

# Designing for the Third Hand: Empowering Older Adults with Cognitive Impairments through Creating and Sharing

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## ABSTRACT

Cognitive impairment is sometimes viewed as a deficit limiting an individual's ability to participate fully in society. Art therapy, in contrast, is a context in which older adults with cognitive impairments (e.g., dementia, aphasia) are positioned as capable, competent, and engaged through the act of creating and sharing artwork. We draw on the concept of the "Third Hand," a practice in art therapy in which the therapist attunes to and enables the desires of the client during interaction. We use this concept to understand how to empower creative work and sharing among older adults with cognitive impairments. We introduce an interactive frame prototype to explore new opportunities for sharing and supporting interaction between these older adults and their therapist. We conclude with a discussion of what designing for the Third Hand means to HCI, including how this metaphor provides a model of empathy and empowerment in design for this population.

## Author Keywords

Empowerment; empathy; art therapy; older adults; design.

## ACM Classification Keywords

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

## INTRODUCTION

A growing literature in HCI focuses on designing new interactive systems to engage older adults in creative activities [34] and social sharing with family, friends, and peers [40]. This involves designs that empower older adults as active creators of digital content rather than being passive consumers [33]. In addition to arguments around social inclusion and equal opportunities for older adults, prior work suggests that engaging in creative activities [10, 30] and

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staying socially connected in older adulthood [2] can promote healthy aging. While such health benefits are promising, fostering creative activities and social sharing among older adults with cognitive impairments (e.g., dementia or aphasia) raises a considerable design challenge.

More than 16 million people in the U.S. have cognitive impairments [7] characterized by difficulty remembering, using language, and decision-making to an extent that affects everyday life. Although some work aims to empower individuals with cognitive impairments (e.g., [38]), our society tends to view cognitive impairment as a deficit. That is, society operates under the assumption that the non-impaired person is normal, and that the person with a cognitive disability is in need of special provisions, protection, or help [18,26]. Further, medical models characterize dementia as a disease in which the body breaks down and needs repair [23]. People with dementia are seen as those "whose brain has been destroyed by the disease and who therefore no longer exists as a person but only as a body to be managed" [3]. Similarly, HCI tends to view aging as a decline, plagued by social isolation and disability [37]. Taken together, these views position older adults with cognitive impairments as a population that is largely disengaged and incapable of fully participating in society.

In contrast to these views, in art therapy, older adults with cognitive impairments are positioned as creative, competent, and capable individuals. Through 18 months of field work, we analyze the role of the art therapist and draw on the concept of the Third Hand to understand how older adults are empowered through creating and sharing. We introduce the metaphor of the Third Hand to HCI as an instructive lens for understanding how to empathetically and reflectively design for empowerment. We find that the Third Hand enables and empowers older adults with cognitive impairments by (1) providing dynamic support; (2) being invisible and fluid; (3) promoting autonomy and choice; and (4) confirming abilities and self-worth. Building on these findings, we iteratively design and test an interactive frame to capture and share therapeutic artwork, revealing the ways in which technology should work in concert with the Third Hand. Our analysis of the Third Hand provides a case of how to achieve empathy in design [41] while contributing to the literature on designing for people with cognitive impairments.

## BACKGROUND

In the 1980s, Edith Kramer, a renowned art therapist, coined the term the “Third Hand” to describe the role of the art therapist in the creative process. The Third Hand is a “hand that helps the creative process along without being intrusive, without distorting meaning or imposing pictorial ideas or preferences alien to the client” [24]. The Third Hand provides functional and artistic support in the creative process by preparing palettes of paint, dipping a brush in paint, or even working hand-over-hand to guide the client’s brush strokes on paper. The role of the Third Hand is also sensitive to the desires, goals, and emotions of the client, by providing support without imposing meanings, ideas, or preferences onto the client’s work. The therapist’s “artistic competence and imagination are employed in the empathic service of others” [24], requiring therapists to embody the artistic goals and preferences of their client rather than their own. Yet, honing an effective Third Hand requires learning to provide effective support. Kramer describes therapy sessions that have gone awry because the art therapist “had not yet acquired a reliable Third Hand” [24]. In this paper, we analyze what it means to be an effective Third Hand and examine how technology aimed to empower older adults with cognitive impairments through creating and sharing should be designed to work in concert with the Third Hand.

## RELATED WORK

This paper builds on prior studies of content creation and sharing involving older adults as well as design research focusing on art therapy and empowerment.

### Encouraging Creating and Sharing Among Older Adults

Rather than being seen as actively contributing online, older adults are often viewed as passive consumers of online information [40] and lurking in online communities due to the complexity of online interfaces for creating and sharing content [27]. Recent work has attempted to address this by engaging older adults in creative activities [34,39] and sharing with peers and family [6,40]. Sharing online can play a role in how older adults create and sustain relationships and memories and this form of sharing contributes to their self-expression and self-presentation [22]. In this vein, prior work introduces tools to share visual content such as photos and art [5,12,14] although older adults’ social contacts are often the ones sharing, rather than the older adults themselves. A few systems have been developed to support older adults in creating and sharing content online. For example, Waycott et al. [40] created the *Enmesh* iPad application to facilitate creating and sharing of stories and photographs among older adults. They found that sharing art in the home accompanied and elucidated historical life narratives. Our analysis further explores the support of older adults in sharing art and stories.

