

Promoting Intergenerational Communication Through Location-Based Asynchronous Video Communication

Frank Bentley¹, Santosh Basapur¹, Sujoy Kumar Chowdhury²

¹Motorola Mobility Applied Research Center
Libertyville, IL USA
{f.bentley, sbasapur} @motorola.com

²Missouri Western State University
St. Joseph, Missouri USA
schowdhury@missouriwestern.edu

ABSTRACT

We describe the design and field evaluation of the Serendipitous Family Stories system, a web and mobile service that allows for videos to be saved in user-specified real-world locations, shared with friends and family, and then serendipitously discovered as those people approach the location of a story. Through a twenty-participant field evaluation, we discovered how this new form of location-based asynchronous communication can be used to strengthen family relationships by encouraging communication across generations and enhancing users' relationships with everyday places in their lives.

Author Keywords

Intergenerational communication, video sharing, mobile, reminiscing, storytelling, evaluation

ACM Classification Keywords

H.4.3 Communications Applications

H.5.1 Multimedia Information Systems

H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous

General Terms

Design, Experimentation, Human Factors

INTRODUCTION

Sharing stories is a core part of being human. People reminisce and discuss stories from their past with family, friends, neighbors, and new acquaintances. A story is a performance that brings together family members and creates lasting memories [11]. Stories serve as a way to get to know others and to build stronger ties through these shared memories.

Traditionally, stories are told face-to-face, and through our research we've found that holidays, family parties, and other in-person get togethers are still the main occasion for

the telling of stories from a family's history. However, families are moving apart from each other. As of 1993, 43% of American adults lived more than an hour away from their parents [10]. This number is growing as the workforce becomes more mobile and retirement destinations increasingly attract older adults to locations far from family. As it has been shown that communication decreases when families move apart [12], we see a need for new communications tools to keep family members connected.

We are interested in connecting older adults to their children over a distance through the sharing of location-based video stories. We believe that the visual nature of video, which allows recipients to literally see their older relatives, combined with the serendipity and asynchronous nature of location-based discovery together form a strong platform for the sharing of memories. This experience then encourages recipients to be aware of places of family importance in their own lives and to initiate communication about these family stories across generations.

By making the creation, sharing, and receiving of video narratives simple, we hoped to turn seniors into creators of mobile media and to engage the whole family in the process of creating, viewing, and talking about family history. We have observed use in daily life through our study and are encouraged by the ways our participants became more aware of their family history and the lives of their relatives as well as the increase in communication reported during the month of use.

RELATED WORK

This system draws on work from a variety of disciplines. Intergenerational communication has been studied in anthropology and gerontology domains. Mobile video use and storytelling have been explored in ethnographic-style studies as well as through the fielding of new experimental systems in this space. We will introduce this work to better ground the design of our system in the research that preceded it.

Intergenerational Communication

Treas' study in 1975 [24] explored a concept he termed "intimacy at a distance" in that older adults preferred to keep their own homes and have specific scheduled times of interaction with their adult children. He found that married

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children keep in touch with their parents more often than unmarried children and that daughters communicate with parents more than sons.

More recent study of intergenerational communication has been focused on communication between grandparents and their grandchildren. Ballagas et al studied current practices in this domain and found that video is a strong way to engage young children who are not yet able to understand the concept of a voice coming through a telephone [2]. From these insights, their group created the Family Story Play system that added live video of a relative to a book so that stories could be read together over a distance.

Yarosh et al [26] reviewed the literature on communication between parents and young children as well as describe five mobile systems to support communication with children while their parents are out of town. We are working in a complementary space by addressing communication between generations after children are grown and independent.

In the spring of 2010, our group conducted a study that addressed communication between older adults and their adult children over a distance [4]. Through this work, we observed tensions between generations about bothering each other too much with phone calls as well as observed storytelling behaviors and how one person's context could bring about a shared story between generations. For example, one participant in our study was walking past a theater while talking to her mom on the phone. She remembered that her grandfather used to dance in that theater when he was in the military on leave. She mentioned this to her mom and they had a conversation about the importance of this place in the life of the family. We were intrigued by this contextual cue that prompted storytelling between generations and this led to the design idea for the Serendipitous Family Stories system.

Mobile Video Use

Currently, the sharing of mobile video is growing in popularity. The ability to upload video to social network services, such as Facebook, directly from a mobile device lowers barriers to sharing video with others. Mobile video streaming services such as Bambuser and Qik allow people to live-stream video to the web from their mobile devices. However, in a 2010 study of these services, Julhin et al found that the majority of streams were tests or had very low production value [13]. One of our goals with this system was to lower the barrier to mobile video creation while increasing the quality and memorability of the resulting clips.

Dougherty studied the use of mobile video for political purposes. She found civic videos to be longer on average than typical videos posted to the Qik system [6]. She found that older users were more likely to use mobile broadcasting for civic reasons compared to younger users who focused more on friends and family.

Reminiscing and Storytelling Systems

Over the past decade, several research systems have been created to encourage reminiscing and storytelling, both for one's own remembrance and for sharing with others.

Olsson et al explored requirements for creating systems to record and share life memories [15]. They observed the importance of time, event, and place in stories and in using these attributes to retrieve the media. In a later study, they observed motivations for sharing stories with close friends and family including strengthening relationships, creating a feeling of community and belonging, and bonding over geographical distance [14]. We sought to use the rich medium of video in the context of the world to achieve these goals of sharing stories.

