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Temporal Snapshots: Unpacking the Experience of Moments in Dementia

# Temporal Snapshots: Exploring Subjective Time in Dementia Through Personal Narratives

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Fig. 1. The figure shows all the elements of the Temporal Snapshots probe. This includes six image prompts used during the discussions, a jar with 17 envelopes, a pen, and a recorder. Each envelope includes a question, a couple of empty cards to write on, and some puzzle pieces

HCI often emphasizes objective measures of time, such as clocks and calendars, which can be challenging for people with dementia to interpret. Incorporating subjective lived experiences is crucial for providing person-centered care. This paper presents findings from a two-week study with six dyads (a person with dementia and their partner), exploring how they experience time through past and future moments in the present. Using the *Temporal Snapshots* probe, we examine how individuals reflect on time and how visuals and questions trigger personal associations. We introduce the *Life Continuum Cones* to illustrate the continuity of past, present, and future experiences, offering practical insights for assistive technologies. This study emphasizes the need for a pluralistic approach to temporal experiences in dementia, advocating for HCI practices to more effectively address the complexities of personal time.

CCS Concepts: • **Human-centered computing** → **Human computer interaction (HCI)**.

Additional Key Words and Phrases: Dementia, time, technology, temporality, temporal-misfit

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## 1 Introduction

Time and temporal experiences have emerged as areas of interest in Human-Computer Interaction (HCI) research, reflecting a broader trend toward understanding how people engage with and perceive time in their daily lives. Recent studies have highlighted the potential of HCI to delve into the nuances of temporal experience, particularly through an exploration of how non-conventional temporal concepts manifest in everyday realities [6, 37, 39, 45–48]. For instance, Rapp et al. emphasized that HCI research can uncover how individuals live through time, connecting these temporal experiences to their broader existential concerns [48]. This connection between time and subjective experience is crucial, as it moves beyond viewing time merely as a linear sequence of events, instead focusing on how time is felt and lived in relation to individual lives. Despite this emerging interest, the design of technology interactions, especially in the context of dementia, remains underexplored in terms of subjective temporal experiences.

The exploration of temporality becomes particularly important in dementia, a group of neurogenerative disorders that significantly disrupt an individual's temporal perception [27]. The onset of dementia often erodes the understanding of objective time constructs, such as clocks and calendars [1, 32]. To mitigate this, technologies offer assistance with daily tasks [51] and provide simplified time information, such as day-night transitions, date, and time [12, 53, 59]. However, many of these technologies, which use clocks and calendars to communicate time, often fail to meet the needs of people with dementia when aiming to provide a sense of control, increase independence, and reduce caregiver dependency [41]. While these are important utilitarian objectives, dementia research has shifted from merely supporting cognitive and physical abilities to addressing individual potential and lived experiences [26]. Therefore, this study focuses on understanding the subjective, lived experience of time in dementia, particularly how individuals with dementia experience time by reflecting on past and future moments in the now.

Human perception of subjective time involves experiencing the present moment and mentally traversing past and future moments [33]. These subjective temporal experiences shape an individual's identity and contribute to their evolving sense of self [11, 43]. Designing interactions that cater to these subjective temporal experiences can lead to more meaningful and engaging user experiences. Although dementia distorts episodic memory and time-processing abilities [16], the capacity to grasp subjective temporal experiences largely remains [55]. Reminiscence therapy, widely used in dementia care, enhances well-being by helping individuals connect with their past [50, 65]. This therapy activates brain areas related to long-term memory and cognition, promoting the recall of memories and influencing present emotions and behavior [50]. However, reminiscence therapy typically focuses on the past, largely excluding considerations of the future. This leaves a significant gap in research and methods, raising critical questions about why people with dementia are being stigmatized as not having a future in the first place. Addressing this exclusion is essential for providing a holistic approach to their care and well-being.

To explore how individuals reflect on the entire temporal landscape including past and future moments, our research introduces the *Temporal Snapshots* probe to people with dementia and their partners for two to three weeks. Prior research indicates that humans make associations with lived moments based on social settings, location, time, spatial environment, activity, and emotion [58]. Building on this, the Temporal Snapshots probe uses generic images and reflective questions for temporal reflection across past and future moments to understand their subjective experiences.

The results show fluidity in the narration of temporal experiences, indicating that the distinction between past, present, and future is blurred for the participants when making associations. As humans experience and make associations in unique ways and the experience of dementia is unique for individuals, it is important to foreground the person in the associations made. For this, we introduce the *Life Continuum Cones* to visualize how individuals navigate through past, present, and future when making associations and present personal narratives in conversations. By focusing on dementia as a specific case, our research emphasizes the importance of temporality in interaction design and the need to reassess how temporal experiences should be designed. Additionally, the insights gained from this study underscore the need to design for subjective time-based designs for other groups of individuals with unconventional temporal perceptions. Thus, our work sets the stage for further exploration of subjective time and poses *Life Continuum Cones* as a starting point to uncover subjective temporal experiences and inform the design of temporal-aware technologies.

