without the deceased. Following the death of his wife, the writer C.S. Lewis reflected, "I thought I could describe a state; make a map of sorrow. Sorrow, however, turns out to be not a state but a process... There is something new to be chronicled every day. Grief is like a long valley, a winding valley where any bend may reveal a totally new landscape (Lewis, 2009, p. 71)."

Historical events have also shifted how we handle death and bereavement. Natural disasters, world wars, and global pandemics like Covid-19 have forced us to find new ways to

say goodbye. Covid-19 continues to rip through communities, taking away the healthy and sick alike. If spoken, goodbyes are expressed through a pane of glass in an intensive care unit or through a nurse on the phone. Limited or no access to bodies means that funerals are nonexistent or indefinitely delayed. Makeshift memorials are held over Zoom. Unexpected and unanticipated deaths, such as those due to Covid-19, complicate grief.

The immediate reaction to a death, any death, is shock and a shattering of one's existence. The bereaved fluctuates between presence and absence, past and present, acknowledgment, and denial. The physical and mental symptoms of grief often mimic those of trauma – heightened anxiety, an overwhelming flood of emotions, and pangs of acute, nearly physical pain. Professional treatment for grief is available but not necessarily affordable, widely known, or even necessary. Digital grief applications and telehealth opportunities are fleeting, providing only temporary relief. Though societal standards place a specific time limit on grief, the process can ebb and flow for an extended time, sometimes for years. Additionally, the bereaved should not be directed to “get over it,” but should also be provided with opportunities to memorialize and honor the dead. This design investigation explores how digital technologies could be harnessed to aid in developing new grieving rituals to help the bereaved throughout the grieving process.

Problem Space

2.1 PROBLEM STATEMENT

Despite an ongoing debate surrounding the grieving process as stages, tasks, or phases, the emotional turmoil one experiences while mourning is largely consistent. The death of a loved one can cause an individual to experience an array of emotions like anger, guilt, sadness, shock, fatigue, and anxiety (Hefren & Thyer, 2012). The bereaved can also feel a confounding sense of meaninglessness and an overwhelming need to maintain the bond between themselves and the deceased. For many, *grief* is relatively natural, a continuous but successful changing of and adjustment to life without the deceased. For others however, this process is not so linear and these individuals can suffer from *complicated grief* (CG), defined here as “a deviation from the (cultural) norm in the duration or intensity of the symptoms of grief” (Wagner et al., 2005, p. 410). As opposed to normative grief, CG can be debilitating, be intense, and can profoundly hinder the griever’s day-to-day functioning

(Baglione et al., 2018). Several factors can cause CG to arise, including a sudden or unanticipated death, the relationship status between the deceased and the survivor, and lack of support during *bereavement* (Rando, 1993).

Traditional bereavement interventions center around a standard form of grieving, even with the understanding that grieving is unique to each individual. Additionally, there are ongoing debates in mental health and psychiatric fields surrounding the diagnosis of CG, with some practitioners treating it as a cousin of posttraumatic stress disorder (PTSD) and other trauma-related disorders. According to Rando (1993), mental health practitioners tend to have inappropriate expectations and unrealistic attitudes about grief and *mourning*. The nature of CG tied with the social stigmas and monetary constraints surrounding mental health treatment makes it unlikely that a complicated griever will seek professional support.

The distress of loss can be detrimental to an individual's well-being, with the bereaved experiencing missing and yearning for the deceased. Losses challenge the foundational conditions that sustain one's actual lived experience (Neimeyer et al., 2010) and thus there is a confounding sense of meaninglessness, both in relation to the self and to the deceased. Survivors can assimilate or accommodate the loss through the act of *meaning making* and the development of personal grief rituals during bereavement. *Rituals* help condone and authenticate the bereaved individuals' reactions to the death as well as validate the relationship with the deceased (Romanoff & Terenzio, 1998).

The development of rituals and the acts of meaning making, take time. Grieving is a coping process of relearning the world including physical surroundings, relationships with others,

and with one's self (Attig, 1991). It is a phenomenological experience conducted through the lens of the individual and his/her capacity to generate meaning (Wendt, 2015). This experience stems from the need to understand the connection between the world and a system of designed objects, thus having potential to help individuals understand this complex web of meaning that surrounds them. Current digital grief technologies focus on surface-level interactions and disregard the physical and intangible experiences of these interactions, as discussed in the Precedents chapter.

While the death of a loved one and the bereavement that follows is a choiceless event, the grieving process is ripe with choice. The bereaved can choose how best to address their grief based on their emotions at the time – they can choose the focus of their attention. Interactive technologies situated in the home could provide a strong support system to aid the mourner in this challenging period of uncertain length, help the individual make appropriate choices to appease their grief, and ultimately come to terms with their loss.

2.2 JUSTIFICATION

Digital technologies are already a prevalent part of everyday life, and intersect with peoples' everyday experiences. These technologies offer additional resources to the bereaved apart from face-to-face support groups, family and friends, written information found in books and pamphlets, and a therapist. The internet is also a hub for grief support with online memorials, message boards, and online support groups. However, these sources can be less credible, are limited in their response and effect on the mourner.

Existing technological platforms or applications that center around bereavement interventions vary in intensity and results.

The more passive approaches involve the establishment of digital memorials, cemeteries, obituaries, and online support groups. These sites require maintenance, storage, and bring about potential issues of privacy. Additionally, bereavement recovery can become hindered at any point, progress can become stagnant, and the griever begins again in an endless cycle of mourning (Baglione et al., 2018). More immersive technologies have utilized location-based mixed reality experiences in public spaces such as cemeteries to honor the lost loved one through storytelling and reflection. Research has been conducted investigating virtual reality exposure-based treatments for anxiety disorders and PTSD, although the extension to bereavement treatment is limited.

These technologies primarily focus on relationships, not coping behaviors. Grief is a multi-faceted experience, unique to individuals, and impacted by personal and environmental factors. There are technological and design opportunities for interactive systems to shape and support everyday practices and rituals, to be tailored to the individual experience, and to offer more personalized support.

Additionally, there is potential to develop more customized and adaptable tools for expressing and processing grief. Here, in this realm of choice, in these moments of experience, lies a complex system of engagement between objects and users, and a ripe opportunity for designers. Within this “site of potentialities,” the individual user is constantly mediating between possible and preferable actions, “...reading cues from the environment and their own body to influence their decisions” (Wendt, 2015, p. 128). The sole reliance on an individual’s coping skills around death with loss makes grief processing more challenging and intense (Sas & Coman, 2016). This study identifies a need for participatory tools and methods that utilize an interactive system to connect with the user.

2.3 ANNOTATED BIBLIOGRAPHY

Complicated grief

News of an unanticipated death can cause a person to experience an intense and intolerable anxiety that temporarily disables their adaptive capacities (Rando, 1996). If these debilitating feelings of painful yearning and denial persist beyond the normative grief period while also hindering day-to-day activities, this person is said to suffer from complicated grief (Baglione et al., 2018). Mourners with complicated grief often suffer from anxiety and depression-related symptoms like guilt and self-blame, and thus traditional grief treatment for complicated grief often mirrors treatment for trauma and posttraumatic stress disorders (Wagner et al., 2005). See Table 2.3.1 for a detailed annotated bibliography.

Thanasensitive design and technology

Technological applications can better support, understand, interact with, and meet the needs of the bereaved through *thanasensitive design*, a humanistic approach to death in design (Massimi & Baecker, 2011). This study outlines guidelines to be utilized by designers including developing technology to support flexible communication while retaining user agency. Systems should acknowledge the loss and support new relationships, support storytelling as a communication vessel, and offer users the opportunity to create and personalize a meaningful artifact. Digital interactive technologies developed with thanasensitive values can help the bereaved reconcile once disrupted social relationships, engage in rituals, and celebrate the lives of the deceased (Odom et al., 2010). Design systems that engage with death and developing technology to remember, honor, and reminisce about the deceased. While the core of this research focuses on the preservation,

retrieval, and protection of an individual's personal data post-death, the principles extrapolated remain useful. For instance, ThanaFenestra, a prototype developed by Uriu and Okude (2010), uses thanasensitive theories to build an interactive family altar grounded in Japanese and Buddhist ideologies. Massimi and Charise (2009) encourage thanasensitivity to be applied as a critical tool to help identify design problems and opportunities.

Embodiment/embodied interactions

Embodiment, both as a defined principle and philosophy is not a new concept. *Embodied interaction* should be viewed as an approach to design, one that holds embodiment as a core property (Dourish, 2001). Central to embodied interactions is the relationship between action and meaning as a way of being and it emerges from our everyday experiences. Embodied meaning arises from how we engage with and act within the world. Meaning is a highly personal concept, is distributed around environments, and is dependent on interaction with things. Principles drawn from embodiment and embodied interactions could affect the design of future interactive systems. “Embodied interaction gives designers the building blocks to embrace the uncertainty of multistable technologies” (Wendt, 2015, p. 152).

Grief rituals

There are numerous definitions of rituals but broadly speaking, rituals are “highly symbolic acts that confer transcendental significance and meaning on certain life events or experiences” (Doka, 2002, p. 135). Rituals differ from habits in that they are acts of significance, and utilize symbolic elements, objects, and actions to provide structure to the grieving process. They legitimize emotional and physical

ventilation of grief and transcend time. While grief rituals can take many forms, three types are rituals of continuity, of letting go, and of self-transformation. Rituals of continuity acknowledge the ongoing presence of the loss and act as opportunities to grieve (Doka, 2002). Acts might include lighting a candle or laying a wreath on a grave site. Rituals of letting go are associated with physical transformation of symbolic objects representing the past relationship. While honoring kinds of rituals, such as lighting a candle, are structured around maintaining an attachment to the deceased, rituals of letting go are structured around the disposal of objects, both in a symbolic and literal sense (Sas et al., 2016). Objects such as jewelry might be deconstructed and reused, or messages and other digital possessions of the deceased might be deleted. Other rituals of letting go are more organic in action and material, such as planting seeds, to symbolize renewal and growth. Rituals of transformation are performed during life transitions and require the mourner to assess existing negative feelings and begin plans for the future. Objects and actions for rituals of transformation often involve newly crafted materials such as written letters or collages and could also include newly crafted objects like written letters to the deceased (Sas & Coman, 2016). Grief rituals can help maintain important social bonds, give legitimacy and meaning to life transitions (Castle & Phillips, 2003), validation of the loss, and increased control over the loss (Sas & Coman, 2016).

Complicated grief

Modern bereavement: A model for complicated grief in the digital age	Baglione et al., 2018
The increasing prevalence of complicated mourning	Rando, 1993
On treating those bereaved by sudden, unanticipated death”	Rando, 1996
Internet-based treatment for complicated grief: concepts and case study	Wagner et al., 2005

Thanatosensitive design and technology

Dealing with death in design: developing systems for the bereaved	Massimi & Baecker, 2011
Dying, death, and mortality: towards thanatosensitivity in HCI	Massimi & Charise, 2009
Experiences in designing technology for honoring deceased loved ones	Odom et al., 2018
ThanatoFenestra: Photographic family altar supporting a ritual to pray for the deceased	Uriu & Okude, 2010

Table 2.3.1
Annotated bibliography
of selected literature

Embodiment/embodied interaction

Where the action is: The foundations of embodied interaction	Dourish, 2001
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Design for dasein	Wendt, 2015
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Grief rituals

Grief rituals: Aspects that facilitate adjustment to bereavement	Castle & Phillips, 2003
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The role of ritual in the treatment of disenfranchised grief	Doka, 2002
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Rituals and the grieving process	Romanoff & Terenzio, 1998
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Designing personal grief rituals: An analysis of symbolic objects and actions	Sas & Coman, 2016
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Design for rituals of letting go: An embodiment perspective on disposal practices informed by grief therapy	Sas et al., 2016
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2.4 DEFINITIONS OF TERMS

Specific technical terms referenced throughout my investigation are defined below.

Bereavement – The period of mourning following a loss, can be associated with much distress and with physical and mental health detriments (Stroebe & Schut, 2010)

Complicated grief – A deviation from the cultural norm in the duration or intensity of the symptoms of grief and is characterized by symptoms of intrusion and avoidance (Wagner et al., 2005)

Embodied interaction – The creation, manipulation, and sharing of meaning through engaged interaction with artifacts (Dourish, 2001)

Felt sense – A grief therapy technique requiring attention to the bodily sense of a lived-situation, articulating the bodily feeling through words, phrases, or images (Farber, 2015)

Focusing – A grief therapy technique to help mourners address resistance or ambivalence in moving forward in the grieving process (Farber, 2015)

Grief – A unique experience of a loss, experienced in the feelings, thoughts, behaviors, and physical body of the bereaved (Hefren & Thyer, 2012)

Grief loop – A specific period in the grieving process where a griever is pulled into a seemingly endless cycle of mourning (Baglione et al., 2018)

Mourning – A process through which one must pass in order to adapt to the reality of the loss (Hefren & Thyer, 2012)

Rituals – Formalized patterns of actions for constructing meaning from a personally relevant event (Sas & Corman, 2016)

Thanatosensitive design – A humanistically-grounded approach to HCI research and design that recognizes and actively engages with the facts of mortality, dying, and death in the creation of interactive systems (Massimi & Charise, 2009)

2.5. ASSUMPTIONS AND LIMITATIONS

Assumptions

I recognize that grief is unique to each individual and may vary due to circumstances including timing and cause of death. I acknowledge the role that spirituality and religion can play in grief treatment, but those realms of coping are not the focus of my investigation. For this investigation, I am assuming the user of this technology is already diagnosed with complicated grief. The social support facet of the technology assumes the user has an established and active social network of family and friends. Given the prevalent existence of interactive technology today, this investigation assumes technological competence, accessibility, acceptance, and the willingness to use a smart system to help users cope with their grief. It is assumed in this investigation that the system is ubiquitous, with plausible artificial intelligence capabilities, existing in a not too distant future home with the user's acknowledgment and consent. It also assumes users, even in a time of grief, will be motivated to accept support.