Peesapati et al created a system called Pensieve for supporting everyday reminiscence [17]. One of their design goals was to make the act of reminiscing more serendipitous and they achieved this through randomly sending emails to users containing content from their own online media accounts. By seeing old pictures or music that was played in the past, users could reflect on these times in their life when prompted by the system.

Location-Based Content Delivery

Several systems have been created that deliver content to users automatically based on their location. Sohn et al's Place-Its system [23] delivered location-based reminders to users when they entered or left a location, such as remembering to take out the garbage when one gets home. Ballagas et al's REXplorer [3] was a pervasive game in Regensburg, Germany that notified visitors about important locations in the city's history as they walked about.

Pan et al created a system called M-Studio for creating and experiencing location-aware stories [16]. Through M-Studio, professionals could create stories that spanned multiple physical locations. An iPAQ client was developed for users to view the content as they walked around campus receiving the stories. The client would send its current location to the server each second and retrieve any related media for that location. Systems like this inspired our work, and we wanted to make it easy for anyone to create such location-based stories without the need for a complex story creation tool and for the stories to be more personal instead of more professionally produced films.

THE SERENDIPITOUS FAMILY STORIES SYSTEM

As mentioned above, the Serendipitous Family Stories (SFS) system was created based on findings of an earlier study on intergenerational communication over a distance [4]. We observed how a person's current location could trigger conversations over the phone about past family stories that occurred in that place. From this, we wanted to create a system that made reminiscing about stories in a particular place easier and would increase communication between generations over a distance.

From our study, we had three main design implications. The main implication was that new technology for inter-generational distance communication should “re-create feelings of being together and doing things together.” We wanted our Serendipitous Family Stories system to put the recipient literally face-to-face with their family members by seeing the video of them telling a story. Because the story is viewed in the location where it occurred, we wanted to re-create the feeling of actually being in that space with the relative.

The next implication was that “communication needs to fit into daily life.” We observed how older adults often felt as if they were interrupting the busy lives of their adult children, and because of this, did not communicate as much as they wanted to. We also observed that the adult children do welcome communication, but want it to be more on their schedule. Because the Serendipitous Family Stories system delivers communication asynchronously and allows for video to be viewed immediately or again at later times, we believe it fits better into the patterns of daily life. Parents can create as many videos as they would like, and recipients receive them over time, one at a time.

Finally, we saw a need for communication to evoke and share family memories. This served as the core concept for our system, as the story is the central component. We hoped that receiving stories would encourage further conversation among family members about the stories themselves as well as other events in their lives. This is supported by our data, as discussed below.

The system contains two user-facing components. First, the Family Stories website allows for users to record video stories using the webcam in their computer and to save them to a spot on a map. Stories can be shared with friends and family members through this web interface. We use a Flash component in the web page to automatically find the camera and audio source to make it as easy as possible to record videos. As our goal was to turn seniors into video-creators, we wanted this process to be as simple as possible.

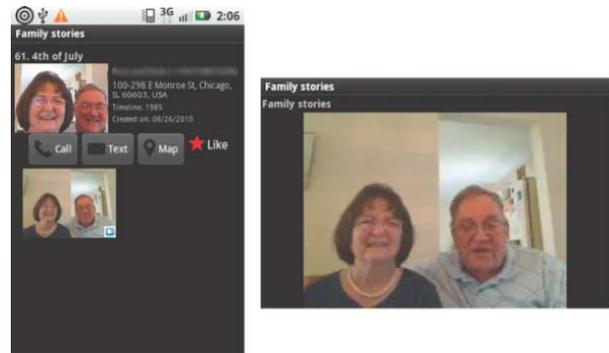


Figure 2: The mobile application allows friends and family to receive notifications when they approach the location of a story that is shared with them. Users can then watch the video of any story that is unlocked.

The second component is the mobile application, which currently runs on any Android phone with OS version 1.6 or higher. This application automatically connects to our server and downloads the stories shared with that device’s phone number. It then monitors the location of the device through network location (to minimize battery drain and work indoors) in the background. When the device nears the location of a story that has not been found before, it will vibrate three times to get the user’s attention. If the user is within a pre-defined radius of the story location, they can “unlock” the story and view the video. Otherwise, they are given a map to the story location. Once a story is unlocked, its videos can be viewed again from any location facilitating the ability to share with others or watch again in a quieter environment. Each story page contains shortcuts to call or text message the creator as well as a button to “like” the story. When users return to locations where stories are located, no vibration will occur, but a silent notification will be placed in their status bar so that they can be reminded of previously viewed stories in that area if they happen to glance at their device.