## 2 Background

### 2.1 Temporality in HCI and Dementia

Conventional views of time have limited HCI possibilities by oversimplifying rhythms, categorizing time as merely fast or slow, viewing the present as uniform, seeing time as linear, tying temporality to artifacts, and reinforcing time hierarchies [45]. However, recent advancements in HCI research have begun to push against these traditional boundaries, offering new ways to think about and design for time. For example, some researchers have revisited the concept of time as a social construct, emphasizing that time is not just a neutral, objective measure but is deeply intertwined with social interactions [46]. Other studies have examined the evolving relationship of humans with technology over time [36], translating findings to express the passage of time through materials, form, and qualities, and exploring how intentionally designed interactions can foster more meaningful and reflective experiences [38]. Additionally, there has been growing interest in exploring the subjective, narrative-driven sense of time experienced in storytelling to better understand current experiences and develop new approaches for addressing issues such as disengagement, re-engagement, adapting to different paces, synchronizing participants, and facilitating interactions across time [6]. Moreover, temporality is being explored in more-than-human contexts, recognizing that human experiences of time are not isolated but are interconnected with ecological systems and non-human entities, and challenging the anthropocentric focus of HCI work [39, 47]. Despite these promising developments, HCI has yet to fully incorporate these alternative conceptions of time into its mainstream design practices. Many existing technologies remain constrained by traditional, linear models of temporality, overlooking the complex, layered, and subjective experiences of time that individuals encounter in their daily lives.

This need is particularly evident in the context of dementia. Time-related changes were among the earliest reported signs of the condition and these changes worsen as the condition progresses [56]. Tools like the Mini-Mental State Examination (MMSE) are used to screen for cognitive impairment, including temporal orientation, through questions about the current year, season, date, day, and month [32, 62]. The Clock Drawing Test, part of the MMSE, highlights the struggles individuals with dementia face in representing time visually [1]. Occupational therapists suggest assistive technologies for time management to help individuals with dementia orient to time, reduce dependency on caregivers, boost their sense of control, and enhance overall independence [41]. These technologies include devices that simplify the communication of day-night cycles, dates, and time, day and date [7, 12, 53, 59], and embodied or digital agents for task reminders [44]. Despite these innovations, most assistive technologies still rely heavily on conventional clocks and calendars, which can be challenging for people with dementia to comprehend. This limitation extends to broader

technology interactions designed for social support [10, 13, 17], companionship [9], and daily activities [51]. While subjective temporal experiences have been studied in fields such as neurology and psychiatry [21, 42, 49], these insights have not yet been fully integrated into the design of assistive technologies. Additionally, Kitwood’s person-centered care approach, which emphasizes the subjective needs of individuals with dementia, remains a foundational aspect in dementia care practice [29, 30]. Despite this, most solutions continue to rely on outdated temporal frameworks.

## 2.2 Subjective Experience of Moments in Dementia

Subjective time weaves together past, present, and future, shaping how individuals perceive their experiences and understand their world [18, 37]. The subjective present plays a crucial role in shaping identity and overall well-being [11, 43], with event-based memory contributing to a continuous sense of self, which fosters both stability and growth [34]. Much like how stories are structured through words, sentences, paragraphs, and chapters, the perception of time involves organizing experiences into discrete units [4], which we will refer to as moments. The event memory system captures snapshots of these moments, while episodic memory weaves the snapshots into coherent narratives forming past episodes [28]. Experiencing moments in subjective time involves the unfolding of each moment as discrete pictures or words [4] and the ability to mentally traverse past and future moments [33].

Dementia, however, disrupts this process due to impaired time-processing ability and memory, leading to distorted episodic memory thus making it difficult for individuals to recall time-related information or perceive themselves within subjective time [16]. During confabulation, individuals with dementia may unknowingly provide false or self-contradictory information, which often results from true memories being misplaced in time or context [20]. Although confabulation is typically viewed negatively, Orulv suggests it can serve as a mechanism for individuals to make sense of their present experiences and maintain a sense of personal identity [40]. These challenges highlight the need for therapeutic approaches that not only address memory loss but also strive to preserve a coherent sense of self. Reminiscence therapy has been shown to enhance the overall well-being, cognition, communication, and mood of people with dementia by helping them connect with their past in meaningful ways [50, 65]. It activates brain regions related to long-term memory and cognition, enhancing the coherence of key life events and influencing emotions and behavior [50]. However, reminiscence therapy often focus on past experiences, potentially limiting individuals’ reflection on the future.