Limitations

This investigation is limited to the grieving rituals, attitudes, and norms of people from Western cultures. It focuses on an individual griever as the main user while acknowledging

outside social connections. This investigation is limited to a linear progression of a few phases and presents a resolution to the bereavement period. Grief can also occur outside the home and in public spaces, but this study targets grief treatment in a domestic space. The treatment methods addressed in this investigation are established grief treatments and other suitable solutions for healing after a death event are encouraged. An additional limitation is the lack of expertise in the area of psychology and the treatment of grief. I am not producing a working, programmed system, but my investigations are presented as prototypes for potential, future ideas. Finally, I recognize that privacy and security concerns are associated with connected systems but these concerns are not the focus of my investigations.

2.6. PRECEDENTS

I analyzed existing applications, interfaces, and emergent technologies centered around guided mourning, meaning-making, remembrance, memory, and the maintenance of the bond between the living and the deceased. I focused on the limitations within each precedent and sought out new design opportunities to understand how each one implemented interactive design features, customizable tools, responsive prompts, and emerging technologies to address the complexities of grief and bereavement.

Grieving course in Headspace app

Headspace is a guided meditation mobile application with course delivery and meditation lessons. In addition to mobile access, the meditation service also includes web resources. Grieving is a three-part course accessible through the Headspace application and aims to create room to heal

through the practice of mindful meditation. Mediation as a coping tool focuses on the personal, emotional toll and utilizes body scan techniques that focus on merging the body and mind.

The application benefits from its visual language and use of animated, playful characters. The animations successfully educate the user on various meditation techniques, making complicated psychological behavioral jargon easier to understand and relatable. Another design opportunity lies in the vocal and sound design. The recordings sound impeccable, with intention in pauses, length of audio clips, and even a choice of dialect.

The applications' limitations include financial limitations, a dependence on self-guidance, and activity options. The application requires a monthly or yearly subscription to access the course. The self-guided program places the burden on the grieving user to choose when to start and continue the course. While the application encourages daily use, it does so through optional notifications. Finally, the application and course only utilizes meditational activity and primarily focuses on building mindfulness, rather than exercises for healing or grieving (Figure 2.6.1).

Fenestra

Fenestra is a domestic technology built to support everyday domestic practices of memorialization (Figure 2.6.2). Modeled after Japanese memorialization practices and butsudans, or home altars, Fenestra highlights new forms of interaction to create meaningful experiences to remember loved ones (Uriu & Odom, 2016). The lighting of a candle initiates the main interactive feature, and a secondary feature is activated when the user looks into a mirror. The study explored how interactive technology could support people's self-determined, evolving practices of memorializing and remembrance.

A highlight from Uriu & Odom's (2016) study is the idea that a robust system could easily fit into people's everyday domestic settings. The lightweight, tangible nature of Fenestra allows the system to shift between being directly experienced and simply being lived with. The subtle interactions and the system-controlled photo display enabled better concentration on contemplating the life of the deceased.

A limitation, specifically for this investigation, is the design sensibilities towards forms, materials, and practices of Buddhism. The use of a home altar is uncommon in Western cultures, especially in American homes, and a similar prototype would need to be reconfigured for a Western audience.

Timecard

Timecard is an interactive interface where digital photos are laid out in a timeline to enable people to construct, interact, and live with a tangible representation of a deceased loved one (Odom et al., 2018). In addition to uploading photos, the system offers the user additional design choices such as reflections and historical events using metadata. Timecard was designed for domestic spaces and it explored ritual and non-ritual behavior when honoring a loved one (Figure 2.6.3).

The study is a great exploration into how technology can support acts of reflection and reminiscence. Users can upload their own digital photos, allowing for customization of the archive. This technology also creates opportunity for long-term usage. Odom imagined Timecard to be an ongoing, generational project, creating a rich and temporal representation of the deceased's lifespan.

The need to input extra data in the form of reflections, photo dates, and other textual metadata might prove to be too burdensome for someone experiencing complicated grief.

Additionally, the entire premise relies on user motivation and participation, resulting in a restrained archive if any user decides to stop or limit engagement.

Missing You

Missing You is a documentary featuring a woman who is reunited with her deceased young daughter through virtual reality (VR) technology (Figure 2.6.4). The mother's virtual interaction with her reconstructed, hyper-realistic daughter illustrates the technological potential of a VR grieving space, but also exposes potential psychological and ethical dilemmas.

The accessibility and financial restrictions to the software and technology necessary to make it unlikely an experience like this could be distributed to a wider audience. The daughter's image was created using photos and memories from her mother, an extreme level of customization that limits the experience to an individual user.

New Dimensions in Testimony

New Dimensions in Testimony is an interactive installation created by USC Shoah Foundation and involves virtual conversations with Holocaust survivors using artificial intelligence and natural language processing. Visitors can engage in conversation by asking questions of two survivors and hearing answers in real-time. The projected figure is highly realistic and gives the perception that the person is present in the room. The responsive nature of the conversations make an experience that feels spontaneous and authentic (Future of StoryTelling, 2021).

This project illustrates the power and potentialities of virtual, interactive biographies. However, the development does require significant back-end work because the stories, images,

and videos need to be collected and recorded prior to a death. The advanced filming technology, specialized display technologies, and natural language processing software makes this nearly impossible to implement as a domestic technology for everyday users (Figure 2.6.5).

EMMA's World

EMMA's World is an adaptive display and VR system developed as an exposure-based treatment to reduce anxiety disorders. Originally created to treat more trauma related disorders such as PTSD, the flexibility of the VR environment suggests a complementary tool to help treat complicated grief (Botella et al., 2008). Users can adjust and customize various environments and landscapes depending on their present mood. For instance, the elation landscape can be adjusted to show sunnier skies, butterflies, and birds (Figure 2.6.6).

The adaptability of the system illustrates the potential of the system to adjust to the needs and abilities of the user. EMMA's World also highlights the collaborative role between a therapist and patient in the treatment process. While the therapist determines the available tools within the environment, the user is still able to manipulate objects and images, while also selecting an option to import exterior items. Design opportunities lie in how environments might be designed to reflect emotions, with an aim to reflect and enhance the user's experience in real-time.

Dadbot

Before his father died, James Vlanos documented the last year of his father's life. He recorded hours of his father telling stories of his life and ultimately transformed his father into a mobile chat bot (Figure 2.6.7). Vlanos built the bot using Pullstring, a pattern matching type of artificial intelligence.

The mobility and accessibility of interacting with the deceased is appealing because it ensures a connective link between the living and the dead. It does however, require a user to engage in end-of-life care and preparation in order to collect and pre-record the necessary data. This technological approach is better suited for individuals experiencing anticipatory grief.

The chat bot component suggests a limited and temporary experience as well, as the program is limited to specific, predetermined interactions. Engagement is limited to text messages and is implemented through a cell phone, a technology under constant revision. Nonetheless, it is an admirable attempt at technology that helps memorialize the deceased and highlights the benefits of conversational design and personalized storytelling.

Figure 2.6.1
The Grieving meditation course within the Headspace app

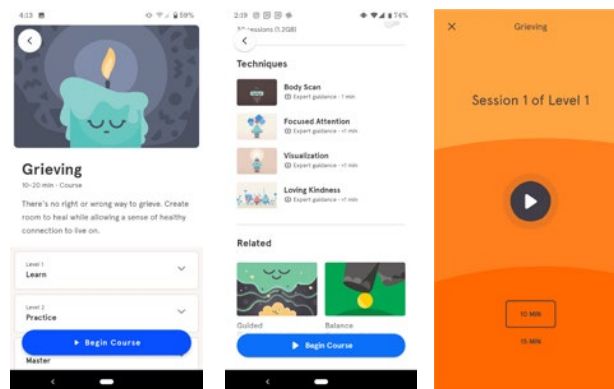


Figure 2.6.2
Fenestra displayed
as a home altar



Figure 2.6.3
A timeline interface
in Timecard



Figure 2.6.4
A clip from the
documentary Missing You



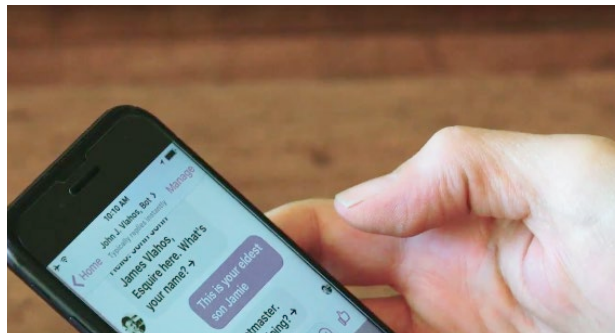
Figure 2.6.5
Museum visitors engaging
in virtual conversations
with Holocaust survivors



Figure 2.6.6
A scene from EMMA's
World depicting the
elation landscape



Figure 2.6.7
James Vlanos interacting
with Dadbot



Investigation Plan

3.1. CONCEPTUAL FRAMEWORK

Grief rituals model

Romanoff & Terenzio's (1998) model outlines rituals in bereavement (Figure 3.1.1). Their research indicates that bereavement rituals should acknowledge that grieving is a process that occurs over time. Rituals should also be expanded to include all phases in the bereavement process, hence the inclusion of pre-death and post-death statuses, both of which apply to the mourner. The model depicts the bereavement process as three separate but connected processes – transformation, transition, and connection. Rituals of connection may focus on maintaining an ongoing connection to the deceased. These could take form as memorials, anniversary reflections, or participation in bereavement groups. Transition rituals aid the mourner as they transition from one social status to the next. Beginning

with detachment, moving to a fluid phase of traversing new identities, and shifting to an adjustment into the new role without the deceased in the world. Rituals of transformation result in a recasting of the relationship between mourner and deceased. These rituals can involve treasured moments, objects, and other symbolic artifacts. I redrew the model to have transformation closer to the post-death status because an unexpected and sudden death circumstance can shatter the assumptive world of the bereaved. The ramifications from a shocking loss causes the transformation of self to be delayed and new structures need to be created to adjust to a changed reality.

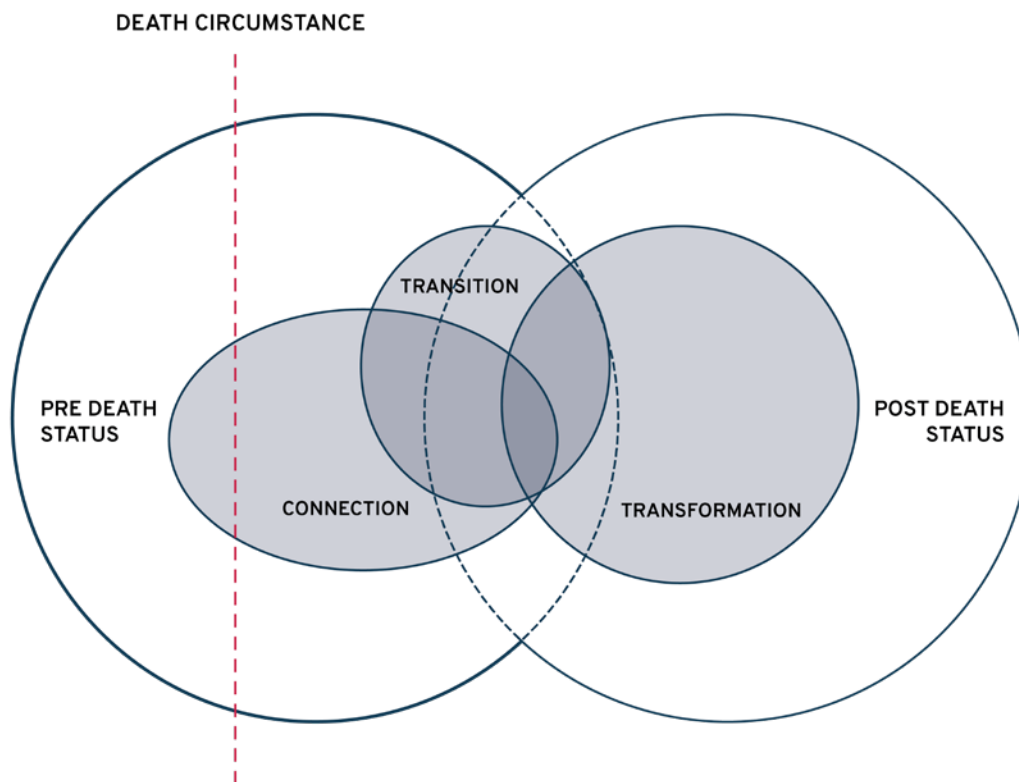


Figure 3.1.1
Model of grief rituals
(Romanoff & Terenzio, 1998)
(redrawn by Isabel Bo-Linn)

New model for complicated grief

Baglione et al., (2018) developed a new behavioral model specifically for complicated grief in the digital age (Figure 3.1.2). The model highlights five phases of complicated grief – fog, isolation, exploration, immersion, and stabilization. Of particular importance, especially for complicated grievers, is the concept of a *grief loop*. The bereaved can become overwhelmed by a chosen social support group and withdraw back to the isolation phase, thus prolonging the bereavement process. Although this model was developed around the relationship between complicated grievers and online support groups, I have adapted the model to be implemented across the bereavement process as a whole.