### Supporting Creating and Sharing in Art Therapy

While designing new tools to foster creating and social sharing among the general population of older adults is a growing research space, considerably less attention has been given to how new technologies could support sharing among older adults with cognitive impairments. The research that

does exist primarily focuses on the context of art therapy. The art therapy literature acknowledges that older adults with cognitive impairments experience changes that affect the ways they use technology and engage in creative activities [35]. Systems such as the ePAD have been developed to assess engagement in art therapy by prompting and monitoring art therapy participation [31]. Other work uses algorithms to provide automated and adaptive assistance to older adults during art therapy sessions [4,19]. These studies assert that technology should not replace the art therapist but rather play a supplementary role in the creation and sharing processes. Our work builds on these findings by detailing the nuances of interaction between the art therapist and her clients as a way of understanding how technology may be integrated successfully into this practice. Further, prior work indicates that technologies for art therapy need to support customization and adaptability, assessment of individual needs, and simplicity. While this prior work aims to empower individuals through the design of new tools for art therapy [31], there are many unexplored complexities to how older adults with cognitive impairments decide whether and how to share their work. For example, Cornejo et al. [11] describe the cooperative negotiation of sharing behaviors involving older adults with dementia in art therapy, in which the older adult may have limited involvement in the decision to share their artwork or how others share their work.

### Designing for Empowerment

Our analysis of older adults with cognitive impairments in art therapy relates to an ongoing discussion in HCI about designing for empowerment, which Ertner et al. define as “the giving or delegation of power, authority or enablement” [16]. Rogers and Marsden argue that the rhetoric of compassion in HCI, in which the researcher or designer aims to help others through their work, perpetuates the asymmetrical and disempowering relationship between the researcher and user [33]. This logic frames certain user populations as “worse off” than the researcher and draws a distinction between those who have and those who have not. Although Rogers and Marsden discuss this issue with the general population of older adults, designs that inadvertently disempower occur frequently in design for older adults with cognitive impairments [1]. Kitwood [23] describes how older adults with dementia can be undermined and disempowered when they are not permitted to use their full capabilities or complete an action they have initiated. Similarly, technology designed “for” older adults often provides comfort to family members without considering the perspective of the older adult or the impact of the technology on them [33].

Research framed with a view of older adults as in need of help may give researchers a perception that it is appropriate to implement solutions that ultimately lead to disempowerment. Instead, Rogers and Marsden suggest switching our focus from helping to empowering users [33]. As a provocative example of this shift in focus, Wallace et al. explore personhood in dementia, in which others help construct an individual’s sense of self and thereby contribute

to empowerment [38]. A deeper examination of what it means to empathize with and empower individuals with cognitive impairments is needed. Here, we study these issues in the context of creating and sharing in art therapy.

### **PHASE 1: UNDERSTANDING THE THIRD HAND**

The first part of our work involves understanding the work of the Third Hand, or the empowering and empathetic role of the art therapist in the process of making and sharing.

#### **Method**

Our field work was conducted over 18 months at one residential living facility for older adults located in the Midwestern region of the United States. This community offers art therapy as a program for its residents. This community has a dedicated studio space for art therapy, although older adults also work with art therapists in community rooms, living spaces, and private residences. The majority of the older adults we interacted with in art therapy live in the skilled nursing portion of this community, which provides care 24 hours per day. The vast majority of these older adults have cognitive impairments (i.e., from Alzheimer's disease, stroke) that affect their memory, speech and language, and physical abilities (e.g., limited arm/hand mobility, use a wheelchair). While we identify our study participants generally as older adults with cognitive impairments, we characterize their diverse needs and abilities throughout the sections below.

Our field work involved ongoing observations of individual and group art therapy sessions within this community. Each observation session lasted 1.5-2 hours, and we conducted 18 sessions. One-on-one sessions involved an art therapist and an older adult, and group sessions involved between two to nine older adults working with the lead art therapist and an interning art therapy graduate student. Researchers observed sessions and took detailed notes about the activities, materials, and interactions of the art therapist and residents. Per our human subjects' approval, we took on the role of observers and did not interact with older adults during the therapy sessions. We audio recorded therapy sessions and took photos of consented participants making and sharing during art therapy. The researchers debriefed with the art therapist after each session. We obtained human subjects approval from the community and the University Institutional Review Board to conduct observations of art therapy sessions. We also obtained consent from the older adults and their authorized representative before studying their participation in art therapy in detail.

Data analysis followed a constructivist grounded theory approach [8, 9]. Our process of data analysis emerged through interactions at our field site, with our data, and between members of our research team, one of whom is an art therapist. Data included field notes, photographs, and transcripts of recorded therapy sessions. We extend work by Cornejo et al. [11] that describes the ways art therapists and older adults negotiate the various regions of public versus private sharing. Extending this analysis, we have come to

view the concept of the Third Hand as a useful analytic frame for understanding the cooperative and supportive nature of interaction between the art therapist and older adults with cognitive impairments. With this in mind, we iteratively coded data and related the codes and emerging concepts to one another through a process of memoing and theorizing.

#### **Findings**

In this section, we draw on prior work in art therapy [11] and our qualitative data to describe what it means to be an effective Third Hand. We first provide some context about the experience of making and sharing in art therapy for older adults with cognitive impairments. The lead art therapist at our field site, who is the focus of our analysis, has worked with older adults, many of whom have had cognitive impairments, for six years. In addition, we observe an interning art therapy graduate student at our field site, caregivers, and volunteers who also interact during therapy.

Art therapy sessions involve one older adult and the art therapist or the therapist working with a small group of older adults. The art therapist prepares the necessary materials for each session and sets up a customized workspace for each older adult. Each art therapy session typically begins by orienting participants towards a particular goal or intention for that session (e.g., make art about a significant relationship in your life). The therapist works alongside the older adult during the art making experience, and when multiple older adults are present, she moves between older adults checking on their progress and assessing whether they need support.