Maintaining a positive outlook on the future is crucial for well-being, as it supports constructive planning and action in the present [35]. The perception and memory of events are intricately connected, affecting actions and language use in the present and future [66]. Hawkins advocates for a holistic perspective on well-being, emphasizing that it should encompass the entirety of a person’s life rather than focusing on isolated moments [24]. Therefore, understanding the interplay between past memories, present actions, and future aspirations becomes essential in fostering a holistic sense of well-being, especially in the context of progressive conditions like dementia. In this context, speculative futures frameworks, such as the future cone, offer valuable insights into visualizing personal temporal experiences [23]. These approaches have been instrumental in global foresight by envisioning diverse scenarios, guiding strategic planning, and exploring new possibilities [63]. They have also been used to examine the impact of circular economies [5] and extend product trends into innovative areas, offering fresh perspectives for design and technology [3]. Integrating speculative futures with inclusive frameworks can help create a more holistic approach to addressing the evolving needs of those with dementia.

Afrofuturism, with its focus on liberation and cultural competence, challenges traditional futurism by addressing colonial biases and marginalization narratives [8]. It can inspire a reframing of potential futures to be more inclusive

and supportive, particularly in designing assistive technologies. This perspective shifts away from past-focused models, fostering the development of relevant and empowering futures that honor diverse experiences and aspirations. Incorporating such holistic and inclusive viewpoints is essential for enhancing dementia care, making it more empathetic and attuned to the complex temporal experiences of individuals.

### 2.3 Uncovering Personal Narratives

Foregrounding individual temporal experiences is essential for understanding how people perceive time subjectively. By focusing on the person and their life stories, their unique temporal realities can be emphasized, which is particularly important in dementia research. Involving people with dementia directly in research can allow for a more accurate understanding of their temporal experiences.

Previous studies have successfully engaged individuals with dementia through personal design probes, enabling them to express their needs, desires, values, and beliefs [64]. Conducting studies in familiar settings and involving caregivers has shown to be beneficial strategies in dementia research []. Also, including informal caregivers, such as family members or close friends, in research can further enrich the research by providing insights into the nuanced temporal experiences of people with dementia. Caregivers, with their deep understanding of their loved one's temporal perceptions and daily routines, can offer a richer perspective. Additionally, carefully designed prompts can play a crucial role in inspiring and assisting people with dementia to make associations and construct narratives.

Effective prompts are key in triggering associations, allowing individuals to articulate their temporal experiences despite cognitive decline. Humans naturally segment activities into events and sub-events, shaping their perception and memory of experiences, which aids in recall and association [31]. For example, a supermarket trip might be divided into distinct phases such as going, shopping, and returning, based on physical changes or conceptual goals, demonstrating how they simplify complex, dynamic experiences into manageable, meaningful units. Events in this context range from brief moments like opening a door to longer ones like choosing groceries to several minutes like chatting with a friend encountered at the store. By carefully designing prompts that resonate with these natural segmentation processes, effective engagement with people with dementia is possible, enabling richer and more meaningful narratives to be discovered.

Two primary theories explain event recall: Tulving's theory emphasizes remembering events based on their what, where, and when, while Campbell's theory focuses on events within periodic cycles like days and seasons, as well as those within a continuous, non-repeating timeline [28]. Research by Tomita et al. indicates that when making associations, people often connect based on similarities in the time period, location, space, social settings, activities, and emotions [58]. However, further studies are needed to explore these dimensions in the context of dementia. These future investigations can help refine the application of prompts in research, making them even more effective in eliciting comprehensive and meaningful narratives.

Previous dementia research on reminiscence has employed sensory stimuli, such as familiar scents, sounds, and tactile objects, to evoke memories and facilitate conversations among individuals with dementia. Astell et al. found that generic materials, like photographs, were more successful than personal items in prompting detailed narratives, as personal items often limit the scope of shared information [2]. This suggests that while personal items evoke strong memories, they may not always facilitate broad discussions, highlighting the importance of selecting stimuli that encourage expansive, rather than restrictive, storytelling.