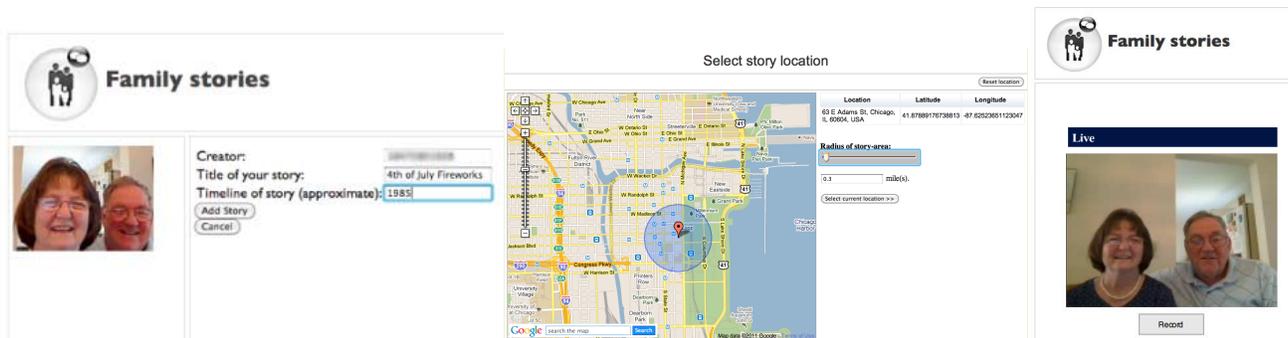


Figure 1: The web interface allows for users to record video stories and save them in a place on a map. Users first create a new story (left), then choose a location (center) and finally record their video (right) to create a new story. Even older seniors found this to be a simple process and were able to create new stories with little assistance.

A “hint” on the main page of the application also tells users the rough cardinal direction and distance to the nearest unbound story. This design creates the potential for a game dynamic in which users seek to find all of the stories that are shared with them.

METHOD

We used a professional recruiting agency to recruit 20 diverse participants to use the system. Ten participants were adults in their 20s-40s living in Chicago and would be receiving stories on their Android phones. The other ten participants were their older relatives (parents, grandparents, aunts), five of whom lived in South Florida (about 1200 miles away) and five of whom lived in the Chicago area, but not with the main participant. These participants ranged in age from their 50s through mid-80s and had all lived in Chicago for some part of their adult lives. They would be creating stories in the system to share with their younger relative.

We met with the older adults first for them to record stories using our web interface. We brought a laptop with a webcam to their homes and, after a brief explanation of the system and a few icebreaker questions, we let the participants create as many videos as they would like (minimum of 5) for their younger relatives using our system’s web site. The choice of content, location, and storytelling style was up to them. After creating stories, we conducted a short interview on previous storytelling and communication patterns in their family.

Later, we met with the younger participants in their homes and either installed our application on their existing Android phone or moved their SIM card into a new Android phone with the application preinstalled. Participants were asked to keep the application installed for four weeks and to call our voicemail diary system whenever they found a story to report on their experience. Their older relative was also asked to call if they received any communication about the stories. After a quick demonstration of the system, we conducted a short semi-structured interview with the younger relatives about their story sharing and communication practices.

In addition to the interviews and voicemail diary entries, we also logged information from the mobile application including times when a story was nearby, when it was viewed, when a story video was played, and when communication was initiated from the application. These logs were automatically uploaded to our server nightly.

LIMITATIONS

There are several limitations to the method that we employed. First, in only allowing the older adults to create videos in one sitting, we were only able to observe the types of videos that the participants initially thought would be interesting to their younger relatives. There was no ability to form a feedback loop and have more stories created as

the study went on. We found it difficult to recruit participants meeting our other criteria (diverse ages, occupations, parts of the city, ethnic backgrounds, relatives who also wanted to participate, etc.) and finding older adults who also had webcams was seen to be too difficult. We will be conducting a deeper content analysis this fall on a wider, more natural deployment.

It is also hard to quantify the number of families who are in the situation where one person lives in a place where the other has memories. Haas et al calculate that over two million adults over 60 have permanently relocated within the US [7]. In addition, Smith and House found that over 700,000 older adults temporarily move to Florida each winter and return home to the North in the summers [22] where they presumably spend time with relatives and friends that remain there. They also reference high numbers of “snowbirds” in Arizona, Spain, and Mexico.

CONTENT OF STORIES

The older adults in our study produced between five and ten stories each in the time provided during the initial interview. This led to 78 stories in total, including our pilot participant. Since no major changes were made to the system after the pilot participant, the following content analysis will include the videos from all ten study participants plus the pilot.

Videos ranged from twenty seconds to three minutes and twenty seconds in length, as shown in Figure 3. Two main clusters occurred around 0:30 and 1:10. This fit with two common narrative styles employed by our participants. For stories that were already well-known to the recipient, often just the salient points of the story were mentioned, making these stories shorter. Participants would use constructs such as “remember when” to set the stage, knowing that the recipient knew the context of the story well. Longer stories were often from farther back in the creator’s life and events that were not as well known to the recipient. In these stories, the stage had to be set in the video, resulting in longer durations. In general, these shorter lengths fit well with mobile video consumption as they could easily be watched while on the go in a variety of circumstances as described below without requiring a major interruption in activity. All videos are significantly shorter than the videos typically posted to mobile streaming sites such as Bambuser and Qik [6].

