Connecting Family Members Across Time Through Shared Media

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Abstract
Family members often rely on technology to connect and maintain their relationships over distance. Yet because of conflicting schedules and time zone differences, it can be hard to communicate synchronously with others. To help address this problem we explored the design of an asynchronous media sharing application called Mimo. Mimo allows family members to capture and share moments with each other using audio narratives as a way to connect time and activities together. We evaluated Mimo with participants who thought about and reflected on its design. Our results point to the value of connecting family members in a one-to-one, private fashion and how personalization is necessary in systems designed for asynchronous media sharing.

Author Keywords
Families; home; asynchronous communication.

ACM Classification Keywords
H.5.m. Information interfaces and presentation (e. g. HCI) Multimedia Information Systems

Introduction
Many families have loved ones who live far away yet it can be hard to find an overlapping period of availability to communicate with them [4]. For these reasons, a
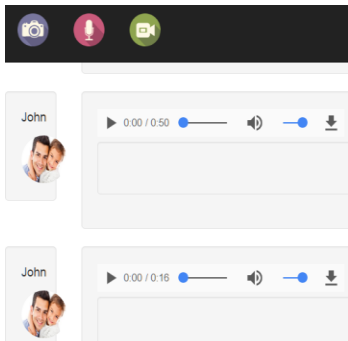
Figure 1: Mimo showing audio clips for a category. The top banner is for uploading new content either picture, audio or video.
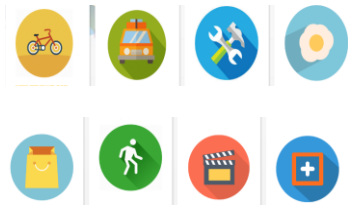

Figure 2: Activity board showing categories of activities. Activities includes: biking, commute, fixing items, cooking, shopping, walking, movies, life in general

variety of research projects have looked at the design of asynchronous communication systems for families (e.g., [2,9,16]). Most allow the exchange of information, yet there is not a strong tie to an activity itself [2,8]. Some exceptions have focused on the sharing of single activities across time, such as co-dining [13,20,21]. In contrast, we wondered if there might be ways of connecting family members across periods of time, where they might be able to share any number of activities and feel like they are actually experiencing the activity together despite the exchange occurring asynchronously. We approached this design problem through two stages. First, we iteratively designed and built a prototype system called Mimo that allows family members to have an ongoing, asynchronous conversation through audio recordings that are similar to podcasts. We tried to make the shared moments special by having them tied to a particular activity that both the sender and the receiver could engage in.

Next, we directly explored the design of Mimo with 21 participants. Participants were shown a working demonstration of Mimo and had the chance to interact with the system. Afterwards, they were interviewed about their reactions to it. Our goals for this stage were to learn how and why people felt they would use Mimo, if at all. Results point to the value in connecting people in a personalized way through one-to-one asynchronous media sharing.

Related Work
Many families share a close and special bond where they place a lot of emphasis on staying connected [12,14,19]. However, this can be challenging when family members live apart and are separated by

distance [15,19]. In these situations, family communication is less about achieving a preset goal, and much more about the sharing of everyday life such that family members can feel as though they know what is going on in the lives of their loved ones [15]. Given the emotional connection that family members desire, they often have a strong preference for using systems that are similar to face-to-face communication, such as video chat [4,15]. Family members are also often aware of the schedule of others, even in situations that involve time zone separation, and try to not interrupt others as much as possible [4]. They also try to not create increased feelings of obligation to communicate [12]. Systems have also been designed for sharing activities synchronously outside of the home [10].

Of course, the challenge with the above systems is that people need to be around and available at the same time for them to be useful. For these reasons, researchers have also explored systems focused on connecting family members asynchronously across places and time. For example, we have seen a variety of message boards used within and between home(s) [6,8] and family members [12]. Some systems also create suggestions for what to share as well as being able to have conversations about shared content [2], and a means to connect people across time by targeting the arrival date of shared media [7]. Research on asynchronous video messaging shows the value of seeing user's reactions to shared video [21], the ability to have conversations over time via threaded video [1], the tying of video messages to real world locations to tell stories [17,18], and the targeted sharing of activities such as dining together [20]. The Family Window offered both synchronous and

asynchronous sharing between households where a time shifting feature let users re-watch video from the past [11]. This is similar to how we imagined Mimo though the Family Window does not support mobile sharing and nor does it try to tie activities together over distance.