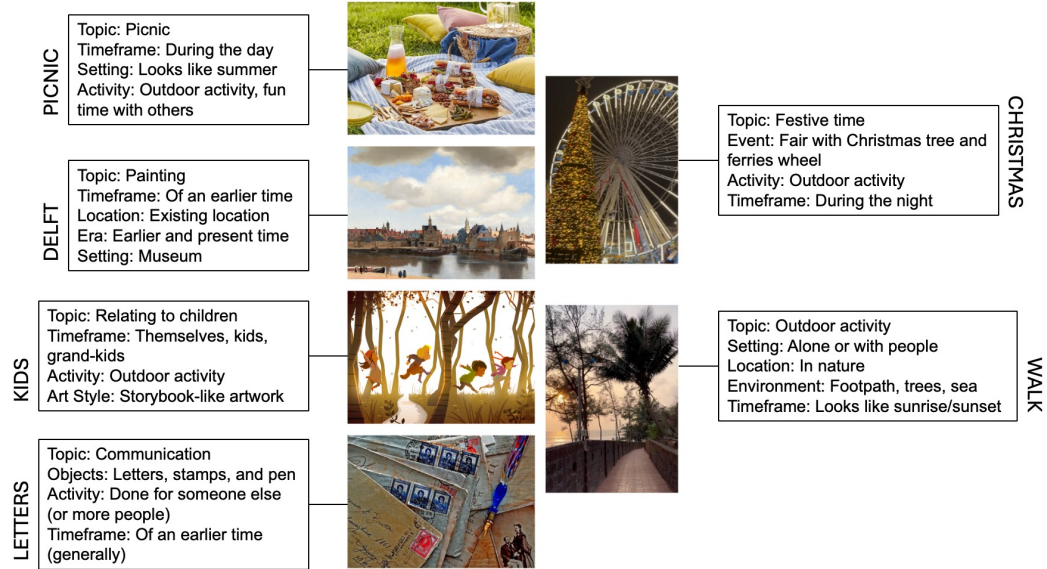


Fig. 2. Six Image Prompts with themes- Picnic, Delft, Christmas, Kids, Letters, and Walk

### 3 Method

This section first explains the Temporal Snapshots probe and then presents the field study that explored the lived experience of time through past and future moments as experienced by people with dementia using the probe. Partners were involved in the study to gain insights into the temporal experiences of dementia from their perspective as they are aware of the routines of people with dementia.

#### 3.1 Temporal Snapshots Probe

The Temporal Snapshots probe aims to inspire people with dementia to make associations with moments from their past and future. By eliciting rich, subjective responses, this tool provides deep insights into participants' experiences, values, and contexts [19]. The Temporal Snapshots probe consists of two parts: 1) image prompts, and 2) jar activity.

**3.1.1 Image Prompts.** The goal of image prompts is to provide a broad visual landscape for inspiration that can trigger associations and lead to meaningful conversations for all participants. To effectively trigger a variety of associations, the contrast was provided in the time period, social settings, activities, location, space, and emotions [58]. It was ensured that the image prompt had multiple artifacts that contextualized the space. Also, care was taken to choose images without recognizable human faces or animals in them so no direct association or disassociation to personal life was made. Based on this, the Image Prompt activity included a total of six images with the themes- Picnic, Delft, Kids, Christmas, Letters, and Walk- as shown in Figure 2. For diversity in visual styles, the image prompts include four photographs (Picnic, Christmas, Letters, and Walk) and two artworks (Delft and Kids).

No.	Time-frame	Theme	Questions
1.	Past	Family Event	Can you recall a time when your family got together for a special day or event? What makes it memorable for you?
2.		Travel	Can you recall a vacation or trip that you enjoyed? What made your trip special, and where did you go?
3.		Achievement	Can you think of a moment when you achieved something important or felt proud of yourself? What was the accomplishment, and why was it significant to you?
4.		Food	Do you have a favorite food or recipe that you remember fondly? What was it, and why is it meaningful to you?
5.		Friend	Can you think of a close friend? What makes that friendship important to you?
6.		Pet	Did you have a pet that you loved and cared for? What was their name, and what fond memories do you have of them?
7.		Music	Do you have a favorite song or piece of music that you used to listen to when you were younger? What feelings and memories does it evoke?
8.		Book/Movie	Do you have a favorite book or a movie that left a lasting impression on you? What was it about, and why did it impact you?
9.	Recent Past	Hobby	Can you tell me about some games/hobbies you used to like when you were younger? Do you still enjoy them? What activities do you currently enjoy as hobbies?
10.		Outdoors	Do you like going outdoors? Can you tell me about a walk you went for recently? Where did you go, and what did you enjoy about it?
11.		Joy	What made you laugh or smile today/yesterday? Is there something funny or amusing that someone said or did recently? What brings you joy generally?
12.		Recent Victory	Tell me about a small victory or achievement you experienced today/yesterday. Is there something you want to do?
13.		Relax Activity	What is a relaxing activity for you? Why do you think it is relaxing? Can you describe how you feel?
14.	Future	Family Event	Can you tell me about a family gathering or celebration that is coming up? Are you excited about it? Who would be there and what activities might take place?
15.		Future Activity	Can you tell me about an activity that you want to do? What would you like to do, and why does it make you excited?
16.		Next Travel	Is there a place you've been thinking about visiting or exploring? Where would you like to go, and what interests you about that place?
17.		Future Goal	Can you share a goal you have for the coming week or month? What is it, and why is it important to you?

Table 1. Reflective Questions in the jar

**3.1.2 Jar Activity.** The questions in the jar activity aim to provide a starting point for conversation. The jar activity includes 17 questions packed into separate envelopes, each including some puzzle pieces and some empty cards to write on if desired. The questions span over distinct time-periods- past, immediate past, and future and may either relate to recurring or non-recurring moments based on the person's interpretation. Based on these aspects, the questions are as shown in Table 1.