As shown in Figure 4, stories ranged over many years in our participants’ lives. Two main peaks occurred during the 1940s when many of our participants were young and growing up and in the 1980s when they were starting families and their children were small. When asking follow up questions with participants about the stories that they remembered most in their lives, we observed a great number of these to have come from the time when they were growing up. Memories of trips, youth sporting events, and friends from their neighborhoods dominated stories in

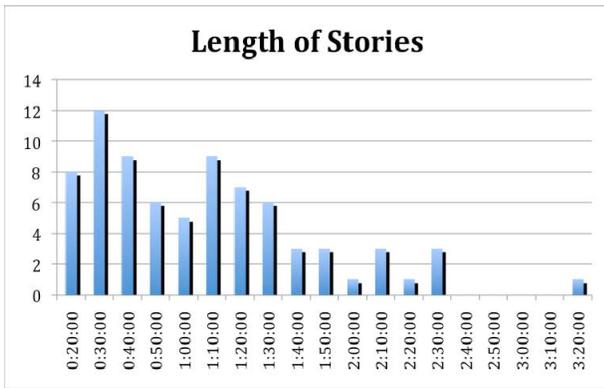


Figure 3: Typical stories averaged 1:10 in length with some quite longer stories created.

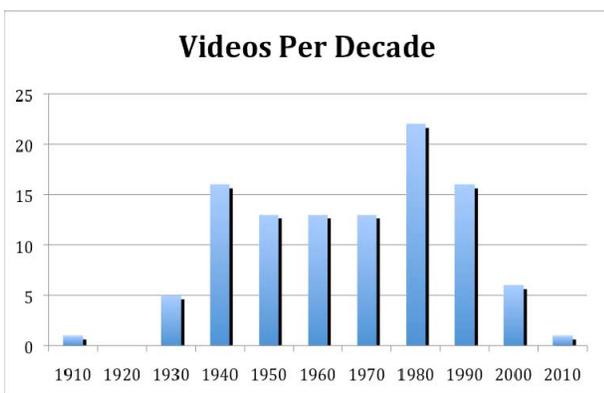


Figure 4: Stories were created from many time periods in our participants’ lives, peaking on times when they were growing up or when their children were growing up.

this grouping. These, often idyllic, times of youth are events that people enjoy reliving as they get older.

There were a variety of characters in each of the stories that was created. Almost all stories included one of the creators as a primary character in the story. Other family members also featured prominently in the stories. One third of the stories included the recipient as a character in the story, and most of these stories were about events that occurred as a family while the participant was growing up, but a few covered recent family events and outings such as trips to a musical or sporting event. Public figures were featured in 14 of the stories where participants told stories about interactions with politicians, famous singers, talk show hosts, and sports players.

Story Locations

Stories were created in all parts of the city and a few surrounding suburbs. Stories created within the city can be seen in Figure 5. Twenty-six of the seventy-eight stories were created in the central business district of Chicago (the “Loop”) with other clusters around major sporting event sites (e.g. Wrigley Field) and in neighborhoods where our



Figure 5. Stories were saved throughout the city, although many were concentrated in the “loop” central business district. 83% of stories were found by participants during study period and are shown with red pins.

participants grew up. Since our participants were from diverse parts of the city, these stories are spread out in many of Chicago’s neighborhoods. In total, 83% of the stories that were created were found during the four weeks of the study. We will have a larger discussion on the process of findings stories below.

Stories covered a variety of location types. Nineteen percent of stories were saved in private places such as homes or workplaces while the rest were saved in public places such as parks, museums, restaurants, and retail establishments. Due to the neighborhood layout of Chicago, this meant that many of the residential stories were created in the outer parts of the city and many of the work or public location stories were created in the city center. There were some exceptions to this such as neighborhood parks and theaters outside of the central business district.

QUALITATIVE DATA

From our interviews and the voice mail diaries, we learned about the experience of using the system in daily life. Data from the interviews and voicemail were analyzed in a grounded theory affinity. We present those qualitative findings in this section where each point that is discussed is supported by data from multiple study participants.

Finding Stories

By the end of the four weeks, our participants had discovered 83% of the stories that were created for them. Some participants found all of their stories while others only found as few as two out of five. Serendipitous discovery of stories was seen by participants as “a cute little treat” (C3) and an experience “that will make you feel happy or bring a smile to your face” (P6). As seen in Figure 7, stories were discovered fairly regularly for the first three weeks of the study, but no new videos were found during the final week. Participants continued to use the system to show the stories to others, but reported not traveling to many new places that week due to the cold (high of -7C) temperatures during that time.

Participants discovered some stories in unexpected places. C2 was picking up a marriage certificate at the courthouse and found a story from his aunt at the mall across the street. “I was surprised. I was not intentionally going to the location to see the story but it was a surprise for me ... and then this thing was right there!” (C2) Other times, participants came across stories and received notifications that they were close by, but not close enough to view the video. In these cases, participants had to change course to find the story. While this was not often possible, and sometimes frustrating in a busy morning commute, when participants had more flexibility they reported opening up the map interface and finding the exact location.

Other stories were in the places where participants expected to find them. Based on family history and common stories that are told, they thought stories would appear in certain places. C7’s father-in-law was an attorney for many years in Chicago. C7 told us: “I went over to the Daley Center because that’s where he did a lot of his court cases.” In the initial interview C3 told us that she was “anxious because I know when I start to use it I’ll start getting notifications right away because I work right next to Macy’s or Marshall Fields.” She told us of her mom telling her of a holiday tradition of seeing the windows at Fields “ever since I can remember.” For these participants, getting these familiar stories helped strengthen the tie of stories to places in their daily lives and reminded them of memories from their past.