Despite this research, we have seen few, if any, system design explorations of asynchronous media sharing systems for families with a focus on the timed-arrival of media where it is tied to activities. This was our focus with Mimo.

Mimo's Design

In order to explore the design space of asynchronous media sharing amongst family members, we iteratively designed a web application called Mimo that could be run on mobile devices when out and about, or when moving throughout one's home. We designed Mimo through brainstorming, sketching, iteration, and testing through our own personal usage.

The goal for Mimo was to try and support the richness of synchronous communication while supporting the flexibility that asynchronous systems can bring users in terms of when and how long they connect with each other. That is, we wanted to make asynchronous sharing feel as though it might be synchronous, where we connected users across time to share and listen to media containing personalized stories while doing an activity 'together'. This characteristic could let family members be updated and aware of each other's life at points in time that best matched their needs. Figure 1 shows the final design of the system. Mimo is imagined to be used between parents and their adult children, or between adult siblings who have a close relationship,

where conversations are often a key part of the relationship [14]. The following scenario explains how Mimo works.

Usage Scenario
Ana is a 25-year-old woman who lives in Singapore. Her mother, Rose, lives in the United States. They have a 15 hour time zone difference with each other. Ana wants to be able to share a walk with her mother, but since they live far apart she decides to use Mimo to share this moment and a conversation around it. Ana goes for a walk and uses Mimo on her mobile phone to record a story about her workday and how her family is doing. She finishes her walk and the recording is stored in Mimo. She then chooses when her mom can access the story. Here she picks a time tomorrow, but sometime within the week. This means that Rose will have up to a week to listen to Ana's story. The next day, Rose wakes up and looks at Mimo. She sees that she has a new notification for her 'walking activity', which means a story from her daughter is waiting to be heard. She can listen to it if she goes on a walk, the same activity that Ana was doing when she created the story. Rose decides to go for a walk so that she can hear Ana's story. After she has listened to her daughter, Rose uses Mimo to record a response to Ana while still walking. This is shared back to Ana as part of their ongoing conversation. The exchange continues across a series of days and weeks while both Rose and Ana go for walks.

Time Shifting
Users record audio, video or capture a photo using existing software on their device and then upload the media file within the Mimo interface. Here they select a time for the media to be made available to a remote

family member. Our goal was to have the sender place additional care and thought into the sending of the media, where they might try to show their understanding of the remote person's availability and schedule (which people often know [4]). Mimo lets users choose an expiration time for the media as a way of instilling a sense of 'preciousness' in the shared story. In this way, users might realize that the content will not be around forever, and that it is important to listen to. This contrasts common digital photo or video capture where people have vast archives of media but typically never look at it [15].

Categories
When users share media through Mimo they can assign it to one of eight different activity categories defined in the system (Figure 2). When users receive shared media, notifications appear grouped by the same categories. We chose this design idea because we wanted to try to tie shared stories with a particular activity. The hope was that the person receiving a story would listen to it while they participated in the same activity as the sender. At this design stage, we did not provide any form of 'authentication' to verify that users did indeed match their recording and listening activities. Instead, we left it as a suggestion in the design where users could decide themselves if they aligned their activities. We chose the eight categories based on the types of activities that family members commonly want to share but face challenges in doing so with synchronous tools like video communication systems [3].

User Study
Following our design work, we conducted a study to understand people's reactions to our design ideas. We conducted semi-structured interviews with 21 participants (8 male, 13 female, age=23-55, average≅31) from different work backgrounds (e.g., acupuncturist, pharmacist, students, software engineers, and web designers) in order to get a diverse sample. Interviews lasted between 20 and 60 minutes including a demo of the system and a chance to have hands-on experience with the prototype. Interview questions focused around people's reactions to the system. For example, we asked them questions such as, "Do you think you will be able to share an activity through the categories with family members?", "How do you feel about connecting with family members using voice recordings?", and "If at all, when and why do you think you'd use a system like Mimo?" At the end, an open-ended question asked them about their ideal method of communication, which in two cases led to a sketch of a futuristic system.

Data Collection and Analysis
Interviews were audio recorded and notes were taken during the sessions. The interviews were transcribed afterwards. Artifacts such as sketches from participants were collected as well. Next, an open coding process was done where findings were labeled according to themes. Axial and selective coding was used to categorize the data and draw out the main themes. Participant quotes are reported with a P# to maintain anonymity.