## 3.2 Participants

The field study involved participants diagnosed with dementia and their partners recruited through snowball sampling from local care facilities and dementia support groups in the [country]. A total of six dyads of a person with dementia and their partner were recruited. Selection criteria included a diagnosis of dementia, living together with their spouse at home, the ability to communicate verbally and consent to participate. The participants were 60–89 years old, [country] nationals, and white in ethnicity. The participants represented a diverse group in terms of gender, and type of dementia (Alzheimer’s- 3, Mild Cognitive Impairment- 2, Huntington’s- 1), thus aiming to capture a wide range of experiences. Due to the progressive nature of dementia and the unique lived experience of individuals, the stage of dementia was difficult to state at the time of the interview. Of the six dyads, two chose to withdraw after the image prompt discussion but gave consent for their data to be used.

## 3.3 Ethical Considerations

Ethical approval for the study was obtained from the Ethical Review Board of [university]. Participants were given information on the aim of the study and study design in the introduction session of the first meeting. Participants provided both verbal and written consent, confirming they understood the study’s purpose, procedures, and their right to withdraw at any time. Interviews were conducted in the language the participants were most comfortable in, using short and simple sentences and repetition when required. During the interviews, the first author was accompanied by a second experienced researcher to help organize the sessions and conduct interviews in [language of the country]. To ensure the comfort of participants, the researchers picked on non-verbal and verbal cues and offered to stop, take a break, or continue with the interview. The interview setting was either the house (4 dyads) or a frequently attended, familiar meeting center for people with dementia (2 dyads), ensuring a comfortable and known environment for the interview. Confidentiality was maintained by anonymizing all data, and the participants’ identities were protected throughout the research process.

## 3.4 Study Procedure

The study includes an interview session and a jar activity. The interview session had 3 parts- an introduction (20 minutes), an image prompt discussion (30-45 minutes), a break (10 minutes), and an interview on the topic of reality (30-45 minutes). The data on reality was for a different study and is reported as a separate paper. In the introduction session, participants were given details about the study, and their consent was taken for participation, ensuring they understood their rights, including the option to withdraw at any time. Following this, the six image prompts were discussed. At the end of the interview session, demographic information (age, type, and stage of dementia) was collected and the jar activity was introduced.

*3.4.1 Image Prompt Discussions.* The six images were presented one at a time to the participants and each image was discussed for about 5-10 minutes. The discussions were led by the accompanying researcher who also had prior experience of doing research with people with dementia. Participants were allowed to observe and reflect on their personal associations, memories, and experiences related to each prompt with the open question- "What does this image make you think of?". Additional open-ended questions were asked to facilitate a discussion and explore further associations on dimensions such as activities, location, and time through what, where, and when questions. Participants were also asked to express their emotions related to the associated moment. The interview session was posed as a conversation rather than an interview and to facilitate this better, both researchers also shared parts of their associations



to break the ice and facilitate better image prompt discussions. The interview sessions were audio and video recorded to capture verbal and non-verbal cues.

**3.4.2 Jar Activity.** Participants were asked to open the envelopes one at a time and record their conversations after reading the question. They were encouraged to consider similar activities, locations, and people and build on associations they make. Participants were asked to complete the jar activity at their leisure before the next meeting which was scheduled after 2-3 weeks, giving participants ample time to complete the jar activity. It was seen that the couples opened and answered multiple envelopes (maximum 3) one after the other. For the jar, the data was collected through audio recordings and written summaries (if they preferred).

### 3.5 Data Analysis

All interviews were transcribed and translated verbatim by two research assistants and the first author went through them to ensure correctness. The data collected from the image prompt discussions and jar activity was analyzed using abductive analysis as described below [57]. The transcripts were first open-coded, following which the data was looked at through the lens of associative memories and the timeframe of the image or posed the question. Then, the codes were re-interpreted in sight of the personal timelines of participants and through their perspectives to add more depth to the interpretation of the results. By doing so, we aimed to foreground the distinctiveness of each couple's unique experiences with dementia, ensuring that their voices are authentically represented. Following this, codes were re-examined and new codes were added.

Additionally, co-coding sessions were conducted with seven other researchers, including the researcher who helped conduct the interview, the student assistant who helped transcribe and translate the data, three researchers working on dementia, one master's student working on VR technologies for dementia, and one researcher working on time for more-than-human context. Each co-coding session lasted an hour, involving a maximum of two participants per session. They spent 15 minutes analyzing one transcript and 5 minutes discussing insights, thereby covering a total of three transcripts per session. The co-coding sessions helped validate the initial codes and discover relevant theories.

Finally, codes were examined for conversion and patterns and summarised to identify themes. Overall, the abductive analysis approach helped uncover patterns in the experiences of time in dementia while still recognizing the nuanced influence of unique personal timelines on the experience of time.

## 4 Results

We present our interpretive analysis [54] of narrative moments making sense of associations participants made when using the Temporal Snapshots probe. Additionally, we make use of Life Continuum Cones as a visual framework to explore and unpack the subjectivity of time experienced by participants. Figure 3 shows the structure of how results are discussed.