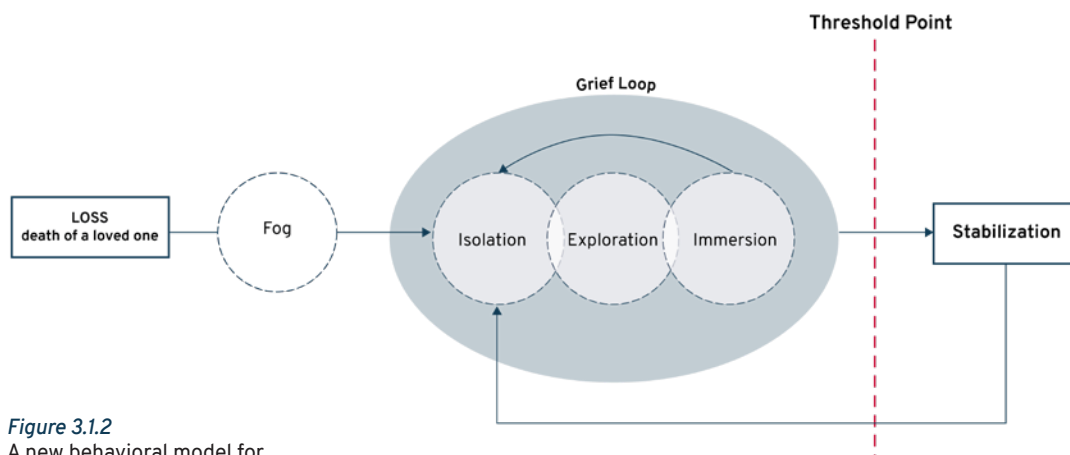


Figure 3.1.2
A new behavioral model for
complicated grief
(Baglione et al., 2018)
(redrawn by Isabel Bo-Linn)

Spatiality of bereavement

This framework (Figure 3.1.3) addresses the physical, embodied-psychological, and virtual spaces present in the grief process. Physical spaces are material in form and can include artifacts like clothing, memory boxes, and shrines. Other physical spaces specific to mourning and bereavement are sites of burial, cremation, and memorialization. Embodied-psychological spaces refer to the emotional and visceral responses of the mourner. Bereavement is often a trigger for depression, and grief is both a physical and an emotional experience. According to Maddrell (2016), grief is carried within the mourner, making the embodied mourner the primary space of mourning. Virtual spaces encompass any non-material spaces of interaction, practice, and performance (Maddrell, 2016). Online chat rooms, support groups, and other information technologies serve as sites for communal remembering and interactive experiences. After a loss, the bereaved perceives, inhabits, and experiences certain spaces and immaterial arenas in new and different ways (Maddrell, 2016). The framework, presented through the lens of socio-economic and cultural factors, offers a glimpse into the shifting, multi-layered geographies associated with living with loss, potentially across an individual's lifetime.

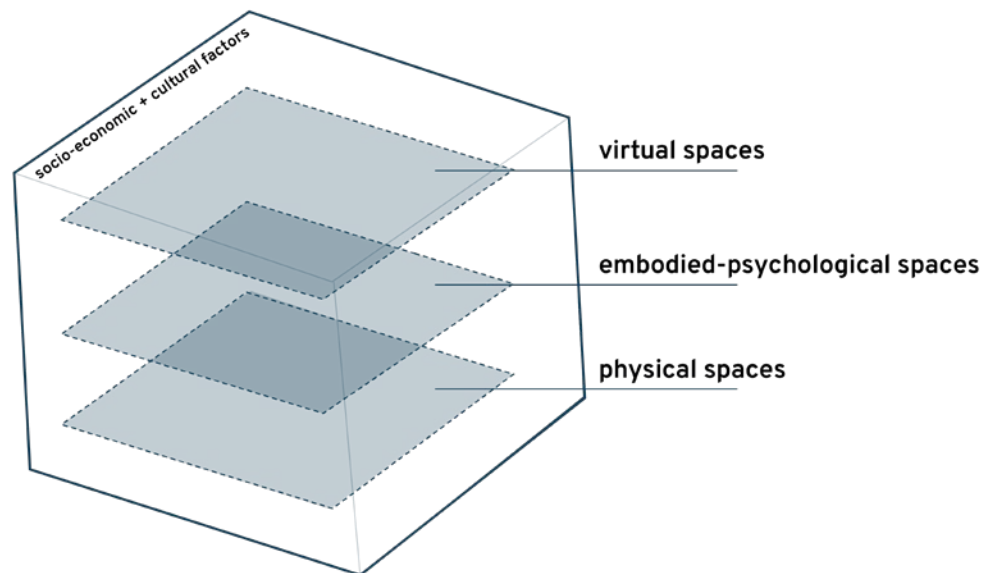


Figure 3.1.3
The spatial dimensions of
bereavement
(Maddrell, 2016)
(redrawn by Isabel Bo-Linn)

Synthesis

The conceptual framework (Figure 3.1.4) for this investigation is based on three behavioral theories: Grief rituals model (Romanoff & Terenzio, 1998); modern behavioral model of bereavement (Baglione et al., 2018); and spatial dimensions of bereavement (Maddrell, 2016).

The framework begins with the death of a loved one, which initiates the grieving process. The following phases overlap because a mourner can move between phases, it is not a strictly linear experience.

The newly bereaved enter a “fog phase” of grieving. Physical places are present here as the mourner will be in a fog as they handle funeral tasks and visit a burial site of some form. The embodied psychological spaces also appear in this stage, manifesting as a fog of emotions including confusion, frustration, anger, and sadness. Embodied psychological spaces remain evident throughout the entire grief process, as grief is an emotional and physical experience.

While grief rituals can be performed throughout the entire process, this framework highlights specific rituals for specific points in the grief process. Connection rituals for instance, are associated with the isolation phase because the mourner is desperately trying to maintain a connection with the loved one who suddenly is gone.

As mourners move into the “isolation phase,” they become literally and figuratively “isolated” as they figure out how to adjust to life without the deceased. Virtual spaces begin to play a role as the mourner might not be emotionally ready for face-to-face interactions but might attempt virtual socialization with bereavement support groups, text messaging, or other digital communication avenues. The

“exploration phase” includes early stages of acclimation to new social structures and are emphasized by rituals of transition. The “immersion phase” is a period of investment for the mourner, socialization becomes more physical and transformation to a more familiar self begins. The mourner may become overwhelmed by everything and thus swing back to the isolation phase. This possibility of cycling back is why isolation, exploration, and immersion are all nestled within a grief loop. Finally, this framework presents a resolution to the grief, a moment beyond a point of recovery when the mourner is no longer mourning. Physical and virtual spaces continue beyond the recovery point as the individual may still be involved with grief-related social networks, and may continue to visit self-identified sacred sites on anniversaries or other future dates.

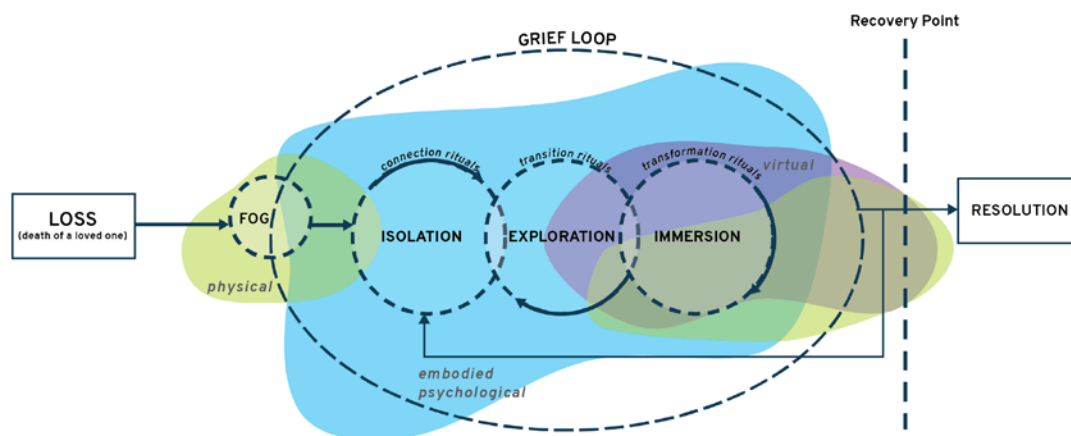


Figure 3.1.4
Conceptual framework
blending grief rituals model,
a modern behavioral model
of bereavement, and spatial
dimensions of bereavement

3.2. RESEARCH QUESTIONS

Primary research question

How can an interactive system of embodied artifacts help individuals suffering from complicated grief at various phases in the grieving process, develop personalized grief rituals to establish resolution and come to terms with the loss?

Subquestions

- 01 How might multimodal interventions provide structure for and facilitate time-limited activities to help the bereaved process and release negative feelings associated with the loss?
- 02 How might multisensory interactions construct new social schemas to help the bereaved promote social connectedness and solidarity?
- 03 How might variable representations of the deceased elicit and externalize positive emotions to maintain an ongoing holistic attachment to the deceased based on memory and meaning-making?

3.3. INVESTIGATION MODEL

I developed this investigative model in tandem with my conceptual framework to guide and situate my studies. Focusing on specific categories of grief rituals (transformation, transition, and connection) and specific phases of the complicated grief process (fog, exploration, and immersion) allows me to investigate the grieving process as an active process where the bereaved may fluctuate between phases throughout the experience (see Table 3.3.1).

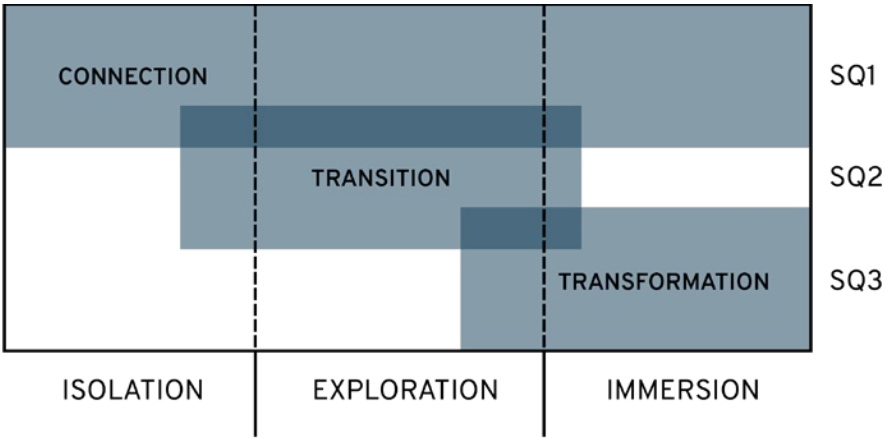


Table 3.3.1
Investigative Model

3.4. SCENARIO

This scenario focuses around my persona, Clara’s, complicated bereavement period. The events within the scenarios occur sporadically over the course of a year and a half (Figure 3.4.1).

Clara is in her mid-thirties, does not live with her partner and has no children. She lives in a different city than most of her family and tries to visit them at least twice a year. She recently lost her mother and is still processing all that has happened. Her mother died suddenly, and Clara is still seeking more concrete answers to explain her mother’s death. Living closer to her mother, Clara handled the funeral planning, obituary, and death announcement to friends and extended family.

Being physically distant from her family, Clara feels lonely and isolated. Her partner is supportive, but as an outsider in the loss, cannot fully relate. A few months have passed since her mother’s death and Clara feels stuck. She thinks of her mother constantly, she often feels deeply unmotivated to do anything, and her social relationships are deteriorating.