The system made receiving stories “fun” as reported by several participants and “being places where other people were” (C4) brought an added dimension to the hearing of family stories. While not all stories were found during the month of the study, many participants expressed an interest in continuing to use the system to find the remaining stories and the system becoming a part of their lives to discover content over months and years. We were unable to support this due to our server power being off over the holidays, but we gave all participants their remaining videos after the final interview.

Strong Memories and Emotions

One of our most interesting findings was observing the

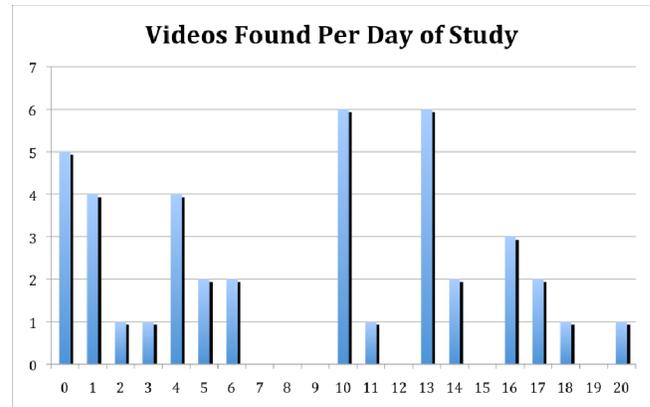


Figure 6: Videos were found fairly regularly throughout the first three weeks of the study as participants lived their lives. Spikes occur on weekend days when participants were more likely to visit new places or go hunting for a story.

wide range of deep emotions that the system evoked in our participants. We had expected just a general enjoyment of the system and an increase in communication, but our participants reported laughing, crying, and getting choked up upon receiving a story or discussing it later with family.

P6 told us of a phone call she received from her daughter-in-law. She called “to say that I made her cry that she was so touched by the stories. And she thought they were funny, the first ones I told her about.” In this case, the story that was shared was about C6 meeting the parents of her now husband back when she was in high school.

C10 reported laughing about many of the stories that were created by his mom and brothers: “After that [watching the two new stories] I called both my mom and my brother and I laughed about the situation cause it was pretty funny what they said.” Laughing about stories was a common reaction, both alone when receiving a story and again later when discussing it with the creator or other friends and family.

Evoking strong and personal emotions demonstrated the ability of our system to re-create some of the feeling of being together and of experiencing places together. The range and depth of emotions demonstrate the potential richness of this new medium of location-based asynchronous video communication.

Ramping Communication

We observed a pattern of ramping communication [19], where initial lighter-weight asynchronous communication through text messages or “likes” led to deeper communication over the phone or in person at later times. This style of communication matches what has been previously observed in studies of social TV systems [9] and we believe is a key way to build social engagement with systems that involve interaction at a distance. One example was C6: I “did end up texting my mother and telling her how sweet it was. Brought back a lot of memories, which was

nice. And she called me back and we actually laughed about it.”

In the end, participants reported feeling closer to their family because of their participation. P4: “This has really brought us closer together because we’ve been more communicative.” P5 called the intergenerational communication that the system created “a minor miracle” since her daughter did not previously show an interest in family history. Here, two factors may have acted together to reach the ‘tipping point’ for an audience previously uninterested in reminiscence activities: the serendipity achieved through the receipt of the story in everyday settings, and the asynchronicity offered by the deferred delivery. We found in our first study that intergenerational communication is often inhibited for fear of interrupting the other family member when s/he is busy. In SFS, both the obtrusiveness and the social pressure of attending to a face-to-face reminiscence activity are avoided.

Extending Storytelling to Family/Friends

The communication that the system generated was not limited to the creator and recipient. In many cases, both the creator and recipient talked to others about the stories that they discovered or showed videos directly from their phone to friends and family after the initial viewing. As shown in Figure 7, many videos were played multiple times with an average view count of 1.8 views per video.

In some instances, participants were not alone when receiving stories. In these cases, discovering which story was about to appear and watching the video became a group activity. C6 received several videos while she was in the car which led to conversation among all present and the sharing of more details of the story: “My husband was watching it with me, we were in the car. So we were in the car and he was watching it with me and was laughing. I don’t remember word for word what we were talking about and then my kids starting asking us questions about it, I know that. He wanted to see the video and they got all involved in it too.”

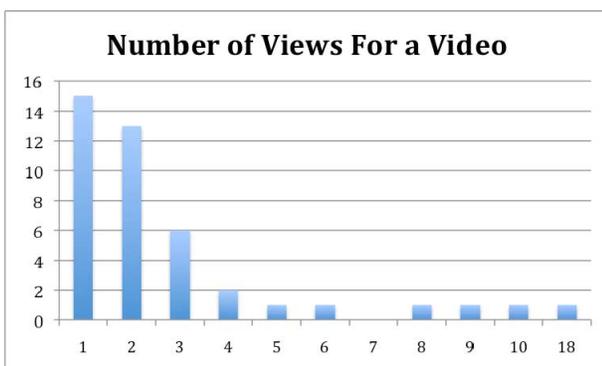


Figure 7: While most videos were only viewed once or twice, many were shown repeatedly to friends and family after the initial viewing.