### 4.1 Blurring of Temporal Boundaries

Our study reveals how participants' navigation through memories and future anticipations significantly blurs temporal boundaries, with associations spanning various moments in time and traversing both past events and future possibilities. This merging of temporal boundaries underscores the importance of grounding these narratives in individual histories, preferences, and unique personal stories.

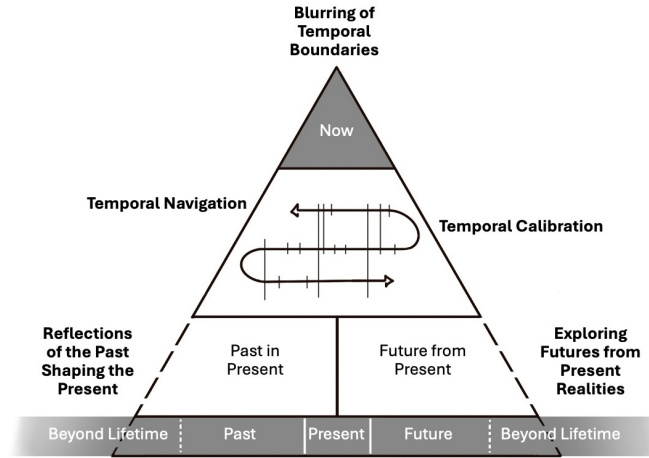


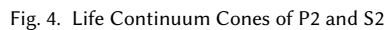
Fig. 3. Overview of Results

To address this, we foregrounded the person and remapped the collected data along a temporal direction from past to future. By visually representing the data for each individual, we highlighted all the topics discussed during the interactions and mapped the narrated moments and associations along this temporal line. This approach not only emphasized the interconnectedness of past, present, and future in participants' narratives but also provided a clearer understanding of how these temporal experiences influence each other.

**4.1.1 Visualizing Narrative Continuum.** The Life Continuum Cones are a visual tool we developed to represent the interconnected nature of personal narratives. Structured as a dual cone resembling an infinity symbol, the cones symbolize the convergence of past and future at the present moment, offering a visual narrative that captures the fluidity of temporal experiences. The left cone represents an individual's lived life, containing snapshots of their past experiences and memories. As this cone narrows towards the present, it signifies the accumulation of life moments that contribute to the current interaction during the Temporal Snapshots probe. Similarly, the right cone represents future possibilities, expanding outward from the present and encompassing potential scenarios that include what is desirable, possible, and improbable. The point where the two cones meet marks the present, and a plane at this intersection lists all the topics discussed during the activity. Each cone is divided into planes, separated by intervals of ten years, except for the first plates on either side of the center, which represent a one-year time span. Together, the Life Continuum Cones provide a comprehensive view of an individual's narrative continuum, seamlessly integrating past, present, and future experiences. Figure 4 shows Life Continuum Cones for P2 and S2.

I am still finalizing how they look.

**4.1.2 Individual and Collaborative Associations.** When navigating through different temporal moments, all participants engage in both individual and collaborative associations. In both ways, participants connect the visual and question prompts with their own lives, drawing from personal memories and experiences. For example, when making individual association, P2 immediately associates the image of painting with the "Church tower of [location]", a familiar landmark from his past, saying, "Yes, I worked there." As he continues to analyze the visual, P2 compares the past and present landscapes, noting, "It must be [other location], perhaps? There is no water in [location], right? (But) there used to be



On the other hand, when making collaborative associations, S2 recalls a Father's Day picnic and connects it to childhood memories, "If we go with the tractor, you would leave one large flat cart behind and we would all sit on it and then we would go to the stream and swim there in the stream. And we went on a picnic there". This recollection triggers P2's memory, "We went swimming there" and P2 continues mumbling about where they swam. "Yes, that is actually. Yes, that is the stream, right?", S2 responds with excitement further naming specific landmarks like the bridge and the dam with a waterfall. This exchange not only reinforces their individual memory but also deepens their connection by piecing together their individual experiences into a shared narrative.

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However, in the case of P5 and S5, the dynamic shifts, with P5 correcting details of S5's narrative. For instance, when S5 claims they had known each other since 1970, P5, typically precise with numbers, responds, "Longer, I think". S5 confirms her memory, explaining she was 17 at the time, to which P5, smiles and concedes, "Oh. Then not".

Throughout their conversations, S5 tends to focus on the experiential aspects of moments, while P5 emphasizes specifics and details. Despite this tendency, P5 chooses to overlook the discrepancy in this instance, valuing the emotional and experiential quality of their shared memories over the exactness of dates. This moment underscores the value of emotional and experiential aspects of moments, highlighting that the richness of shared experiences can outweigh the precision of factual details.