User Study Results
Time Shifting
The ability to send media at particular times received positive feedback. 15 of our participants liked the idea of having the option to send their audio narratives, photo or video messages based on their family

member's availability. The idea seemed novel to them and they liked its contrast with the existing ways that they communicated. Three of our participants thought of using the time shifting feature for special occasions such as birthdays, anniversaries or reminding family of a shared experience.

"I would use it in special occasions such as birthdays, anniversaries or special events, common memories. It can help touch the common experiences you had with others." -P2

P4 felt this feature could help him be more connected with his wife and parents who live far away with more than a 15 hour time zone difference.

"Yes I want to use it with my wife and my parents because we live in different time zones … I think it's a good idea but I think the key is you want to send an async message to your partner, you can set the time like when to hear and how many days it can be kept in the board. I think these two make this different from the existing async sharing systems. For example, I share a video to you but it can set a time and it can set a time when it can appear, so basically I have the control of how my information looks like on your side right!" -P4

We asked participants how and who they would use Mimo with. 16 of our participants thought they could use Mimo with family members to bond around shared interests. For example, P1 thought he could use it with his sister to send her pictures of beautiful scenery from when he was hiking since she likes photography. He said he wouldn't do this with his parents though

because the learning curve would be too much for parents who weren't used to such systems.

P2 felt that the categories in Mimo could act as an encouragement for his family members to see him and be inspired and encouraged to do the same thing, especially for physical activities.

"Maybe you can encourage people with this for stuff that they don't do! for example I go to gym now and my dad or brother doesn't go, so I would show them I'm weight training and they always liked to do as well, so you'll send this and tell them that I have started this new thing! Look at me! So maybe this will encourage them. You know humans like to see something similar to them." –P2

Sharing Activities with Audio Narratives
15 participants thought using audio stories was a good idea since it could allow them to multitask while listening and hear a family member's opinion on the topics they shared. Three of our participants felt that synchronous methods of communication could easily lead to communication that was one sided. Instead, they felt that the ability to send asynchronous audio narratives would help people to have a two-way conversation.

"I guess often the information exchanges are pretty one way often especially if it's a big catch of phone call with my mom or my dad. So and I think oh with my dad I would really love it if he just give me his opinion on all the stuff that is in the news right now. My dad he loves reading Shakespeare and stuff so if my dad record a weekly podcasts about stuff I'm reading about that I like to talk to [my daughter] about I would

definitely listen to that just probably the same way I'd listen to my election podcasts." –P6

Five of our participants were opposed to using audio narratives because of two main reasons: 1) they felt listening to long audio files could lead to boredom, and 2) talking into a void was awkward for them.

"To be honest I never have the patience to listen to a podcast from the beginning to the end because podcast is you can only hear but you dont know whats going to happen in the next ten second, so you don't have the preview or sense of what's happening but if you have a text you will say, "ok this paragraph is interesting I might look on that" but podcast is very passive. I don't prefer a narrative like a podcast for communication." - P4

P5 was eager to use audio narratives with her girlfriends but not so much with family. She also believed the system would be more interesting for female users because she felt they would be more interested to share their feelings about an activity than men.

"Yes I think it's interesting, for me, although I believe this does not work with family but for friends it would be interesting especially with girlfriends… since girls like these type of fun things, not that guys won't like it but I think girls will like this more and the method that is designed it's clear that has a feminine touch in the design." -P5

Two participants drew sketches, one for how Mimo should allow sharing a narration and files to more than just one family member and the other which drew an always on video and audio system embedded in a wall connecting two houses similar to Family Window [11].

Discussion and Conclusion
We designed an asynchronous prototype system called Mimo and conducted an initial exploratory study to understand how people might use such a system and what its drawbacks would be. Participants saw Mimo as a way to connect with a particular individual, such as a parent, child, or sibling, and hear their views on a topic or reactions to stories they had shared. The value people saw in Mimo came with its one-to-one style of connection rather than one-to-many. This illustrates the value in designing asynchronous media sharing systems that are very personal in nature.

It is important to note that creating a single platform that works with every family dynamic would be hard. That is why the idea of giving some design choices to the user was very well received by our participants.

For family members, Mimo meant that one could hear the sound of a loved one's voice. This illustrates that audio can act as a rich media for connecting family members. It naturally supports the ability to multi-task, but it also further instills the idea of a very personal connection through the voice of another. Yet sharing asynchronous audio was not seen without its challenges. Participants felt like recording audio clips might feel one sided. People were also concerned about 'talking into a void' without being able to sense the presence of their family member.

Overall, our design and study results point to design opportunities for further exploring asynchronous media-sharing systems for family members.

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