Art making most frequently involves visual elements, such as painting with acrylics or watercolors, drawing with pencils or oil pastels, needle felting, and collage involving magazine clippings or photographs. The therapist we observed also uses technology to record older adults' voices (e.g., telling stories or singing) and edits the recordings into an audio collage or audio story. However, none of the individuals in art therapy used computers independently.

Most group therapy sessions conclude with a period of sharing, in which the therapist encourages participants to describe their work and what it means to them. The sharing activity is critical, as this process helps older adults articulate their own needs and feelings, express themselves to their peers, and relate to others experiencing similar situations, such as coping with their changing abilities and memory loss [11]. The art therapist explained the value of art therapy for older adults with cognitive impairments:

*"If [the older adult] can have those opportunities to connect with people and be treated like a person that is a huge thing... Art plays a really big part in addressing that, because when you're having a creative interaction with somebody, you're not bound by the normal linear conversation, social[ly] acceptable rules of how people normally interact. Because you are expressing yourself through multiple forms, you're engaging with somebody in a*



**Figure 1. Art therapist preparing paintbrush for participant during art therapy.**

*more playful spontaneous way, you don't even necessarily have to be able to speak coherently to be able to express yourself creatively."*

In addition to participating fully in the experience of creating art, participants receive feedback from others in the group that can *"help somebody feel seen and heard and connected,"* said the art therapist. Currently, however, these older adults primarily share with – and consequently feel seen and heard and connected to – others who are present in group therapy. In Phase 2 of our research, we discuss opportunities for sharing with those outside of the group.

In summary, we find that the art therapist is far more than a facilitator of creating and sharing; she enables and empowers these participants through acting as the Third Hand. Our analysis reveals four primary qualities of the Third Hand that lead to empowerment while being mindful of the needs and abilities of older adults with cognitive impairments.

#### *The Third Hand Provides Dynamic Support*

Central to an art therapist's effectiveness is her ability to support and adapt to the widely varying abilities and needs of her clients [24]. This involves acknowledging the particular abilities of an individual with cognitive impairment, which can vary day-to-day or even moment-to-moment, and responding accordingly to these fluctuations. The art therapist works with older adults with a broad range of abilities. Some express themselves fluently and others have severely limited ability to verbalize thoughts. Some have severe upper body motor impairment from a stroke or Alzheimer's disease, affecting their ability to manipulate brushes or write independently.

The art therapist offers varying amounts and types of functional support depending on the unique needs of each participant at that particular moment. For example, the therapist may provide functional assistance by loading a brush with paint or steadying a participant's hand as they do detailed work. The art therapist also suggests options that work well with each individual's capabilities. When a participant's shoulder was hurting her, the art therapist suggested that she paint with watercolors to reduce the

resistance between the brush and paper to minimize her shoulder pain.

Just as the art therapist adjusts materials to the physical needs of the client, she also adjusts the activity to the client's understanding and motivation for engaging in the art therapy process. She said some clients *"have that awareness that I am making art and here's why and here is what it means to me, and here's what it might mean to other people,"* and contrasted that with other clients who may create *"without maybe deciding 'this is why I'm making it.' 'I'm making it because you asked me to make something.'"* Thus, the Third Hand provides dynamic motivational support tailored to each client's understanding of and intention behind creating.

The art therapist uses her knowledge of each client to provide this dynamic support, which she bases in part on a longstanding relationship built on many therapy sessions as well as meetings with the client's care team. The therapist also provides continuity between sessions, bringing back partially finished artwork or setting finished artwork in front of the client for inspiration, and bringing up themes that a client has surfaced in previous sessions. When a client does not recognize the artwork or remember details about it from week to week, the art therapist provides the context and to help them pick up where they left off. Hence, the Third Hand provides longer-term contextualized support that facilitates continuity in the making experience over time in addition to in-the-moment functional and motivational support.

The art therapist is aware of the value of having the older adult do as much as possible on their own, as 'over-helping' can lead to disempowerment [23]. In our observations, the art therapist often encourages an older adult to attempt painting or drawing on their own first and then provides support as needed. This delicate balancing requires ongoing vigilance: the therapist described this as *"the decision making therapists are doing every second."* She is mindful of older adults' emotional states during the creation process and steps in to provide support and alternative strategies when a client becomes frustrated. She explained, *"at some point it detracts from the experience if we ask them to do too much."* Yet, an effective Third Hand takes care not to help when it is not needed. For example, at the beginning of one group session, a participant wrote, *"I'd like nothing better than to be able to walk, or even move, by myself without a million people helping me."* After reading this card aloud, the art therapist asked the group if anyone else related to the feeling. Being aware of how over-helping can lead to disempowerment, the therapist said, *"How can I help you make an image about people not helping you? Well here's your brush, do you want your green? So that's the help I'll give, I'll get your color loaded and then give it to you."*

Though the therapist acknowledges and adapts to each individual's abilities, the focus is not on the therapist as filling a void or deficit left by an older adult's disability. Rather, the therapist frames her actions around enabling and empowering each client. It is not the older adult that has to

change to match the task, but the task that must be altered to accommodate the abilities of the older adult. That is, the art therapist views the environment as problematic rather than the older adult [15]. And, most importantly, care is taken so that the Third Hand does not offer more help than is needed, as this can lead to disempowerment [23].