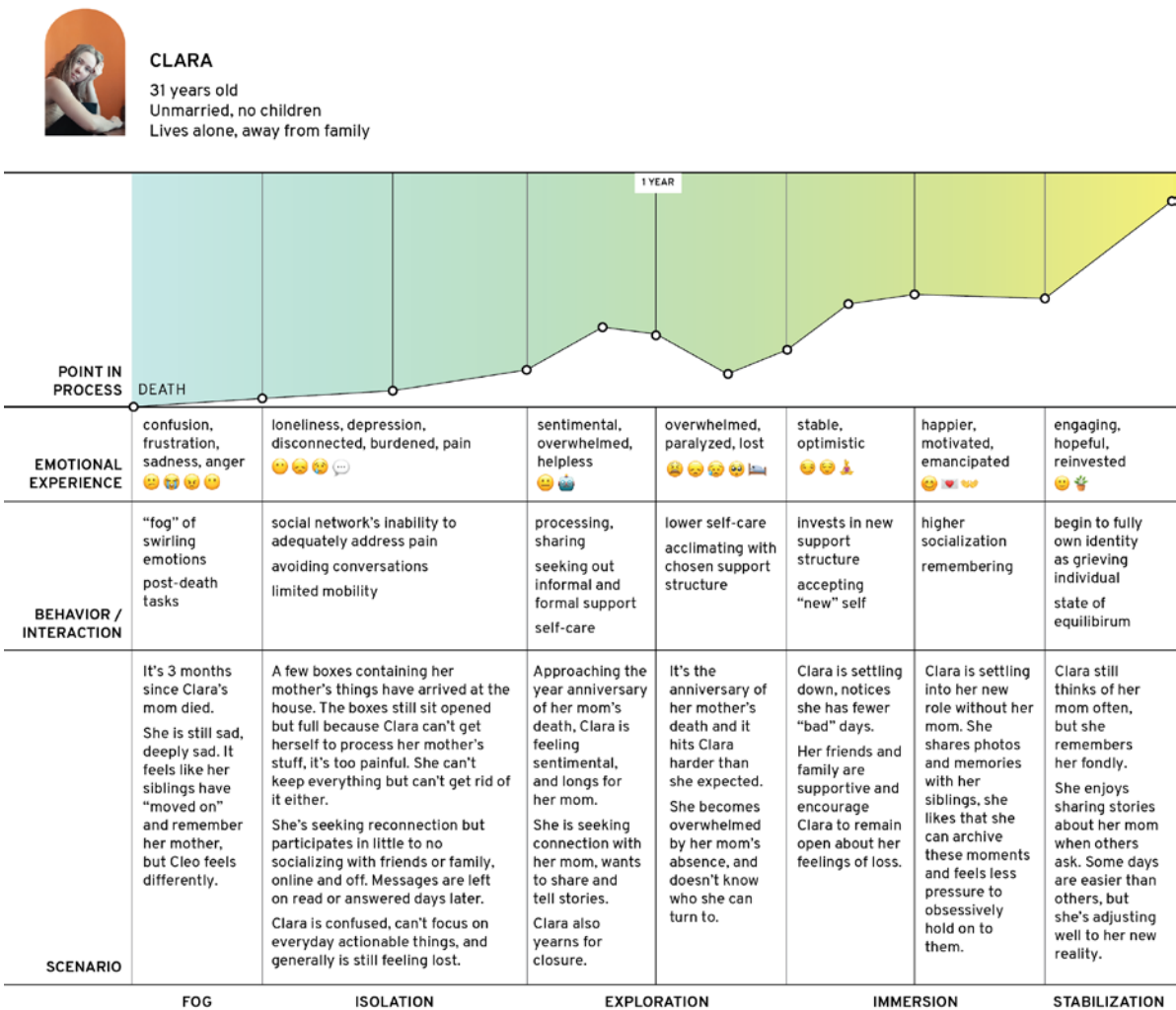


Figure 3.4.1
User journey map for my persona, Clara

Studies

4.1. MULTIMODAL INTERVENTIONS

This study investigates the implementation of multimodal interventions and the role of the user and the system to provide structure, facilitate time-limited activities, and relieve ruminating negative feelings and behavior. Structure provides a context for ritual enactment while allowing the mourner to exercise and experience control over the chaos of the grief process (Sas & Coman, 2016).

An integral component of this study was determining the locations of the system within the home. The system is composed of networked objects, all connected via a central cube. Following the principles of calm technology, the system should weave into the fabric of everyday life, and shift between the center of attention and the periphery (Case, 2016). The environment in which the system lives also determines the type of signaling to output. Figure 4.1.1 displays the central cube and

the other objects that make up the system, and Figure 4.1.2 explores some status states the cube could display. Possible states include an idle state, a listening state, an off state, and a recording state. The central cube is designed to be a type of ambient media and display, meant to reside in the background and not interrupt the attention of the user, but be available when needed or prompted.

The visual explorations within this study centered on the actions and behaviors of the user and the system, separately and in collaboration. Throughout the relatively unpredictable grieving process, through the ebbs and flows of emotional states, the user and the system are constantly learning, responding, and adapting to one another. This study examines how this coexistence can develop rituals centered around self-monitoring of mood, socialization, and the maintenance of connection.

Self-monitoring of mood

Avenues of self-care and rituals of self-transformation act as forms of support for the mourner. During rituals of self-transformation, the user evaluates her life, and works to identify negative feelings in need of attention. The user is encouraged to assess her current mood as she stands in front of the mirror. The system prompts the user to quickly indicate their current state of mind by touching the appropriate face, as illustrated in Figure 4.1.3. The selected face is cataloged by the system and the user is able to review her data in a weekly and monthly format (Figure 4.1.4). Other explorations into what a mood recap interface might look like are shown in Figure 4.1.5. I developed two different color combinations as the darker shades of green and blue fit aesthetically with the conceptualized system, but the red, orange, and green combinations seemed more familiar to everyday users.

I chose a cartoon image for this study for the benefit of universality, as a cartoon face is a form of amplification through simplification (McCloud, 1993). According to McCloud, the power of cartoons is their ability to focus our attention on an idea, in this case, determining a state of mood. Any user's temperament, however, is varied and complex. Human emotions are difficult to encapsulate within a simple smiley face. Other explorations study how the user might express her disposition utilizing more abstract forms and colors variety (Figure 4.1.6).

Grief manifests as emotional distress. Grief is also a phenomenological and physiological experience. Grief is embodied, the mourner carries grief within. Grief is felt physically – feelings of a literal heaviness, fatigue, pain, or the feeling of emptiness (Maddrell, 2016). Therefore I thought it important to develop explorations that incorporate physical symptoms of grief as well as emotional symptoms.

Moving forward through grief is difficult and often requires a mourner to accept that which she most wants to reject – the loss itself. One technique employed by grief therapists to help a mourner through the resistance of acceptance is through an exercise known as *focusing*. Focusing allows the user to address thoughts and feelings while also concentrating on the bodily experience of grief (Farber, 2015). In Figure 4.1.7, the user is guided by the system into a focusing exercise. The system prompts the user to engage in a short breathing exercise, timing the breaths by light bars progressing up and down the mirror. After breathing and focusing on the *felt sense* of her body, the user articulates the situation as felt within the body, outside of thoughts or feelings. Articulating intense heartbreak or an empty feeling in your chest can be hard to articulate but techniques like focusing help the mourner express these difficult sentiments. The system scans for adjustments to the

body indicating a possible change in the user's disposition as a signal to either continue or stop the exercise.

Questions emerged while exploring user-generated and system-generated interventions. What is the system doing when the user is not actively involved? Figure 4.1.8 visualizes moments when the user is present, but not engaging with the system. The system scans the user, looking for signs of certain moods based on past inputs such as tears when she is sad or an upturned mouth when she is happier. Are tears present? What does it mean when a hand covers a face? Could the use of sunscreen imply a trip outside? In this exploration, I studied how to visually depict what the system was processing and the kinds of information to be relayed in the user's periphery. In the periphery, for instance, the system may notice a brush and postulate that the user is going out. It displays a message similar to something that the deceased might say, which appears in the user's center of focus.

Mourners can sometimes feel literally paralyzed by grief. If the user is having a particularly rough day and cannot get out of bed, the system examines the situation by comparing the time of day to the user's previously analyzed movement levels, and signals for the curtains to open (Figure 4.1.9). These past movement levels would be detected and cataloged by the system. It was this exploration that led me to contemplate the communication visuals between the connected objects. What does the system's interface look like when it is communicating with another object within the system?

Socialization with family and friends

A mourner also transitions to a new social role as they progress through the grieving process. A loss can be devastating socially, with the mourner avoiding conversations with friends and

family, and an overwhelming sense of isolation and a belief that their pain and sadness is misunderstood.

This exploration outlines how missed messages might be signaled to the user. In Figure 4.1.10, the sender's icon increases in size as the missed messages pile up. A visual indicator may not be enough to break the user's periphery. As the messages and calls continue to be left unanswered, the system gradually increases the level of signaling, adding haptic vibrations, pulsing lights, and eventually an auditory tone (Figure 4.1.11). These subtle yet noticeable changes alert the user to social inquiries without outright alarming them. Following David Rose's spectrum on designing for subtlety, signaling should escalate slowly and respect one's attention "like a polite butler clearing his throat (Rose, 2015, p. 129)." Figure 4.1.12 speculates how the messaging interface might look while displayed on the user's desk.

Connection with the deceased and self

As the mourner transitions to a new social role, I needed to acknowledge the relationship between the mourner and the deceased. This relationship, this bond, continues after death and rituals can help maintain a healthy connection to the lost loved one. Studies exploring how the system might initiate a dedicated time throughout the day so that the user actively thinks of the deceased looked at how reflection and memory helps the mourner externalize positive emotions and celebrate the relationship (Figures 4.1.13-14). The system might subtly recommend that it is time for reflection and sentimental activity through the display of a sentimental photograph, chosen and uploaded by the user at a prior time. (Figure 4.1.13).

In my scenario, the user is plagued by ruminating thoughts of her mother at night when she is trying to sleep. In this situation, the system initiates a connection ritual by displaying an image of an envelope and turning on a subtle light, signaling the user to “speak” to her mother (Figure 4.1.14). The verbal act of developing an ongoing narrative with the deceased can allow the relationship to continue and begin to transform.

Observations

For this study, I focused on quick moments-in-time throughout the user’s day. Interventions and signaling are circumstantial to the moment in time, the active behavior of the user, and the preferred behavior. The relationship between the user and the system is key to adaptability too. There might be moments when the relationship is dominated by the system and other moments when the relationship is more collaborative. This fluctuating relationship makes multimodal signaling even more important, as the system must adapt to the user’s state of mind as moods vary throughout the grieving process. Overall, the goal was to ensure that the system functions with limited friction, shifting from being directly experienced, then back to simply being lived with.

Throughout the study, I found certain modes of signaling to be more appropriate for the preferred behavior. Certain signaling, for instance haptics, subtle lights, and tones, could be easily accepted and acknowledged by the user because they are familiar. Other forms that relied largely on visual cues could easily be dismissed or missed. Either way, I wanted to provide the user with clues to make her understand when the system was active, what the system was doing when active, and discover moments when the user might feel in control.

While these explorations visualize the user responding positively to interventions, questions arose around ill-received

signals. What happens if the user doesn't respond well to the signal or the information?

Finally, the visuals of this set of interfaces started to become important in this study. I started by exploring how the system may signal to the user, but did not immediately account for the system signaling to itself. How do the visual components of the displayed information change from instance to instance? I found it was important to differentiate between the system's internal messaging and external messaging that is meant for the user. The science-fiction inspired interface aesthetic could prove too futuristic, too robotic, while a more human look might come to feel too natural.