## 4.2 Temporal Navigation and Calibration

When narrating moments, participants fluidly traverse various time periods, relying on personal and social markers to navigate and sequence moments in their temporal landscape. These markers are either singular, significant events or recurring occurrences that help structure their recollections. However, due to dementia, all participants sometimes experience disruptions in their temporal awareness, causing them to lose their grip on these personal markers. Consequently, this can lead to the blending or misplacement of moments, affecting the coherence and clarity of their narration.

*4.2.1 Connecting Life Phases and Generations.* In their narratives, all participants connect different life phases along a linear timeline, referencing periods such as childhood, work life, and times before and after marriage.

As they make these connections, participants often highlight similarities and contrasts between their various life stages. For example, P2's experience highlights a stark contrast between the accelerated pace of working life and the relaxed tempo of retirement. He recalls, "My work started at 6:30 AM in [location], so I had to leave home by 5:00 AM", highlighting a life once governed by strict schedules and high pressure. In retirement, however, P2 describes a significant shift "Now, there's no need to be anywhere at a specific hour", allowing him the freedom to "enjoy time" without obligations, embracing a slower, more leisurely pace.

Similarly, P3's reflections on travel showcase a transition from adventurous exploration to a more measured approach. "Yes, we like to go every now and then... not just to the Netherlands and its surroundings", P3 says with enthusiasm, reflecting a continued desire for exploration. S3 tempers this by acknowledging the growing challenges of travel due to dementia, prompting P3 to reflect and adapt. P3 says, "Occasionally, we go in the region. Not too far away or anything", recognizing the need to adjust due to his degrading condition. P3's narration of travel reflects a change in how they experience time—no longer rushing from one place to another but savoring their journeys at a slower pace, with P3 noting, "If you no longer have to work, you naturally have a lot of free time, so you can easily spread things out".

Additionally, the scope of associations extends beyond reflections on the participants' own lives to include and reflect upon the experiences, milestones, and futures of their children and grandchildren. For example, P5 fondly recalls Christmases spent with his family, "They all come and eat with you, and their children play," highlighting the importance of these gatherings in his life. S5 goes further back in time and adds, "The youngest [kid] has learned the most... he loved making fries and everything", reminiscing about how their children's volunteer work at a local theme park brought joy to the family. As their family grows, these traditions evolve, with S5 finding joy in adapting to the grandchildren's needs. Coming back to the present time, S5 says "Now we have to adapt everything for the grandkids. It is different and fun again, right? Yes". Then she again goes further back in time and talks of Christmases with P5 from before their marriage and before having kids. This dialogue reflects how family traditions and the experiences of different generations intertwine, creating a rich tapestry of shared memories and evolving practices.

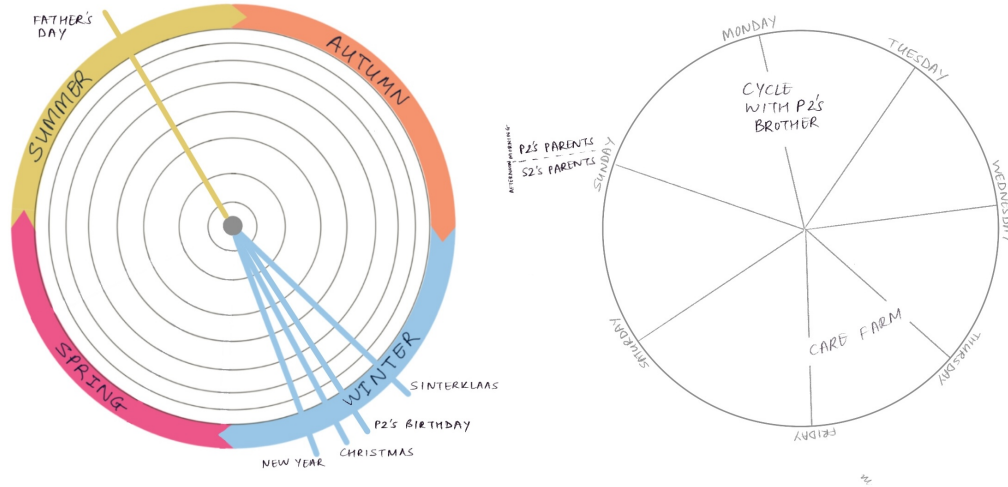


Fig. 5. Temporal granularity experienced by P2 and S2

**4.2.2 Recurring time markers.** In addition to linear markers, all participants anchor their sense of time using recurring cultural events, seasonal rhythms, and weekly routines, which provide structure and continuity on a more granular level.

Weekly routines, for example, offer participants a way to calibrate their temporal experience with regularity. P2 and S2 frequently discuss their regular activities, such as “P2 cycling every Monday with his brother”, “P2 visiting the care farm on Thursdays and Fridays” and S2’s “weekly bike rides to the nearby village”. Figure 5 shows granularities mentioned by P2 and S2 when talking of time and moments. These routines illustrate how the rhythm of recurring activities often takes precedence over specific dates, providing a sense of continuity and structure.