#### *The Third Hand is Invisible and Fluid*

An effective Third Hand fades into the background during the creating and sharing experience. To achieve this, the therapist does much work behind the scenes to prepare for a therapy session. Some of this preparation work involves purchasing and selecting materials and mediums, generating prompts or themes to inspire creation, and setting up the work area where her clients attend art therapy. This work requires the therapist to incorporate her knowledge of the client's preferences and abilities in order to envision the future interactions, needs, and desires of her clients. When done effectively, she is able to weave in and out of the creation process, supplying materials and inspiration as needed by each individual.

Although prior work characterizes the role of the art therapist as a co-creator of content [11], our analysis of the Third Hand offers a slightly different interpretation. The art therapist explained that the goal of the therapist is not to be a partner in creating art, but rather to *"be the Third Hand like machinery. Make the physical work happen."* Rather than being present in the creation of art as a visible actor, an effective Third Hand empowers the client to be the sole artist by offering support when necessary and fading into the background as soon as possible. An effective Third Hand becomes invisible in the creation process, confirming and empowering the older adult as the director of the creation process and the ultimate owner of the artwork. For example, one participant who was needle felting (a process that involves using a tool filled with small needles to weave together thread fibers) expressed her difficulty doing detailed work around the edges, to which the therapist responded, *"I'm going to be a felting assistant."* By using the term assistant, the art therapist positions herself as in a supporting role and frames the older adult as the main artist. When asked about this interaction, the art therapist explained, *"It was always her [the older adult's] process. I was the extra hand... That's what a therapist should be doing by second nature."* Similarly, before sharing a piece of work in a group therapy session, the art therapist said to another client, *"Ok, I'll be your scribe. Tell me what to write."* The therapist reaffirms that the client is the one in charge of the art making and sharing experience to ensure that it is the older adult's voice coming through what is written, not the therapist's.

While the art therapist provides ongoing and dynamic support during creation, she is mindful about whether her involvement made the final creation deviate from what the client intended. That is, with an effective Third Hand, the art therapist's desires and artistic direction should be invisible in the final artifact. The therapist described making decisions

about *"whether the work represents who [the older adults] are,"* or whether the authorship has shifted to the therapist, before sharing artifacts created during therapy with family members or the care team. In summary, the Third Hand aims to be invisible and fluid throughout the creation process as well as in how the final artifacts take shape.

#### *The Third Hand Promotes Autonomy and Choice*

A central goal of art therapy is to engage older adults in a constructive activity "that confirms their sense of autonomy and selfhood" [24], and this is particularly important for older adults with cognitive impairment who are often deprived of these opportunities [23]. As part of promoting autonomy, the art therapist uses her knowledge of each older adult's preferences to empower them to create art the way they want to. For example, one older adult can say very few words because of a stroke. The therapist said:

*"The way that I interact with [the client] is often me using my knowledge of her and how she works to give her choices that I think she might like. So giving her choices of colors she might like or giving her choices of sounds that she might like."*

The Third Hand attends to older adults' subtle cues and interactions as a way of promoting their autonomy, then acknowledges and performs on behalf of their desires. In one session, the art therapist said to this same participant:

*"Do you want that same yellow again? Okay let me get you [the paint]... I love that sometimes you don't even need to say I need yellow paint, I just see you [are] looking at the yellow paint [and] I think 'she wants yellow paint.'"*

For individuals with limited verbal abilities, the Third Hand is a vigilant and attentive facilitator that promotes autonomy by taking into account clients' preferences even when no words are spoken.

An effective Third Hand also empowers by providing choices whenever possible, from the colors and materials to whether a client works on the same project or starts a new piece. By giving choices, the art therapist must do the work of calculating what the older adult is able to do and wants to do and then offer choices that might be appealing. At the same time, the therapist must be mindful and attentive to cues from the client signaling possible desires that she has not yet proposed. The ultimate goal is to construct interactions that empower through enabling choice.

The work the Third Hand performs to promote autonomy and choice takes place in the context of other actors in the older adult's life, such as caregivers and family members who may be present in art therapy. We learned of instances in which an older adult's family member or caregiver encouraged the older adult to make art in a certain way or of certain objects as a way of reconnecting with them. The therapist explained that it is more important to reaffirm the older adults' freedom and independence in art making than adapt to family members' wishes. Although this guidance by others is meant

to be supportive and help relate to an older adult, this can ultimately be disempowering by reducing the older adult's autonomy and choice in the creative process.

#### *The Third Hand Confirms Abilities and Self-Worth*

Honing an effective Third Hand involves learning to interact with clients in ways that validate their abilities and the work they are doing [24]. One way the therapist does this is by referring to clients as skilled artists. On several occasions, we observed community staff or visiting family members and friends drop in on group therapy sessions that were held in communal lounge areas. Often others outside of the therapy group described the work as "crafts", which tends to minimize the skilled and sophisticated nature of creating artwork. The therapist routinely clarifies that this is an "art group" and that "it's a good group of artists we have here," calling further attention to the older adults' abilities by labeling them artists. She also comments on the strategies they use to make art. When one individual tried a new technique, the therapist told her, "I think you're really onto something with this drawing style." She supports people in recognizing that they are approaching their goals, saying to a participant, "This is beautiful. And last week you said you wanted to do something more representational, so here you go, it's happening!" In another instance, one older adult criticized the art she made one session, and the therapist responded by saying, "I think that many more paintings exist in my head than I will ever actually put down on paper. You'll get an idea for something and it might just stay as an idea." The therapist related to this client by positioning herself as unable to create all of the artwork she wished she could, suggesting this feeling was common among artists.