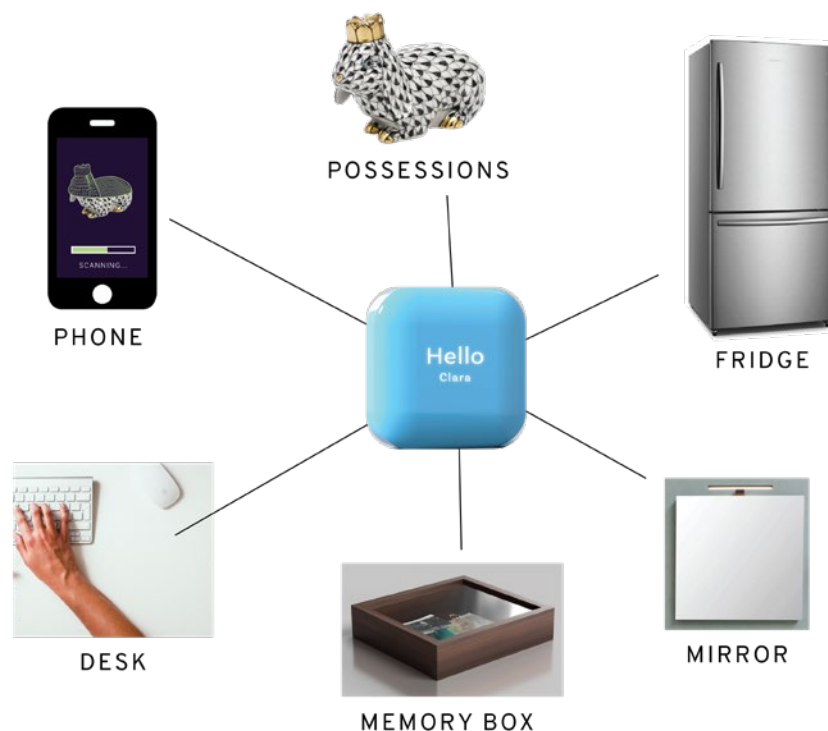


Figure 4.1.1
Overview of the system and
connected objects

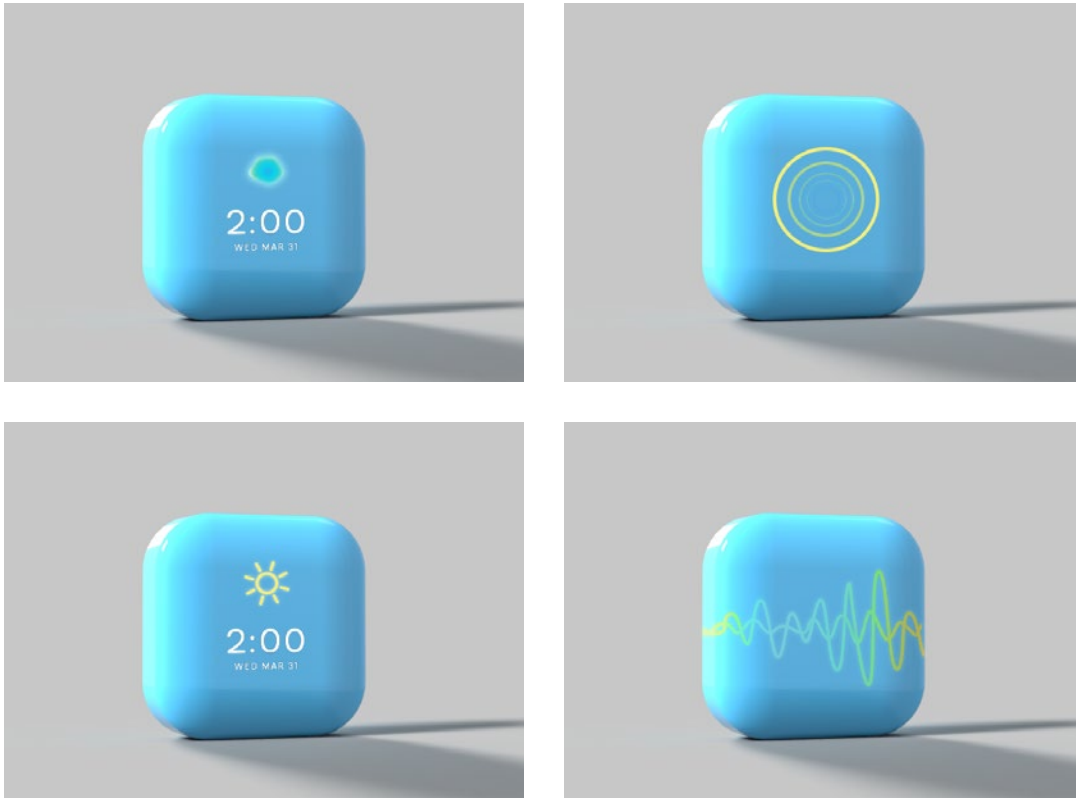


Figure 4.1.2
Status states displayed by the central cube



Figure 4.1.3
The user picks the appropriate face to register her current mood





Figure 4.1.4

The user selects the face that best represents her current mood, and also views a month's worth of collected data



Figure 4.1.5
Variations on visual elements
of a monthly perspective of
cumulative moods

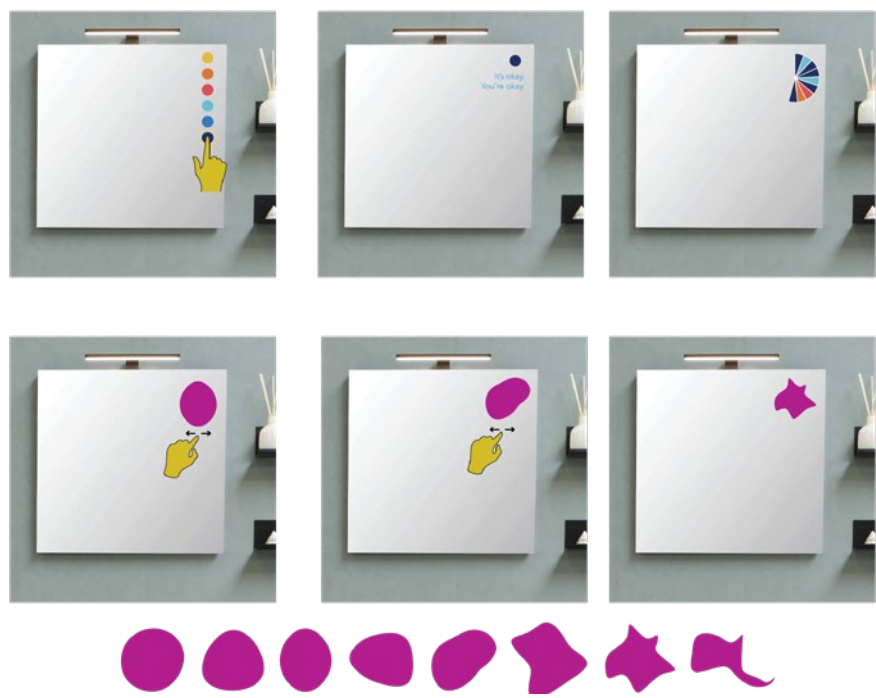


Figure 4.1.6
Alternative visual forms to
represent the user's current
temperament



Figure 4.1.7
The system notifies the user
to begin a focusing exercise



Figure 4.1.8
The system continuously
observes the user's behavior
even when the user is not
actively engaged

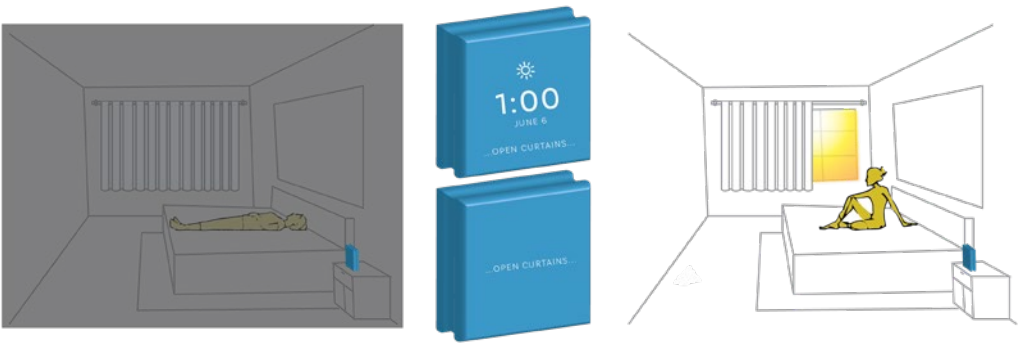


Figure 4.1.9
The system notices that the user is still in bed despite the late time, so signals the curtains to be opened

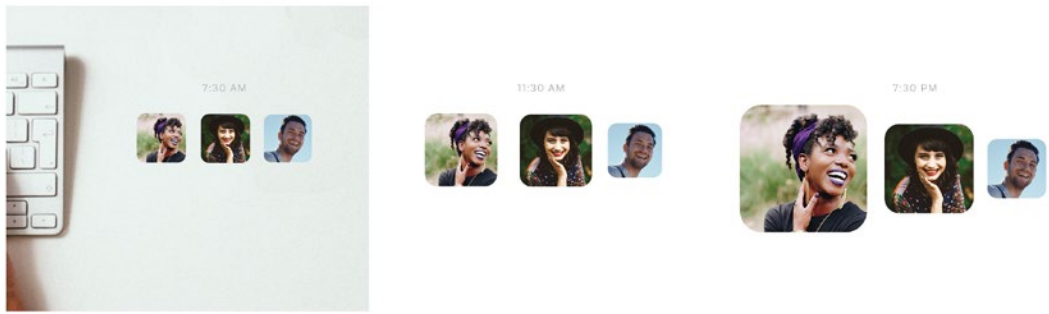


Figure 4.1.10
With each missed call or message, the sender's icon increases in size

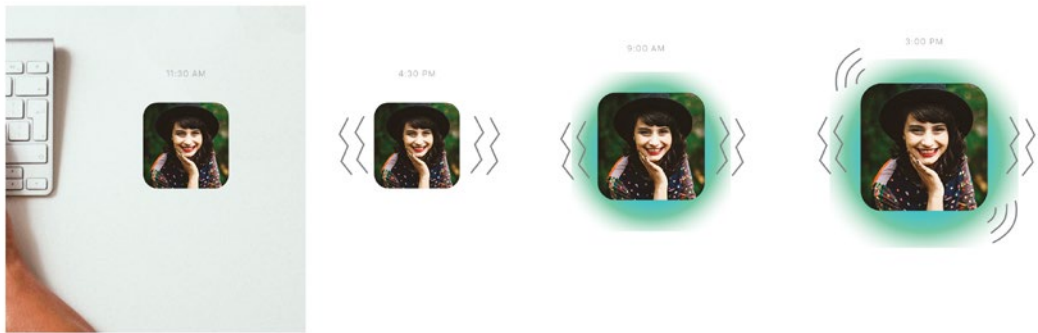


Figure 4.1.11
With each missed message, the signaling form increases from subtle to insistent

Photo credits: Alief Vinicius, Eye for Ebony, and Stephanie Cook via Unsplash



Photo credit: Aleks Tappura via Unsplash

taking away the healthy and sick alike. If spoken, goodbyes are expressed through a pane of glass in an intensive care unit or through a nurse on the phone. Limited or no access to bodies means that funerals are nonexistent or indefinitely delayed.

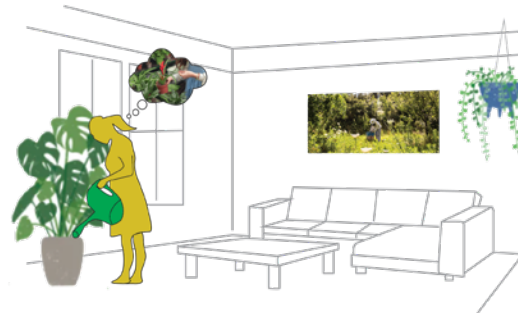
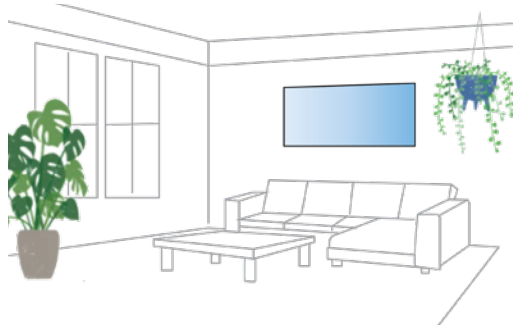


Photo credits: Hassan Oualbir, and
bee-naturales via Unsplash

Figure 4.113

The system displays a sentimental photograph, prompting the user to dedicate a specific time of day to actively remember her mother

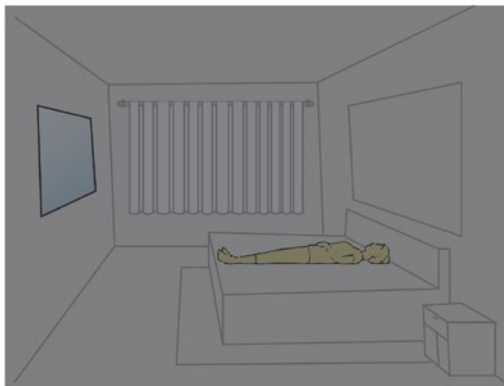


Figure 4.114

The user “speaks” to her mother, creating a ritual of developing a narrative to continue the bond with the deceased

4.2. MULTISENSORY INTERACTIONS

After exploring multimodal signaling, I was interested in how the system might help the user construct new social schemas and promote social connectedness through multisensory interactions and features. Drawing from traditional grief therapy techniques directed at relationship building and maintenance, I created a series of visual studies to explore how the system and user might interact with connected smart objects to help the user learn to let go, to honor, and to transition to a new social role.

User driven interactions are moments in which the user initiates and leads the interaction. System driven interactions involve the system initiating and controlling the interaction. This study makes use of a framework for interaction zones from a study by Vogel and Balakrishnan (2004). A subtle interaction corresponds with a more ambient display, similar to a system's neutral state. In this zone, the user should be able to comprehend information at a glance. A subtle interaction might also include body motions like hand gestures to control the information on display. As the user moves closer to the display, the interaction increases in explicitness. The system may recognize the user's orientation and determine the measure of "interruptibility," while also presenting the user opportunity to explicitly signal an end to the intended interaction (Vogel and Balakrishnan, 2004). A direct interaction in a close interaction zone is when the user is close enough to touch features and more explicit interaction with the information.

Even though the system is situated within the home and is ubiquitous role, the user needs to be able to opt in and opt out of interactions. I explored gestural motions (Figure 4.2.2) that the user could use to "open" the system, "close" the

system, and generally communicate readiness to interact. Swiping up means “open” the system, call it up, make it active. Swiping left or right allows a “scroll” through the system, and a downward motion would “close” the system.

Symbolic objects, like personal possessions, play a large role in grief rituals. These objects function as linking objects, or objects that continue the link with the lost loved one (Sas & Corman, 2016). Linking objects help validate the relationship with the deceased and help facilitate remembrance. I explored moments when the user would initiate the interaction with the system, for instance, when archiving the deceased’s possessions. Clara finally goes through her mother’s belongings and fondly remembers her mother’s collection of bunny sculptures. Unfortunately she doesn’t have room for all of these possessions but she still wants the opportunity to view the objects, even if she has to physically part with them. Keeping the bunny figurine in some manner, is a way of reclaiming and rehousing the remains of a life now gone (Gibson, 2004). Figure 4.1.3 illustrates Clara scanning in a selected object into the system and selecting its desired location for display.