Some participants would also show many of the videos to their significant others. This was especially common when the participant was a son- or daughter-in-law of the creator and wanted to get to know more about a side of the family that was less familiar. C7 “watched them all one day when I was on the way home and then I watched them again with [my wife]. Showed them to her cause she wanted to see them and wanted to see what her dad had said.” C2’s wife works where her mom used to work and C2 “talked with [her] about it and then she gave [her husband] the feedback on how different it is at her workplace today.” In these cases, the stories served as conversation starters to learn more about the family and its rich history.

Our study ran over the holiday of American Thanksgiving, which is a common time to have large family gatherings. In the voicemail diaries, almost all of our participants reported sharing stories with family members during this holiday. C4: “Oh yeah, I showed everyone at Thanksgiving. Which was nice because it was Thanksgiving and everybody was together. My mom started talking about the stories then and it was great!” C6’s son wanted to tell others about all of the stories they had been receiving in the car: “My son brought it up actually so he brought it up there. It was before a few of my other family members came and they were like, mom, show tio [uncle] the stories and stuff.”

Other times when visiting family served as opportune times to share stories. C5 “was hanging out with my cousin. And I was telling him about this app ... And I was like, look! Look! It’s mom and dad and they recorded stories and they geolocated them. So I showed him the stories and he was like woah, that’s cool.”

Having stories of relatives accessible on a mobile device allowed for conversation starters when around other people. Especially when those people knew the family well, conversations around these stories often emerged and extended well beyond the creator and recipient.

Re-engaging with the city via family history

Serendipitous Family Stories allowed our participants to engage with the city in new ways. Previously everyday locations took on added meaning as participants learned about the significance of those places in their family history. While some stories were familiar, many stories were new to our participants, and they saw the importance of these places in their parents’ or grandparents’ lives when they were growing up. This caused participants to engage with their ‘regular’ places differently as they learned about the stories and other historical tidbits about their city.

Some stories were very ‘visual’ and gave their recipients a chance to visualize the experiences enjoyed by their older generations. P7 left a story about the times when the lights would go out at his office in the Sears Tower each evening. Upon discovering the story, the son-in-law said “It was interesting to hear about [father’s] office in that building and how when the lights went off the whole city lit up,

otherwise you couldn't see anything. It was very dark up there. That was an interesting story."

C4 commented on receiving the stories in the places that her grandmother used to frequent decades ago: "Just being other places that other people were is neat." Often, participants learned about how these places have changed over the years. C4 learned of an old amusement park where her grandmother used to go on dates. It was torn down in the 1960s and she drove past the site everyday. As she told us: "I had no idea there was even an amusement park there." C3 learned about an old TV dance show called Ray Reiner that used to be filmed in Chicago and that her aunt had participated in: "It was a story about her being on the dance show and how they took video and used to go on boat rides. I had never heard of Ray Reiner, but I guess everybody else has because when I talked about it with people from my office they all said that oh yes, Ray Reiner is very popular. ... [My aunt and I] just talked about who Ray Reiner was and how he was kind of like a Dick Clark."

Through these stories, our participants not only engaged with their family history, but they also learned about the city's past and the importance of the places that they pass by each day.

Creating stronger family bonds through storytelling

Sharing stories allowed our participants to create stronger relationships with their family members. Recipients learned about aspects of their relatives' lives that they had not known before and also reminisced about shared family experiences in their past.

C4 learned a lot about her grandmother's life growing up. "I didn't know that they didn't have a car. She never had a car growing up. So everything they did they took a bus or the train and things like that." Stories like this helped the younger generation to imagine a life very different from their own and see older relatives as they were in their younger lives. As her grandmother put it, "She got a big kick out of the things that I did tell her though! And I guess she never knew her grandmother was human."

Often, the lives of older relatives remain mostly unknown to younger generations. C3 learned a lot about her aunt during the study, even though they are fairly close and talk regularly. "Yes, she said that she never realized that I worked at Carson Pirie Scott. And she said that she also didn't realize that I was pregnant when I worked there. She was so surprised to hear that. So she says, 'Were you married!?' ... And said that she didn't realize that I was a Jr Executive with Carson Pirie Scott. She thought I was just always just a little sales clerk."

C7 learned a lot about his father-in-law's interests: "I didn't realize that so much [father's interest in architecture] Cause I thought he was more into, he does a lot of work for like legal funds and stuff, and I didn't know he was so into

the architecture of things. I talked to him about it. I talked to [my wife] about it too."

This learning was not just one-way from the creator to the recipient. P3 reported learning a lot about her niece through using the system: "And she learned things about me that she didn't know too. We learned things about each other. And that's really cool, you know."

Families also reminisced about shared experiences in their past, and this helped to increase feelings of connectedness between the generations and reinforce the good times that they had spent together. P6 left a story for her daughter about going to see a musical in downtown Chicago. "Cause it was my daughter and my other daughter, it was a girls' night out. ... That was the first time we went out to see a play so that was just great." Her daughter talked to her about the story and planned another theater event when reminded of the good times they had on the first outing. "We talked about how that was fun and how we want to do that again."