The art therapist further confirms older adults' self-worth by emphasizing their contributions as artists. One individual described wanting to help others and painted an image of artwork coming out of a hand. The therapist saw this and said to the group, "What we create with our hands can actually help other people. So maybe even just by making art with our group today, you have helped other people." During the next group session, the art therapist reinforced this participant's contribution to the group. She said that the idea for this week's prompt "was inspired by what you were saying last week about wanting to help other people." Importantly, this positions these older adults as capable of helping others rather than the ones in need of help.

Another way the therapist confirms the abilities and self-worth of these older adults is by taking self-expressions, some of which are typically perceived as negative symptoms of cognitive impairment, and positioning them as positive creative expressions. For example, the therapist described one participant's speech as "word salad" due to a stroke. Instead of viewing these verbalizations as problematic behavior, the therapist described engaging with the individuals' speech creatively by introducing rhythmic movement, gently tapping on the individual's hands or knees. The therapist observed the participant's words

become rhythmic and rhymed. The therapist then introduced a paintbrush, and the individual created abstract marks on canvas in time with her speech. The therapist described this interaction as reframing the verbalizations not as "word salad" but a form of spoken-word poetry, an expression of self to be engaged with creatively rather than managed. Further, audio recordings of this interaction and accompanying artwork became powerful expressions of self that the art therapist shared with family members with great emotional impact. In this way, the Third Hand allows others "to view somebody's expression as an expression of who they are as a person and not just as a negative symptom of a disease," noted the therapist. Similarly, with the client's permission, the art therapist frames their artwork in high quality frames and places their work in the community gallery space. This further emphasizes that what these participants are creating is valuable and worthy of sharing.

The Third Hand also confirms clients' abilities and self-worth by helping others interpret the expressive artifacts they create. For example, a participant's sibling visited and commented on her work, which she interpreted as a skeleton for Halloween. The piece the participant was working on, however, was an image of her parent, who was very sick, had lost a significant amount of weight, and passed away a few days later. Stepping in as the Third Hand, the art therapist offered the participant the opportunity to explain the context and intention of her artwork to her sibling, who then reacted to the piece with shared emotion about losing their parent. The Third Hand translates and contextualizes older adults' expressions in ways that draw out their meaning; the Third Hand calls attention to an individual's voice when they are unable to do so on their own.

## **PHASE 2: PROTOTYPE DESIGN AND TESTING**

From our field work, we began to explore how new technologies to support creating and sharing should be designed in light of the Third Hand. New systems that help capture, document, and share what these older adults create through art therapy may serve to further empower them and connect them with others in their life who are not co-located during the therapy session [11]. However, technology designed for this context must carefully attend to how it should work in concert with the Third Hand.

### **Interviews with Art Therapists**

We initially discussed multiple design ideas (e.g., interactive mailbox, wearable displays, Google Glass) with the art therapist at our field site, then continued to discuss design ideas through interviews with five additional art therapists. These therapists (1-7 years of experience) work with older adults with cognitive impairments in residential communities and adult day programs. Based on their feedback, we decided to explore the concept of an interactive frame as a metaphor for interaction. This leverages the common practice of framing artwork as a way of sharing work while confirming a client's abilities. Therapists indicated the importance of capturing audio associated with

the artwork, which allows for affective information in speech, non-speech vocalizations, and music or singing [32]. Therapists asserted that clients should direct the interaction as much as possible, and incorporating accessible and familiar physical buttons may facilitate this.

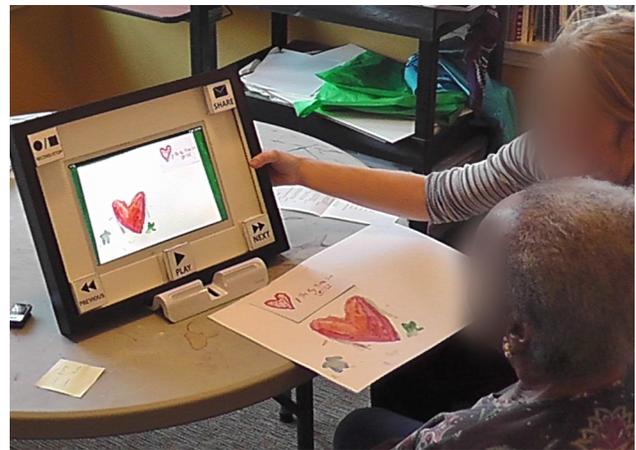
### **Wizard of Oz Prototype**

Based on our formative design work, we created an interactive art frame using a Samsung Galaxy Tab Pro tablet mounted inside a wood frame. We created an Android application that runs on the tablet and can be used by a therapist and client to capture images of artwork through the tablet's camera and then record audio messages that link to the image. We mounted the tablet inside the frame and added five reconfigurable physical buttons around the edges of the mat inside the frame (see Figure 2). Given the exploratory nature of the prototype, the physical buttons were non-functioning and controlled via Wizard of Oz. We used a second tablet computer to drive the Wizard of Oz interaction from across the room. The secondary tablet runs a separate application that issues commands to the interactive art frame via Bluetooth. A researcher stood in the room with the therapist and client and responded to when a client pressed a button through the Wizard of Oz controller. At this stage of prototyping, four of the physical buttons correspond to the following commands: record, play, and go forward or back between audio comments. The fifth button, a "share" button, was included to prompt conversation about whether, how, and with whom the client and therapist envision sharing artifacts and audio, but did not result in any action from the Wizard of Oz controller.