Clara’s sister is also interested in keeping some of their mother’s possessions, so Clara picks an object out and packs it up to ship to her sister. The object remains projected and visible, but slowly fades from view as the package is in transit, eventually becoming archived into the system, available for Clara to view at any time (Figure 4.2.4). The slow fade of the sacred object allows Clara time to mourn her mother and the object, thus participating in a ritual of letting go, defined here as the process of working through the negative feelings associated with the loss (Sas et al., 2016).

I also explored moments when the system initiates and controls the interactions, as illustrated in Figure 4.2.5. Clara’s

mother's favorite time of year was December, the holiday season. Clara fondly remembers her mother decorating the house with specific artifacts. The system initiates the act of reminiscing by automatically switching out the current decor to display the more sentimental, holiday-themed artifacts.

I explored moments when the system initiates interaction in response to Clara's actions. In Figure 4.2.6, Clara is reading and speaks aloud a desire to share a particular passage with her mom. The vocal command and request by Clara to share this passage activates the system. The system indicates a response with a glowing light and a vibration. It then waits for a response. If Clara says or indicates no by not answering or averting her eyes, the system returns to an idle state. If Clara chooses to interact, she touches the cube which warms to her touch. She recites the passage and the system records it and then archives it. Similarly, Clara might utilize the memory box as a digital archive. I wanted to provide choices for interaction for ease of use and to encourage consistent use. Clara could choose between uploading a memory in a video, textual, or audio based format (Figure 4.2.7).

As this study also focuses on the social aspects of Clara's life, I explored a system that encourages Clara to be more social. Within the immersion period of the grieving process, the mourner aims to invest herself in her new support system (Baglione et al., 2018) and transitions to a new social role. The delivery of the information aims to not overwhelm the user, and so limits the amount of information presented, reconfigures how the information is represented, and presents the information at specific times. If the user becomes too overwhelmed, there's the possibility of withdrawing to the isolation phase. Figure 4.2.8 depicts a message that changes as Clara moves from an implicit to a personal interaction. When Clara is farther away and less involved, a small portion

of the message is shown. The small pulsing signal notifies Clara. If she moves closer to the display, more of the message is shown. Finally, when Clara is up close and indicates her readiness to participate, the system reveals the entire message, along with options for her to answer the message. At any point in the process, Clara can give a motion signal to close the message. Figure 4.2.9 illustrates what the messaging interface might look like on a refrigerator. The refrigerator is one interface where I imagined a message might appear, it is not the only active interface in the system. I wanted to explore other ways Clara might be notified of social opportunities outside of her cell phone, her laptop, and her desk space.

In a related exploration, I imagined even more subtle interactions. The system could relieve Clara of the burden to respond. Her missed messages and calls appear on her desk surface, displayed as images only, with the more adamant messengers appearing larger. As Clara gets closer to her desk, the system audibly summarizes the message from the most prominent image. Finally, once Clara is close enough to interact, the system initiates communication by mentioning that a friend had messaged and speaking the message (Figures 4.2.10-4.2.13).

Relaying social moments and messages are opportunities for the system and Clara to work together in a way, as a unit, rather than the system functioning as a personal assistant. I explored how the system might ease increased sociability for the mourner. The system would summarize a message, relaying it to Clara in a conversational tone, relieving the burden of Clara having to read the message verbatim (Figure 4.2.11). Clara responds vocally, and the system drafts an audio message as an alternative to Clara drafting a message herself.

In another instance, the system once again summarizes a message, attempting to engage Clara in conversation. This time Clara glances at the message and nods, but doesn't respond (Figure 4.2.12). In response to the physical but non-verbal cue, the system sets an internal reminder to remind Clara to follow up with the message sender at a later time. Figure 4.2.13 shows a moment when the system literally takes over communication, and responds to the friend on top of Clara's message.

Observations

Throughout this study, I incorporated physical sensory modes because bodily engagement can heighten the ritual experience. According to Sas et al., (2016), the act of actively doing something can help mitigate passive victimization after a loss.

I differentiated between messages from an outside source and messages from the system, through a variation in typography, specifically with the change of color. I used ellipses to signal an internal system change, such as saving a message. I wanted the system to respond to both a physical touch (i.e., typing) and a voice, as there will be moments when the user might prefer mode of interaction over the other.

Other design explorations included a readiness-to-hand approach, examining the relationship between the system and the user, based on active engagement. Acting through the object, as opposed to with or upon it, might help build a rapport if user interaction feels seamless. Each step prompted by the system is purposeful and invites the user to the next step. In regards to designing an experience, explorations tip-toed a line between user agency and system dominance. Questions arose about the relationship between Clara and the system, power dynamics, consent and privacy. Is the act of responding on behalf of or on top of Clara's message beneficial or detrimental

to the relationship? I questioned how the system might analyze Clara's body and facial structure to determine or predict a specific mood or behavior. Would the system use a form of facial recognition software? How could the system be properly trained to ensure accurate predictions? I also questioned how the system might adapt to Clara's behavior and emotional state, specifically how Clara would correct the system. What kind of feedback loop needs to be designed to ensure boundaries are maintained but successful adaptability is still achieved?

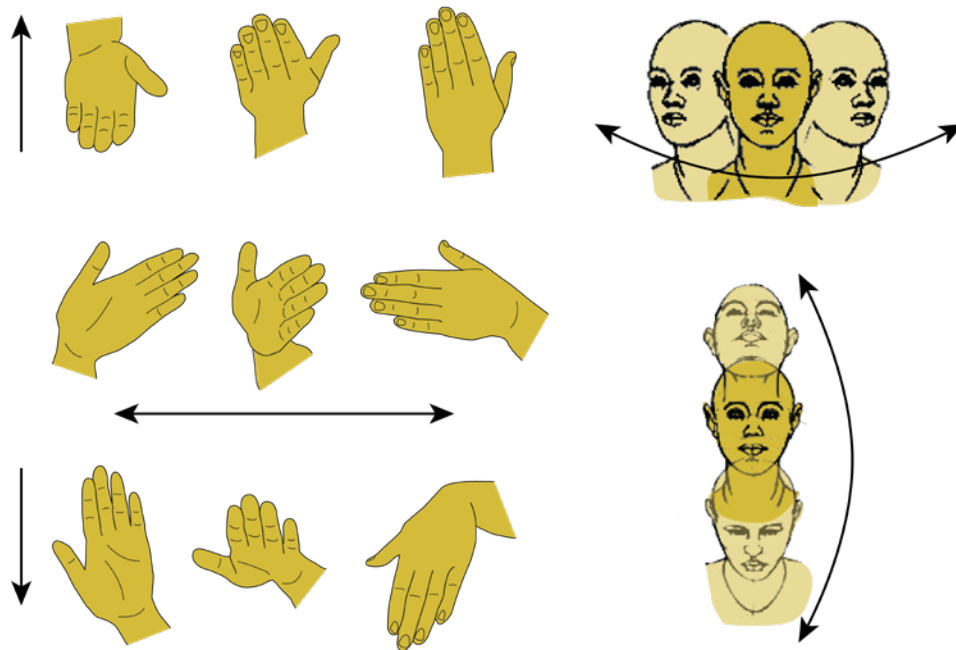


Figure 4.1.2
Gestural motions to activate,
deactivate, and navigate
through the system



Photo credits: Janney Caspari, Wolfgang Rottmann via Unsplash

Figure 4.1.3

The chosen possession is scanned into the system and designates the location for the possession to be displayed.

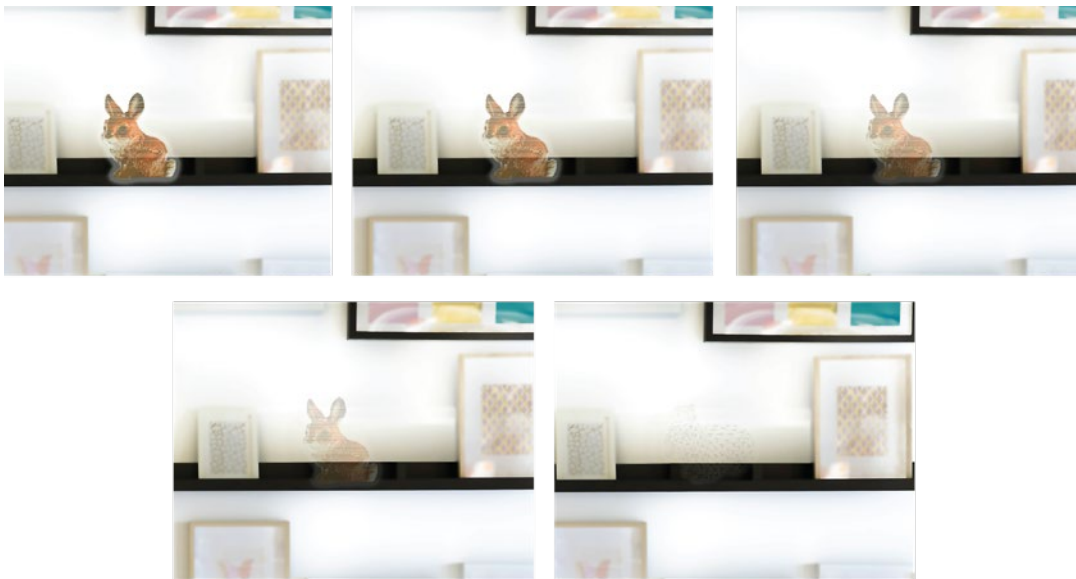


Figure 4.2.4

The object Clara scanned into the system slowly fades away as the object is in transit to her sister's house



Figure 4.2.5
The system detects a special time of year and updates the decor accordingly

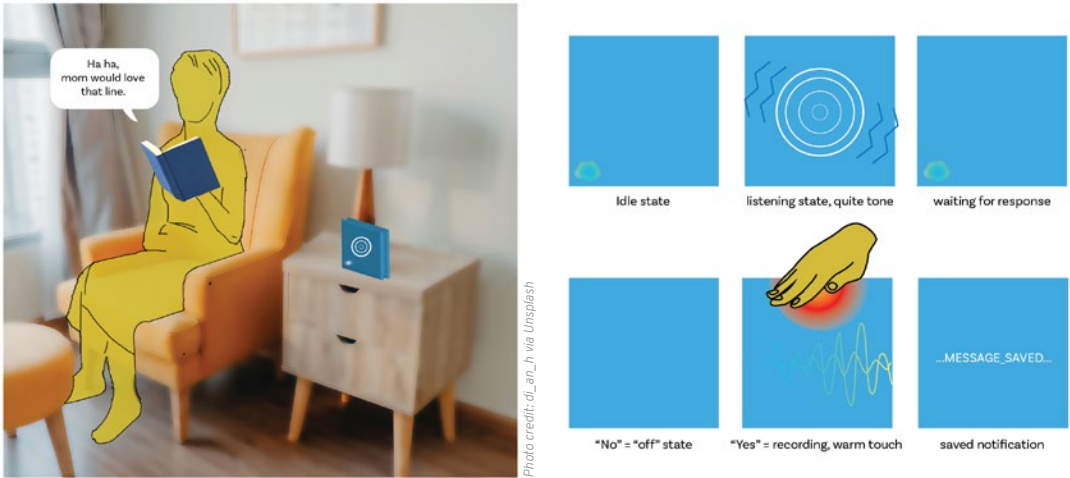


Figure 4.2.6
The system responds to Clara possibly wanting to share something with the deceased

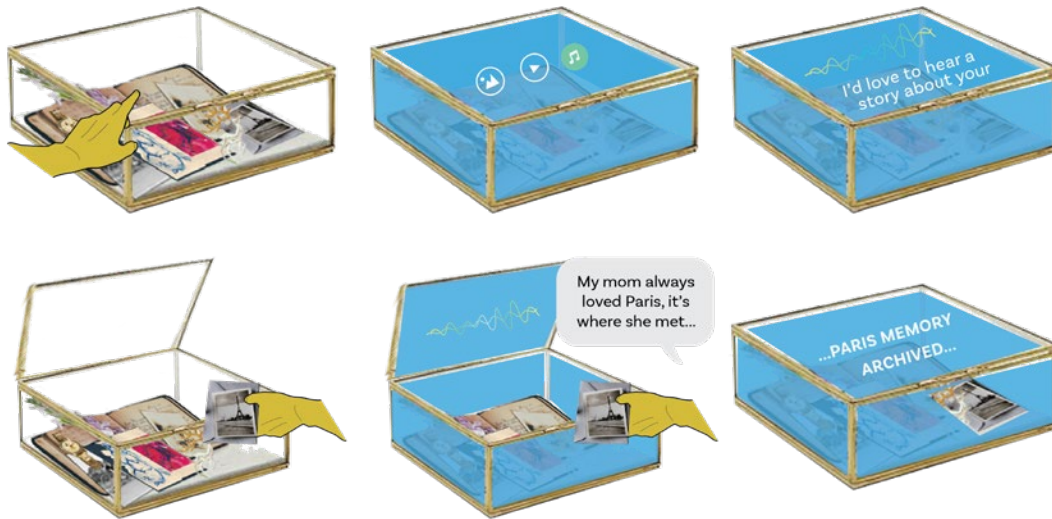


Figure 4.2.7
Clara accesses the memory box archive by recording and accessing stories about her mother



Figure 4.2.8
As Clara gets closer to the display, more information from the message is revealed