Reliving memories of old sporting events was another common topic for stories that brought back fond memories of childhood both for the creator and the recipient. C10 was reminded of times when the whole family would go ice skating together: "That one was something that we used to do back in the day with my mother which was going ice skating and we used to love doing that. And she just talked about how ... every different person in the family would try to ice skate, who would fall. And that was the one time that my little brother was good at something I wasn't athletically." This memory prompted a call to his mother where they talked about old memories in the park playing baseball as well as the ice skating outings.

C1 was able to relive memories about taking a boat out on the river when he was young: "When I was a kid we used to have a small boat ... and I think we had my grandparents with us and we ... took the channel all the way down to the Chicago River and we showed them, they had never seen the buildings from the Chicago River before. So that was kind of neat to hear. Cause I didn't really remember it too much from when I was a kid, but hearing my parents tell it, you know they were real happy that they were able to do that and show my grandparents that." Through hearing this story, C1 was able to reconnect with a bit of his past and relatives across three generations.

Through using the system both to create and receive stories, participants strengthened their family bonds. Both through learning about new experiences from the past and by reliving times that the family had experienced together, our participants were able to be stronger families through their participation. The conversations that occurred and the events that were planned occurred directly as a result of using the system and receiving these asynchronous stories.

DISCUSSION

We believe that the mobile device is an ideal platform for fostering reminiscing experiences and increasing feelings of connectedness in families. While “measurements, metrics, and methodologies” for establishing connectedness are “not well established” [25], we have seen an increase in the frequency and duration of communication as well as an increase in communication that focuses on details of the family from users of this system. In addition, when asked for any final comments on using the system, several participants explicitly spoke of feeling more connected to and informed about family members. These stronger connections and knowledge will hopefully continue into deeper relationships in the future. If this can be validated, it demonstrates the power of a few mobile experiences during a four-week period to dramatically enhance family relationships. We see this as similar to the power of a weekend trip or other time spent together in strengthening bonds among friends and family. The experience provides a multitude of topics and common interests among those involved which we have observed being used to inspire future communication and activities to engage in together. P6 and C6 are already planning more outings together as a direct result of reminiscing that came from one of the stories shared in the system.

Our observations in the study have shown initial results that mobile interfaces that support ramping communication fidelity can indeed increase communication about family history and strengthen family relationships. Getting a story, liking it or texting the sender, and then moving on to deeper phone or in-person communication about the story and other topics of family history was a successful communication path for almost all of our participants. We are encouraged by these findings and would like to see how this style of usage can extend beyond the immediate family to sharing stories with friends and acquaintances.

Virtual Placemaking

This system has also demonstrated a new way for people to connect with a city and become aware of the importance of the places that they visit everyday in the lives of others or in history of the city itself. Previous location-based media systems have focused on delivering professionally produced content [16] or advertising [1] to users in certain locations. By sharing content of direct importance to close social relations in the context of the city, the system thus makes those places more meaningful and memorable in a very personal way.

Current discussions on the concept of “Placemaking” focus on physical changes to a place in order to make them more amenable to the needs of people who spend time there [21]. Location-based media systems can create a form of “virtual Placemaking” where in they making places more meaningful for people through the delivery of personally meaningful digital information about that place, thus transforming people’s perceptions of that place.

Location-based asynchronous media delivery is a new and interesting way to communicate with those in our lives. We are interested in other applications of this technology that can help make people more aware of their surroundings and the places where friends and family have visited or enjoyed.

Improving the production quality of mobile video

One of our goals with this work was to create a system that promotes the production of high quality content in mobile video. By focusing on storytelling, we chose a domain that centers on performance. Telling stories is an art where the performer wants to entertain as well as inform and recipients want to understand and be engaged. [11] This creates a high incentive for story creators to produce higher quality video with more engaging content. Because of this, stories were also kept short, allowing for easy mobile viewing between, or in parallel with, other tasks the recipient was involved in while navigating the city. The narrative quality of the videos that we observed was much higher than the content observed through studies of mobile video streaming services [13]. We believe this is largely due to the focused and performative nature of storytelling to a small audience. Recipients all enjoyed watching the video content that was produced explicitly for them.

Turning older adults into media creators

Often, older adults see video recording and other interactive technologies as too complicated to learn. By creating a system that allowed for simple video recording through a webpage, we hope to encourage more seniors to get involved in the process of creating media and sharing stories with others. All of the older participants in our study commented on the ease of creating new stories in the system and most participants were able to use the system with little guidance from the research team. We hope that by engaging older adults, it will be easier to create historical records of past eras and that families will feel closer to each other because of the stories that are shared.

CONCLUSION

Our initial findings demonstrate that location-based asynchronous video communication can enhance relationships and create feelings of togetherness over a distance. We are encouraged by these findings and have created a more scalable version of the system that will be released publicly. We are interested in comparing results from this larger scale deployment to findings from this study and in investigating other uses of the system that emerge beyond intergenerational storytelling. Some of our participants were quite interested in using the system to leave location-based messages for loved ones at their work or at a distant airport to receive when they land. Participants also mentioned wanting travel tips from friends in other cities so that they could stumble upon restaurants and attractions as they roam the city. We are interested in how a single system could support these uses in addition to the type of family stories that were created for this trial. Most

of all, we hope that this new communication medium can work to create stronger bonds across a distance in the lives of many users and better connect people to the cities in which they live. To study this, we will soon be releasing the system as a public beta at <http://www.storyplace.me> to study emergent uses of this new form of communication.