We tested the interactive art frame with three older adults with cognitive impairments. Before the testing session, we worked with the art therapist to collect images of their artwork and recordings of them creating the artifacts. We seeded the art frame with this content so that each participant could revisit his or her own content and audio recordings. The art therapist led the Wizard of Oz testing by walking participants through various features of the interactive frame (e.g., play recordings, navigate between recordings, create new recordings, and share their work). Two researchers observed the prototype testing sessions and took notes and photographs. All sessions were audio recorded. At the end of the session, the art therapist debriefed with the research team. Rather than interviewing the older adults directly, we had the therapist ask questions about their perceptions during the testing session. This allowed us to draw on the therapist's long standing and close relationship with her clients to overcome communication difficulties we might have as outside researchers. Additionally, this allowed for in-the-moment reactions about the prototype and idea of sharing, which is critical when working with individuals with memory impairment.

### **Case Studies of Interaction**

We used the prototype to encourage a conversation between the art therapist and three older adults about how to support



**Figure 2. Art therapist and participant test interactive frame during Wizard of Oz session.**

creating and sharing, rather than as a final design to evaluate. Therefore, the interactive frame serves as a resource for inspiring design ideas that aim to empower these individuals with widely varying capabilities and goals.

### *Case Study: Giving voice in family dialogue*

Lea had a stroke several years ago and is affected by aphasia, dysphagia, and dysarthria. Lea is unable to speak. The art therapist explained that during art therapy sessions there is little verbal interaction. Instead, the art therapist sometimes selects sounds at the end of the session that represent the theme of the art was made during that session.

For Lea's Wizard of Oz session, we added to the frame a painting she created that was inspired by a photo of her husband's boat and added audio of waves as the therapist explained that this fit with the theme of the painting. Lea seemed to recognize her own work in the frame and was able to press the buttons when instructed by the therapist.

While Lea is unable to add her own verbal comments to accompany her artwork, the therapist suggested that Lea, if presented with choices, could select from existing audio clips (e.g., music, sounds). Providing Lea with choices is particularly important to empower her in participating as the full artist, due to her difficulties expressing her preferences independently. As an empathetic Third Hand, the therapist already provides dynamic support by carefully selecting and presenting Lea with choices throughout the creation and sharing process. The therapist is attuned to when her options do not work and comes up with other options.

Artwork can be an important communication artifact for individuals with limited verbal abilities, yet this is achieved by the Third Hand working carefully to scaffold social interactions around and through artwork, and the interactive frame may be a way of fostering co-located social interaction for people who have difficulty verbalizing. Lea's husband viewed Lea interacting with the frame during the Wizard of Oz session. He expressed interest in her painting and was impressed by Lea's artwork, which the therapist explained that he had not done before, despite coming into several art

therapy sessions. Lea's husband visits her frequently and they sit together, with her husband doing the talking. The therapist explained that sometimes the unstructured nature of communication and Lea's husband's difficulty understanding her results in frustration. Acting as the Third Hand, the art therapist helps facilitate social interaction between Lea and her husband, and sometimes her daughter, offering interpretations and elaborations about the meaning and context of Lea's artwork. Given this, the therapist envisioned using the frame to support co-located social interaction with her husband and daughter. As Lea is not able to join in conversations verbally, her artwork and the audio she chooses can enable her to participate in the dialogue. Additionally, having the artwork appear in the digital frame enables Lea's husband to recognize and appreciate Lea's work as art, which may further confirm Lea's abilities and that what she is creating is worthy of sharing.

#### *Case Study: Enabling sharing stories at a distance*

Amy has moderate dementia. In contrast to Lea, the art therapist noted that Amy "really likes to share her stories verbally," and can do so easily when prompted with supporting details or by a familiar image. Much of Amy's artwork tells a story, and the therapist noted how "often the meaning and purpose of the artwork is more important than the actual image itself." While Amy frequently expresses self-criticism about her artwork, the Third Hand encourages Amy to share her work as a point of entry into the broader, personally meaningful concept that the art represents while deemphasizing the importance of the artwork as an artifact. In addition, the stories and context Amy provides during the creation process are critical for helping others understand the meaning behind her artwork. The art therapist said:

*"One of her pictures is this green amorphous shape, but if you had the audio to go along with it, you would understand that she had been talking about the green dress that she wore when she got married. And so suddenly that picture is communicating a lot more than you initially would think."*

Third Hand helps capture, contextualize, and convey Amy's art, as well as her stories, to other people in Amy's life, such as her children who live elsewhere. During the Wizard of Oz session, Amy expressed an interest in sharing stories and messages with her daughters, who all live far away. Amy explained that she is more interested in sharing thoughts than talking about her artwork: "I have something sometimes I'd like to talk to [specific people] about. Not necessarily artwork." Additionally, her children have expressed an interest in viewing her artwork as a way of understanding these stories. The therapist explained:

*"When I met [Amy's] daughter and talked to her about some of the things that [Amy] was exploring in art therapy, she was surprised that those stories were coming up... in normal interactions in day to day life or in a phone call with a family member you maybe don't talk about the meaningful stuff. You don't start telling those stories, or people don't know how to solicit them or hear them."*

With this in mind, the interactive frame could provide a fluid way of capturing Amy's stories in the moment as she shares them, as it may be difficult for her to recall them spontaneously given her memory impairment.