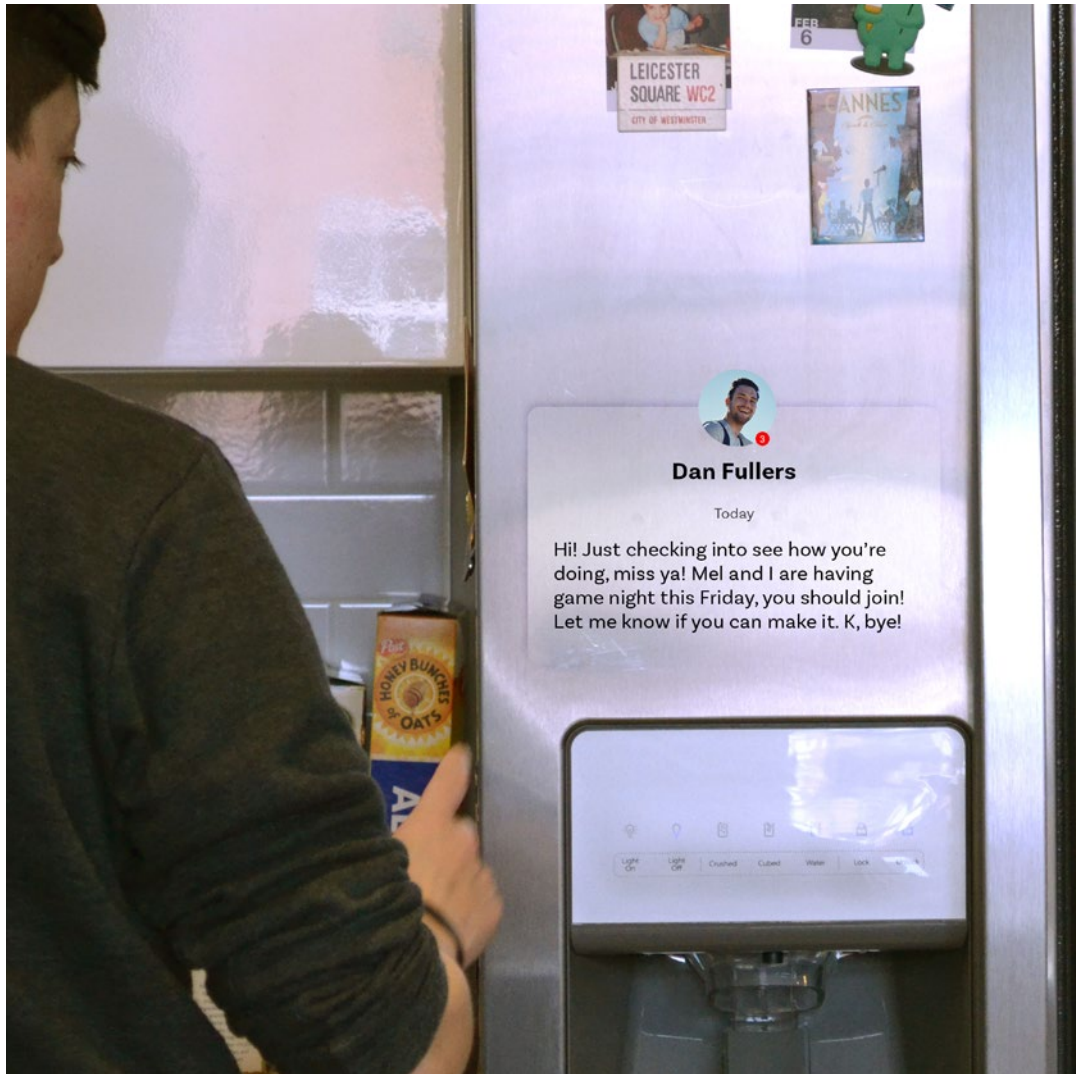


Figure 4.2.9
A rendering of a messaging
interface on a fridge

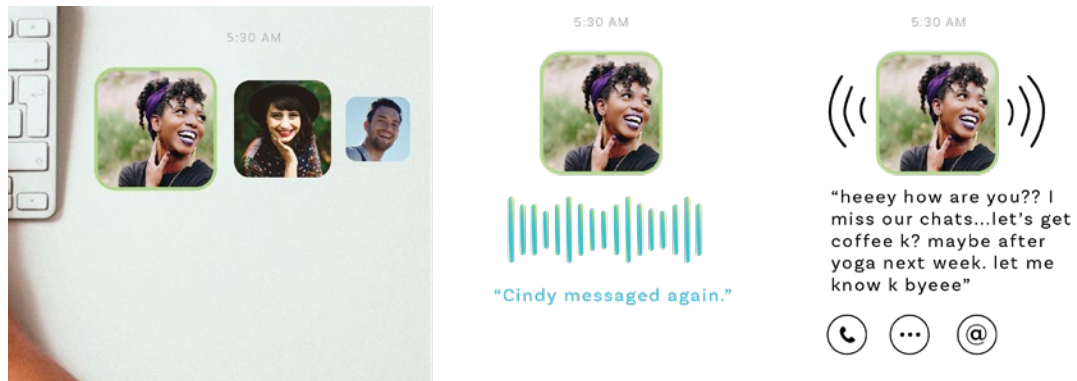


Figure 4.2.10
As Clara gets closer to the display, the message changes from being predominantly visual to more auditory

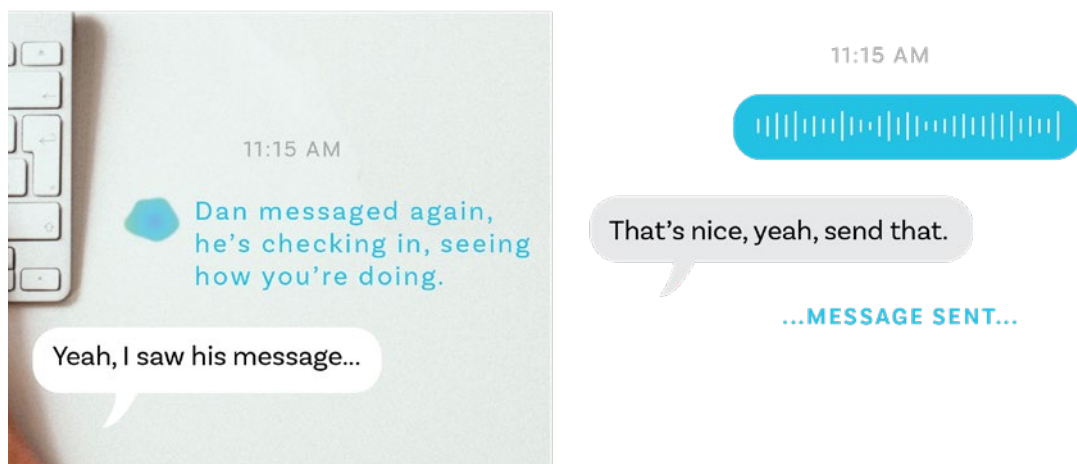


Figure 4.2.11
The system responds vocally and drafts an audio message for Clara

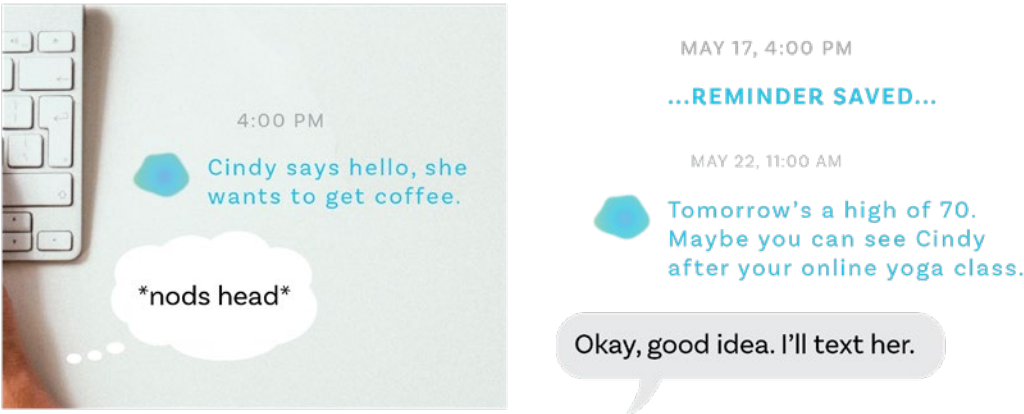


Figure 4.2.12
The system responds to a physical, non-verbal cue, and sets an internal reminder to remind Clara to follow-up at a later date

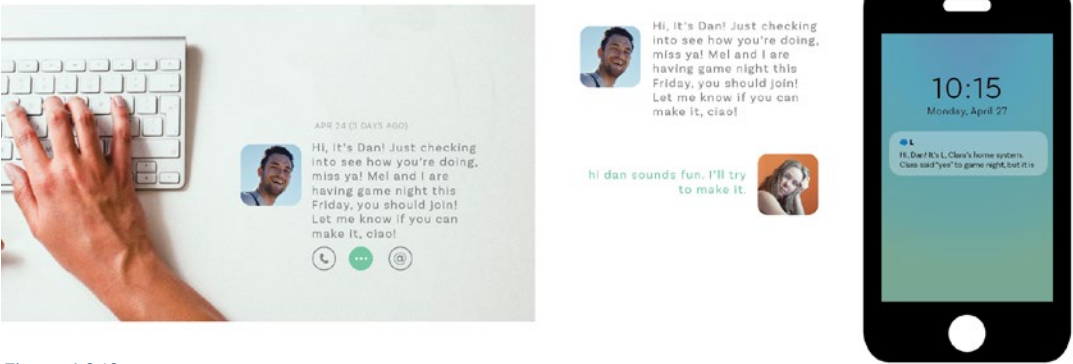


Figure 4.2.13
The system responds to the friend after Clara responds

4.3. LITERAL AND METAPHORICAL REPRESENTATIONS

This study explores how varied representation of the deceased might help the mourner conjure and externalize positive emotions to maintain an ongoing holistic attachment to the deceased.

A bond with the deceased continues after death. This continued bond includes the characterizations and thematic memories of the deceased person, and the emotional states connected with those memories (Klass and Steffen, 2017). I wanted to explore how the deceased might continue to play a vital role in the ongoing lives of the living. Photographs are important for recalling and retelling memories, and can also act as a bridge between the living and the dead.

The first exploration centers around the literal representation of the deceased, in the form of photographs. These photographic images serve as fictional icons, defined here as any image used to represent a person, place, thing, or idea – in this case, the deceased.

Early in the grieving process, the living and the deceased are still close, in both a temporal and corporeal sense. The deceased is a continuous part of the thoughts and memories of the grieving, and external references such as photographs prevent their images from fading in memory (Gibson, 2004). It may be too difficult for the bereaved to view an unaltered, distinct image of the deceased. I chose different filtering effects to manipulate photographic imagery (Figure 4.3.1). The image changes from distorted and unrecognizable to more objectified, concrete represented form. In some instances I manipulated the entire image while. For other photographs, I only manipulated the human form. Without

legitimate user testing, this study raised the question: What is central to the memory – the person, the event, or both?

Objects are also important components in grieving because objects are embedded in the construction of identity, functioning as metaphorical and metonymic devices (Gibson, 2004).

I conceptualized Clara utilizing a precious memento, such as a locket, to elicit memories. The locket functions as a melancholy object, or a linking object whose meaning undergoes transition throughout the grief process (Sas & Coman, 2016). The locket, once a dear possession of the deceased, evolves into a remembered object throughout the grief process. It starts as an object of mourning and a symbol of loss and evolves to be a memorable item, one that honors the deceased and allows for reflection by the mourner. Clara, wearing the necklace because it reminds her of her mother, occasionally rubs the locket, especially when she thinks of her mother. The images inside the locket changes, appearing in random order. According to Leong et al., (2006), users reported a range of positive and rich experiences when encountering effects of unpredictability. This study however, was conducted with music as the primary interaction, it cannot be definitely stated that a user in mourning would experience such positivity when viewing a particular photograph. Since Clara chooses and uploads the photographs herself, I speculate that her generalized reactions to a randomly selected photograph would not result in utter devastation.

Each photograph in the locket would be a different representation of Clara's mother, from a distinct representation of a recognizable face, to less direct and more symbolic representation. (Figure 4.3.2).

Stemming directly from a more iconic representation of the deceased through photographs, I also explored the form of

how the deceased might be presented. Figure 4.3.3–4.3.5 depict other ways I explore more indexical representations, contemplating how to elicit memories and other less tangible concepts of the deceased. These moments, for example when the system utters a sentimental saying (Figure 4.3.3), are ways of forming metaphorical connections with the deceased. An audio recording of a sentimental saying may not be a traditional form of a digital memento, but the goal with this exploration was to make the memento discoverable and fun. This interaction is meant to be serendipitous, a way to create meaningful unexpectedness through interactions that emerge in everyday practices (Liang, 2012).

The deceased might also be represented through personal memories of the deceased, ones that the user recalls and retells. A memory box, for instance, is a common memento used by mourners to remember the deceased (Figure 4.3.4). It functions as a standard, physical memory box, full of curated mementos including photographs, jewelry, or other items. Once connected to the system, the memory box doubles as a digital archive. Figure 4.3.5 illustrates a moment when the user requests the system to playback a store memory, specifically a story about the deceased. This exploration raised questions about the visual aesthetic of the system when it communicates to the user versus communicating with the connected objects. What does a message look like when it is sent? When it is received? Are confirmation messages only necessary for the user to view? Figures 4.3.6–9 speculate how the system and its associated objects might look and function in the home.