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REFERENCES

- Aalto, L., Göthlin, N., Korhonen, J., and Ojala, T. 2004. Bluetooth and WAP push based location-aware mobile advertising system. In Proc. MobiSys '04.
- Ballagas, R., Kaye, J., Ames, M., Go, J., and Raffle, H. "Family communication: phone conversations with children." Proceedings of IDC '09
- Ballagas, R., Walz, S.P., Kratz, S., Fuhr, C., Yu, E., Tann, M., Borchers, J., and Hovestadt, L. 2007. REXplorer: A Mobile, Pervasive Spell-Casting Game for Tourists. In CHI '07: Extended Abstracts.
- Bentley, F., Harboe, G., and Kaushik, P. Involving Seniors in Ethnographic-style Work: Initial findings from a study on long-distance communication. CHI 2010 Workshop on Senior-Friendly Technologies: Interaction Design for the Elderly. April, 2010.
- Bidwell, N.J., Reitmaier, T., Marsden, G., and Hansen, S. 2010. Designing with mobile digital storytelling in rural Africa. In Proc CHI 2010.
- Dougherty, A. 2010. New Medium, New Practice: Civic Production in Live-Streaming Mobile Video. Masters thesis in Comparative Media Studies, MIT.
- Haas, W., Bradley, D., Longino, C., Stoller, E., Serow, W. 2006. In Retirement Migration, Who Counts? A Methodological Question With Economic Policy Implications. *The Gerontologist* (2006) 46 (6): 815-820.
- Hart, P. The Reverse Geocache Puzzle. <http://arduiniana.org/projects/the-reverse-geo-cache-puzzle/> Accessed June 18, 2010.
- Harboe, G., Metcalf, C., Bentley, F., Tullio, J., Massey, N., Romano, G. (2008) Ambient Social TV: Drawing People into a Shared Experience. Proc CHI 2008.
- He, W., Sengupta, M., Velkoff, V., and DeBarros, K. 65+ in the United States: 2005. US Department of Health and Human Services and US Census Bureau. <http://www.census.gov/prod/2006pubs/p23-209.pdf>
- Huisman, D.M.. 2008. Telling a Family: Family storytelling, family identity, and cultural membership. PhD dissertation, University of Iowa.
- Lawton, L., Silverstein, M., Bengtson, V. Affection, Social Contact, and Geographic Distance between Adult Children and Their Parents. *Journal of Marriage and the Family*, Vol. 56, No. 1. (Feb., 1994), pp. 57-68.
- Juhlin, O., Engström, A., and Reponen, E. 2010. Mobile broadcasting: the whats and hows of live video as a social medium. In Proc Mobile HCI 2010.
- Olsson, T., Soronen, H., and Väänänen-Vainio-Mattila, K. 2008. User needs and design guidelines for mobile services for sharing digital life memories. In Proc Mobile HCI 2008.
- Olsson, T., Lehtonen, M., Pavel, D., and Väänänen-Vainio-Mattila, K. 2007. User-centered design of a mobile application for sharing life memories. In Proc Mobility '07.
- Pan, P., Kastner, C., Crow, D., and Davenport, G. 2002. M-Studio: an authoring application for context-aware multimedia. In Proceedings ACM Multimedia (MULTIMEDIA '02).
- Peesapati, S.T., Schwanda, V., Schultz, J., Lepage, M., Jeong, S., and Cosley, D. 2010. Pensieve: supporting everyday reminiscence. In Proc. CHI 2010..
- Ballagas, R., Reville, G., Horii, H., Follmer, S., Go, J., Reardon, E., Mori, K., Kaye, J., and Spasojevic, M. 2010. Family story play: reading with young children (and elmo) over a distance. In Proc CHI 2010.
- Rhodes, B. and Maes, P. (2000) Just-in-time information retrieval agents. *IBM Systems Journal* 39(3-4).
- Riley, M. W. and Foner, A. *Aging and Society*. Russell Sage, NY, 1968.
- Lynda H. Schneekloth, Robert G. Shibley. 1995. *Placemaking: The Art and Practice of Building Communities*. Wiley.
- Smith, S., and House, M. 2005. Snowbirds, Sunbirds, and Stayers: Seasonal Migration of the Elderly in Florida. Presented at the annual meeting of the Population Association of America, 2005.
- Sohn, T., Li, K.A., Lee, G., Smith, I., Scott, J., Griswold, W.G. Place-Its: A Study of Location-Based Reminders on Mobile Phones. In Proc. UbiComp 2005. Tokyo, Japan, pp. 232-250 2005.
- Treas, J. *Aging and the Family*. In D. Woodruff and J. Birren (eds.), *Aging: Scientific Perspectives and Social Issues*. Van Nostrand, Ny, 1975.
- Yarosh, S. 2010. Poster of the outcomes of the "Designing and Evaluating Affective Aspects of Sociable Media to Support Social Connectedness" workshop at CHI 2010.
- Yarosh, S, Davis, H., Modlitba, P., Skov, M., and Vetere, F. *Mobile Technologies for Parent/Child Relationships*. In: Allison Druin, editor, *Mobile Technology for Children*. Boston: Morgan Kaufmann, 2009, pp. 285-306.