A secondary use of the frame is confirming Amy's abilities and self-worth, and we saw that simply framing and discussing her work in the interactive prototype might be empowering to Amy. Recently she spoke about being frustrated by the way she felt she was treated in assisted living. Amy came in to the Wizard of Oz session frustrated, but at the end of the session as part of the message she recorded with the interactive frame, she said, "This is really nice. And after the time I've had recently, it's unimaginable. So I thank you." The therapist attributed this change in attitude to having sat with her and looked at her art in the prototype frame. The therapist noted that for participants who, like Amy, may be frustrated due to changes in independence and mobility, "just us sitting there with them, with a frame with their artwork in it, and us asking them questions creates a feeling of 'you are special. Your artwork, your stories are special and important.'" That is, displaying and discussing their artwork in a way that positions it as valuable furthers the work of the Third Hand by reaffirming the older adult's abilities and self-worth.

#### *Case Study: Sharing the experience of creating*

Kay has late-stage dementia, uses a wheelchair and is unable to walk independently. Her speech is severely limited, and she rarely talks in sentences that others understand. The art therapist said "sometimes it [her speech] comes through clearly and sometimes it doesn't." Kay enjoys the sensory and kinesthetic experience of art therapy and appreciates physically interacting with the materials. She sometimes becomes "really calm, really smiling, really relaxed, really engaged" during art therapy, said the therapist. In one session, Kay spent half an hour using her fingers to spread purple paint on a canvas in a circular pattern. She sang and laughed as she applied the paint with her hands.

We presented this painting and audio of Kay making the artwork in the interactive frame for her Wizard of Oz session. Following the art therapist's guidance, Kay successfully navigated the audio of her singing and laughing while making art. However, the therapist indicated that Kay likely did not remember her artwork, and generally would not likely understand or benefit from seeing her art in the frame. Instead, she indicated that the positive experience of making art is far more important to Kay than the final artifact. The art therapist noted the importance of "Finding a way to communicate to other people on the care team and her family what she is still able to do and what a meaningful moment is with her." The therapist noted that although Kay is often engaged during art therapy, her family and other members of the care team might not see her engaged in this way.

Given this, the therapist wanted to use the interactive frame to capture Kay's laughter, singing, and playfulness while making art and share that with her family. However, this

brought up questions of how to capture and effectively share the process of creation. The therapist explained:

*“If I had all the time in the world... and I was able to capture all the different pieces of the process, I would have taken a picture of her hands... and part of the audio of her singing, and I would have taken a picture of her doing it and an audio of her saying how she was feeling, and I would put those things together into a little clip and that’s what I would share with the family. It’s not something that she can really say or put something together to share but as the therapist I would say this is worth sharing with her daughter.”*

As the Third Hand, the therapist takes license to capture and reify a client’s interactions into a composition that she feels is worthwhile to share with others. This involves the work of providing context and interpreting the creating experience in a way that allows others to see Kay’s abilities and appreciate the positive and emotional experience of making art. Yet, in this case, the therapist lacked the ability to use technology in a seamless way that allowed her to capture this experience in an invisible and fluid manner during the process of creation.

#### **Technology and “Breakdowns” in the Third Hand**

Overall, we observed several ways in which the therapist used the interactive frame to further the work of the Third Hand by empowering participants to create and share. For Lea, the interactive frame helped her have a voice in family conversations. Although critical of her own work, the act of framing and discussing Amy’s work helped confirm her self-worth and abilities. For Kay, capturing and reifying her experience making art positions her as an active and engaged individual, when others on her care team and in her family may not view her this way. In contrast to these examples of how the interactive frame works in concert with the Third Hand, we also observed three “breakdowns” in the work of the Third Hand due to technology.

First, using technology (both our prototype and other tools) to capture and share what is created in art therapy can disrupt the work of the Third Hand by taking the therapist’s focus off the individual receiving therapy and foregrounding the therapist’s role in the sharing process. Over time, the art therapist has developed practices and an understanding of her clients that allow her to fade into the background of the creation and sharing process, thus highlighting the active role of the older adult rather than her own activity. This results in a dynamic, fluid, and invisible Third Hand. However, the therapist described how current technology becomes obtrusive and disrupts the work of the Third Hand when she attempts to share the client’s artwork: *“If I say ‘Let’s share your artwork. Let me take a picture, email it to myself, I’ll email this to your daughter, don’t worry, she’ll get it.’ And those things don’t really add up to anything that makes sense.”* Using technology in this way, the therapist becomes the main actor and the client is relegated to a more passive role in the sharing process. In contrast, the interactive frame streamlines capturing images and audio and allows older adults to participate directly in the sharing process. However,

there were still challenges for individuals with limited verbal abilities (e.g., Lea), as the therapist had to improvise and load alternate audio clips into the frame. The invisible and fluid nature of the Third Hand depends on doing the “pre-work” of loading content into the frame that is customized to each individual and provides them with appropriate and appealing choices. It will likely take time for the therapist to appropriate new sharing tools, such as our prototype, in ways that make her work appear invisible.

The second “breakdown” we observed occurred when the act of sharing separates the artifact from the meaning and context provided by the Third Hand. The art therapist explained how clients, particularly those new to art therapy, need a way to share the meaning behind the art while minimizing the artwork itself. She said of these individuals:

*“[They] might be willing to share the message but may be scared to share the artwork or find a way to clarify that the message is what’s important and... ‘I’m not sharing this because it’s a perfect piece of art, I’m sharing this because I want you to know the message behind it.’”*

Sharing means that others may interpret the artwork on their own without the Third Hand stepping in to contextualize and elaborate the significance of the artifact. The Third Hand offers important history and context that empowers clients in sharing while minimizing their fear of others critiquing or misinterpreting their work.