Observations

Despite an attempt to avoid using specific photographic images of the deceased, it proved imperative for this investigation. I specifically chose imagery that depicted

different renditions of a human face and form. In reality, photographs are not always formal portraits, but include depictions of everyday life. I recognize the sensitive nature of fictional representation of the deceased, so took care not to make the featured persons too familiar.

Drawing from conceptualized interactions with the locket and memory box, there is opportunity for more research around designing and developing more serendipitous interactions. Liang (2012) suggests the potentialities of powerful personal meanings can be discovered within the experience of serendipity. Given the sensitivity of grief, I speculate that serendipitous experiences could prove more detrimental to one suffering from complicated grief.

This study spotlighted the potentialities of a highly-customized system that starts as a basic unit and develops into a complex, adaptable system through user cues, user input, and other forms of data collection. The curation of the digital archive is left entirely to the user, which could either promote or discourage consistent use. More research needs to be conducted to figure out exactly how memories are uploaded, archived, and accessed, especially over an extended period of time.

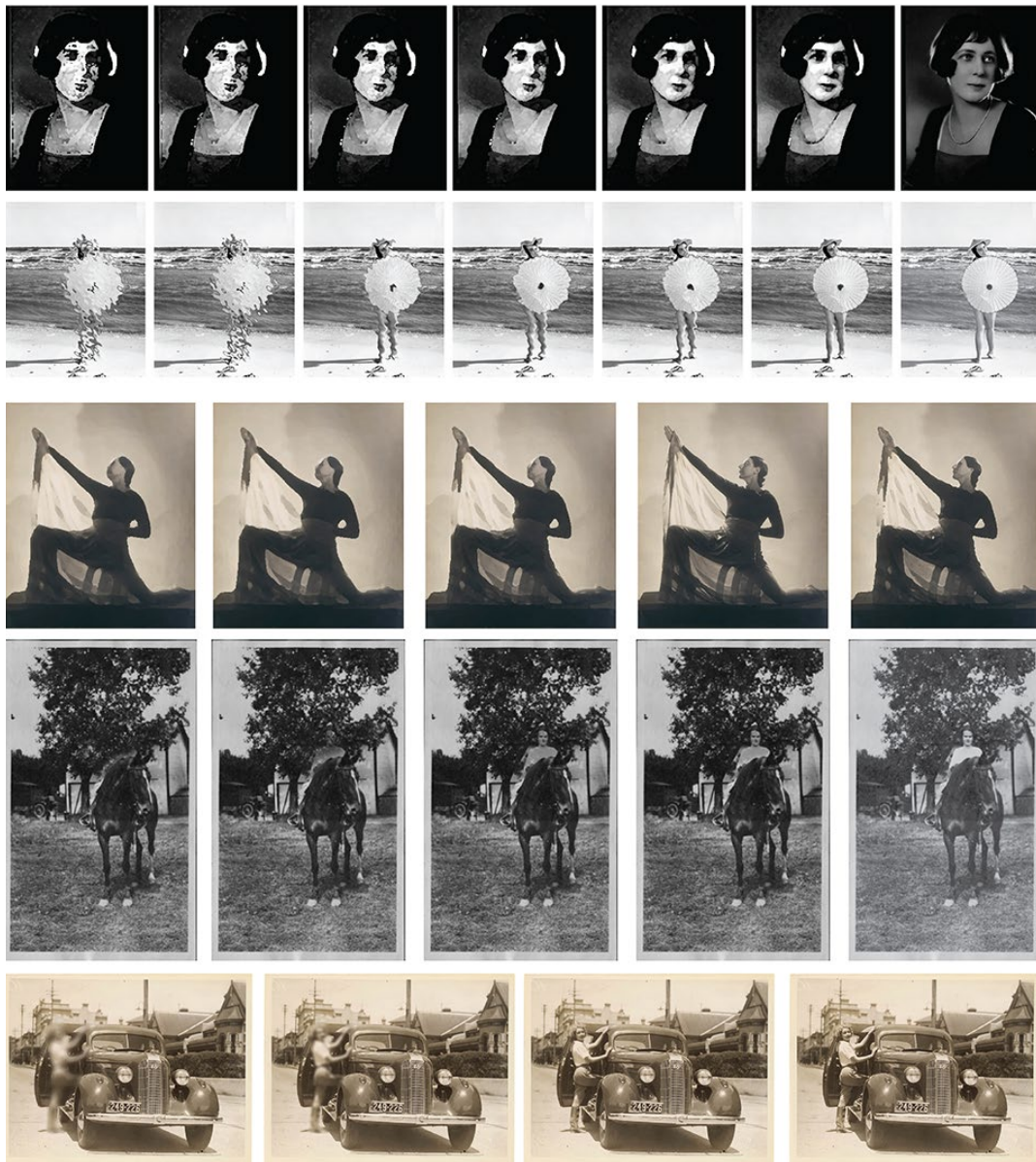


Photo credits: Flickr Commons

Figure 4.3.1
Explorations into image
manipulation of the literal
representation of the deceased



Figure 4.3.2
Locket randomly displays a variety
of photographs and images to
represent the deceased





Figure 4.3.3
The system responds to the user with a beloved saying often said by her mother

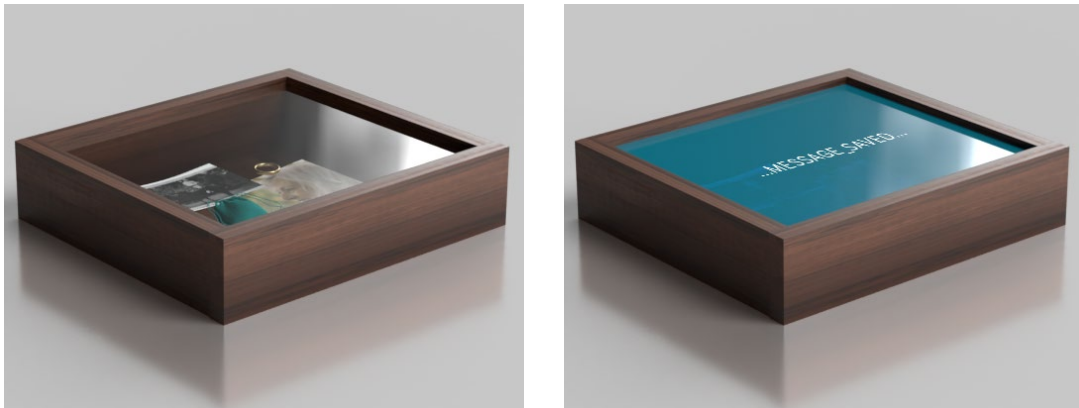


Figure 4.3.4
The memory box as a physical memory box and as a digital archive



Photo credit: Adobe Stock



Figure 4.3.5
The user interacting with the system to recall a stored oral memento



Figure 4.3.6
The user interacting with the system, sharing a book she thought her mother would like



Figure 4.3.7
The memory box as a regular
memory box and as an active
part of the system



Figure 4.3.8

The user archives a physical photo and an oral story about her mother. A few months later, she requests the system to access the archived story and retell it.



Figure 4.3.9

The system displays an interface indicating it is a special day (the deceased's birthday). It connects with the user's locket, which becomes warm to the touch. Upon opening, the user admires an image of her mother. The system also displays a reminder to the user regarding the special day.

Discussion

5.1. DESIGN PRINCIPLES

During this investigation, I conceptualized a networked system of embodied objects to help a user cope throughout a complicated grieving period. Over the course of my research and design investigations, several principles emerged that are applicable in various areas of design.

Language of delivery

Visual hierarchy is imperative in a system with multiple modes of communication. Designers need to consider what information is the most important to show at any particular moment. Differentiation between internal systemic information and external user-intended information needs to be considered. Within the context of a sensitive emotion such as grief, the language of delivery should not overwhelm the user. The cognitive states of a user throughout the grieving

process fluctuates, and bombarding the system with an abundance of text in any particular display might overburden the user.

The body as another user

An argument can be made that the mind and body are not separate entities, especially within the context of grief. Grief is a phenomenological experience, and manifest symptoms that are closely aligned with depression and trauma in both mind and body. We inhabit our bodies, our bodies inhabit the social and physical worlds. Therefore, designers should consider the potential of the body as a means of communication, specifically through gestural movements and voice activation. There is opportunity for more research around body and movement-based experiences. The body could be viewed as an ambiguous third-party and designers need to consider the role of the body in the act of perception, and as a mediator between internal and external experiences.

Data is key

The key to the adaptability success of a networked system is the collection, distribution, and analysis of data. Personal data collection spans from the objective and identifiable (age, weight, height) to the subjective and abstract (self-identified mental and emotional state, personal thoughts and feelings towards others, in this case the deceased). Another important area of discussion is determining accessibility to and use of private and public data. In Study 1 and 2, I explored integrating messaging into the system, bringing in data from text messages and voice calls. Extensive consideration needs to be given towards what kind of data is collected, how it is collected (face scans, user input), and how the user's data is protected and secured. Designers also need to consider

privacy, security, and consent of users outside the primary (grieving) individual.

Time will tell

The declaration that a system will adapt to the user's behavior implies changes over time. The user will change physiologically and psychologically over time as they grieve. Information displayed by the system might look one way at the start of the grieving process and look another way at a later date. Other considerations include the long-term maintenance of the system including storage, accessibility and permissions by others besides the primary user, and potential utilitarianism post-grief resolution.

Maintaining the status quo with adaptability and customization

Designers need to find a balance between adaptability and customization while maintaining user agency and freedom of choice. The user needs the option and ability to opt-in, opt-in, and change her mind. Ideally, the system should guide the user, adapt based on feedback, and avoid forcibly steering the user to participate in unwanted or undesired activities. Other meditations could involve inquiries into when responsibility lies with the system and when it lies with the user, or if and when it is appropriate to override a user's input or request.

Presence of the system

A system that lives within the fabric of the home, serving as both an invisible and visible element within the environment and the life of the user. When designing a networked system, interfaces need to consider the most appropriate manner to function in various states of use. Design decisions need to be made to aid in the system and its associated objects blending

into the home when unneeded, and becoming more apparent and obvious when in as a central focal point. Considerations could explore how form and material choice can embody qualities like tangibility and durability.

5.2. FUTURE WORK

User testing

Future continuation of this work would benefit greatly from the implementation and support of legitimate user testing. Grief is a deeply personal, subjective, and often private affair. My assumptions in this investigation could be addressed with extensive interviews of grieving individuals. Future work would also require more time to collect appropriate data reflecting the various stages of the grieving process.

Additional expertise and collaboration

The continuation of this investigation would also benefit from the invitation of additional expertise. Partnership with collaborators within the field of human-computer interaction (HCI) and psychology would expose blind spots within the investigation as well as open up new opportunities for testing and implementation. Further, partnership with software developers and industrial designers could aid in discovering technological possibilities for a system of objects.

Extension of spaces and users

One of the key constraints of my investigation was limiting the system to the confines of the home and to one primary user. Future adaptations from this work could explore an expansion of the system beyond the home, and the designation of exterior spaces as significant sites for action. Could the

system become transportable and transferable to burial sites or other pre-established places of meaning? Further research should be done to determine the potentialities of additional users as well. Grieving is both a solitary and social experience, involving extended parties in various capacities throughout the mourning period. Could the system allow limited accessibility to other family members or external social connections like those from bereavement groups?

Religion and spirituality

I limited my investigation to reflect an American, Western, non-religious, non-culturally specific context. In reality, grief and death can be deeply intertwined with religion, spirituality, and culture. Future adaptations of this work could focus on the more ethereal and transcendental facets of grief and bereavement.

Implications for practice

My investigation references grief therapy with the presence of a grief therapist. There is potential to expand the accessibility and use of the system to include a therapist. Further research should be done to test the feasibility of implementing the system as a temporary, therapist-recommended intervention tool. There are also related industries that could find use with aspects of this system like the funeral industry, death preparations services, and non-human deaths. This system could also be initiated by the dying, and customized to accommodate more specific deaths like those of a child, a spouse, or a pet.

5.3. CONCLUSION

This investigation speculates the potentialities for a system of designed, embodied objects to help individuals understand the complex web of meaning within and around grief. Despite extensive research confirming that grief is a highly individualized, unique, phenomenological experience, traditional bereavement treatments continue to center around a standard, normative form of grieving. Additionally, current digital grief technologies focus on surface-level interactions and disregard the physical and intangible experiences associated with the complex grief process. I do not suggest that this system or others like it replace therapeutic treatment of grief therapy, but instead can function as a system of customized tools and resources to aid in grief resolution.

Grief is a universal experience, one that comes about from loss of any kind. Every person, regardless of socio-economic or cultural standing, will experience grief in some way shape or form in his or her lifetime. The distress of the loss can be detrimental to an individual's well-being, with the bereaved experiencing a sense of longing and yearning for the deceased. Survivors, straddled with an oppressive sense of meaninglessness, are frequently left to their own devices when it comes to mourning. I hope the results from this investigation will contribute further work to the field of thanatology and grief therapy while reexamining and redefining conversations around death and mourning.

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