Finally, we observed that the way we (and online technologies in general) conceive of sharing is artifact-centric. Though the interactive frame captures audio comments, which could provide important context about a particular image, the therapist also wanted to capture the experience of making art as a way of contextualizing the final artifact. This observation inspired discussion of ideas like buffering the last thirty seconds of audio so that the therapist can press a button to save an audio clip after something meaningful was expressed, similar to the ‘Something Just Happened Camera’ explored in participatory arts workshops by [20]. Using the system in this manner provides an extension of the Third Hand, supporting the ongoing interpretive work and decision-making therapists do moment-to-moment. With Kay and others with late stage dementia, capturing and sharing through the interactive frame could help others to see these individuals as artists who can creatively express themselves. Thus, the role of the Third Hand, working through the interactive prototype, is to empower these individuals by highlighting and confirming their abilities and simultaneously countering the perception of them as passive and disengaged.

#### **DISCUSSION**

Developing empathy for users’ needs and desires is a critical part of the design process [29,41]. Much work in the field of HCI focuses on methods to assist designers in achieving an empathetic relationship with users, including developing empathetic relationships specifically with people with

dementia [27]. However, efforts to gain empathy and compassion for users, which are well-intentioned, can frame the user as “worse off than us” [33], ultimately disempowering these individuals. We argue that the metaphor of the Third Hand provides a compelling example of empathy in interaction without disempowerment: the work of the Third Hand empathically transforms the actions of individuals who society sees as disengaged into meaningful and creative expressions of the self.

Wright and McCarthy assert that empathy “evolves in the context of ongoing relationships wherein one person learns about the needs of the other by responding empathetically, sometimes getting it right sometimes not, and then attuning future empathic responses” [41]. Similarly, the art therapy literature explains that the art therapist “adjusts to shifting, intersubjective exchanges of attunement, misattunement, and re-attunement that form the basis of the therapeutic alliance” (p162, [17]). Fine-tuning responses enables her to respond empathetically to the client as she develops her understanding of them [41]. The therapist, therefore, becomes an active guardian of and participant in the older adult’s sense of self [38]. Thus, how can we design technologies that are in “alliance” with the user in ways that empower while attuning to their changing needs and desires?

To understand this, we revisit the four qualities of the Third Hand that lead to empowerment and reflect on our prototype system. First, the dynamic support the Third Hand provides, which is functional, motivational, and contextual, is achieved by acknowledging an individual’s capabilities and limitations (not ignoring them) and adapting in-the-moment. Though support is given when needed, immense care is taken to not offer more help than is required. In art therapy, the goal is to support the individual in creating art in a manner that approaches the limit of what they can do on their own. Although the art therapists in our design work spoke positively about adding physical buttons to our prototype frame, the very act of abstracting out certain functionality in this way may reduce a user’s ability to use their full capabilities. As designers, we often uniformly simplify interfaces for certain populations in an effort to make them easy to use. Yet, this does not take into account the enormous variation that occurs across people with cognitive impairments and even within an individual from day-to-day and moment-to-moment. By universally simplifying interfaces without attuning to individual capabilities (e.g., such as adaptive or multi-layered interfaces [25]), we limit the expressiveness of the interface and may restrict individuals from engaging to their full extent.

Second, the Third Hand achieves empowerment by fading into the background of interaction and purposefully foregrounding the intentions and desires of the user. Although similar digital photo frames exist throughout the community we study, using the interactive frame we created may ultimately signal that someone is in therapy or needs help sharing; we will be mindful of this in our ongoing work.

All too often, the help provided by a system takes the focus of our attention and at times is so pronounced that it marks an individual as disabled or needing help (e.g., the large size and design of a GPS tracker for people with dementia invites stigma [13]). Until the socially constructed framing of cognitive impairment as a deficit [18] changes to a less stigmatizing view, designers should avoid creating designs that signal cognitive impairment to the self and others.

Third, the Third Hand emphasizes individual choice and autonomy, but this requires thoughtfully preparing options that match a user’s intentions as well as being receptive to implicit cues that acknowledge a choice (e.g., a head nod or shift in eye gaze). This empathetic listening and observing is particularly important for people who have difficulty with language or expressing themselves. Further, empathetic listening involves attuning to goals that may be different from what was originally intended (e.g., a client who wishes to use a sharing tool as a personal journal rather than to share with others). Empathetic listening and observing relates to the concept of an affective loop, in which systems respond to cues such as breathing and heart rate and promote reflection of affective experience [21,36,42]. Understanding the finesse of the Third Hand involves acknowledging that our efforts as designers must work in concert with, and not attempt to replace or fully know, the interactional partners and practices that lead to empowerment.

Fourth, the Third Hand confirms abilities and self-worth by reinterpreting and contextualizing a user’s expressions so that they are meaningful to the self and others. As we found through our prototype, sharing becomes problematic and introduces new risks (e.g., misinterpretation or criticism) when the artifact separates from the context and interpretation provided by the Third Hand. Thus, a system that embodies the Third Hand would help preserve this context while enabling users to articulate the meaning of their work beyond what their own capabilities allow without disparaging their abilities.

## **CONCLUSION**

The metaphor of the Third Hand provides an example that the HCI community can draw upon as we engage in empathetic design, particularly with older adults with cognitive impairments. It is through the dynamic, invisible, and ability-confirming work of the Third Hand that older adults with cognitive impairments are positioned – and validated – as capable and competent individuals. The Third Hand helps us understand how technology designed for creating and sharing could move beyond a rhetoric of helping to actually empowering individuals with cognitive impairments to be active and engaged in society. More broadly, we must reflect on how technologies may work in concert with and potentially disrupt social practices aimed at empowerment.

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