Cultural markers also play a significant role in structuring participants’ time. For example, S5 describes the anticipation of setting up the Christmas tree by saying, “First [St. Nicholas] has to leave... as soon as December 5th has passed, the Christmas decorations will arrive”. This statement underscores how precise cultural markers guide their transitions between events. P5 adds, “When all the children and grandchildren are gone, we can put it up”, highlighting how social cues tied to cultural events shape his sense of time.

Similarly, annually recurring local events like carnivals provide markers for larger time spans in participants’ social circles. For example, S6 says, “In [name of local area] they count like ‘that was so many weeks before’ and ‘that was so many weeks after’ carnival.” Following this, P6 confirms with S6 that while carnival occurs around autumn or winter, “The fair is usually in summertime, yes?”. This demonstrates how cultural events tied to seasonal changes help structure their perception of time over the year. All participants refer to seasons when talking about annual events and tasks. For instance, P6 reminisces about seasonal tasks at her childhood home, such as planting in spring and harvesting in autumn, saying, “Going through spring, autumn, summer, winter... you experience it all automatically”. She maintains this connection to the seasons where tasks like “mowing the grass” and “pruning a little” are annual events tied to seasons helping her maintain a sense of continuity. This approach allows participants to grasp the passage of time over longer periods and maintain a sense of continuity across their lives.

I am still finalizing how this looks. I might integrate this with the cones.

4.2.3 *Slipping Through Time*. Most participants demonstrate a strong sense of temporal awareness when navigating different timeframes and organizing moments across various timescales with varying levels of detail. However, there are instances where this awareness slips, particularly among all participants with dementia, highlighting the complexities involved in managing temporal navigation.

For example, during a conversation about their homes, P6 recalls, “We shortly lived on the waterside... we quickly cycled up the dike and to the water”, referring to a memory from childhood. S6 gently corrects him, saying, “But that was at your [childhood] home. I’m talking about our last home from last year”. This slip shows how memories from different periods can merge, creating confusion in present recollections.

Similarly, when recalling instances of traveling to distant locations, P3 confidently states, “We do have, erm, we do have a number of long-distance trips. Well, erm, Indonesia. Thailand”. S3, however, gently intervenes, shaking her head and correcting him, “No Thai... no Thailand. My son has been there”. This moment reveals the nuances of their shared memories, where P3’s recollection intertwines with the experiences of their family members, leading to a mix-up in details. In disbelief, P3 says, “She said no?” not realizing the mistake. S3 then turns to the researcher, clarifying with a slight chuckle, “No Thailand, heh.”

These instances of slipping through time highlight the challenges participants face in maintaining a coherent temporal narrative.

#### 4.3 Reflections of the Past Shaping the Present

Participants’ narratives reveal how their perceptions and experiences from the past continue to shape and influence their present-day experiences.

4.3.1 *Timeless Themes*. Participants demonstrate a deep connection to certain timeless themes, reliving experiences that reveal their unique perceptions of time and significance.

For P2 and S2, timelessness is embodied in their experiences with water and sun. They describe moments spent by or in the water as though time stands still. P2 and S2 vividly recall childhood memories of experiences near water and jumping off rocks in Spain later in life. They evoke this timelessness through sensory details such as the “scent of the sea”, the sensation of “leaping from rocks”, the feeling of “levitating while swimming”, and the experience of “unwinding while sunbathing”. These recollections are filled with a sense of stillness and calm, where time appears to stretch infinitely.

In contrast, timelessness for P5 and S5 is tied to a specific location. When asked where he wants to go, P5 immediately mentions “[Name of the theme park]”, to which S5 responds, “We go there every week!”. Despite this, P5 maintains that it doesn’t matter, underscoring his fondness for the place. This frequent visit to the theme park signifies a constant, enduring significance, offering P5 a unique kind of temporal comfort and continuity. Despite S5’s suggestion to consider other meaningful destinations, places from their past, recent enjoyable experiences, and desire to visit some museums, P5’s immediate preference for the theme park highlights how certain places can hold a special, unchanging value in one’s life.

This contrast illustrates that while P2 and S2 experience timelessness through symbolic moments related to water and sun, P5 and S5 find it in recurring visits to a cherished location. This divergence underscores how different individuals encounter moments where time feels suspended, either through symbolic experiences or through specific, meaningful places.



4.3.2 *Objects as Storytellers.* Objects often act as tangible links for all participants, serving as physical embodiments of their past experiences and connecting them with their personal histories.

For S6, travel souvenirs are cherished reminders of past journeys. When asked if they brought back souvenirs from holidays, P6 initially responds, “Well, not really”, but S6 quickly counters, “Yes yes yes for sure... under the TV there are a whole load of souvenirs that we brought home from our travels”. P6 then recalls specific items, “Yes, little things from New Zealand... Stork egg or an ostrich egg is there, [and] a kiwi”. S6 adds, “Miniature Swarovski or stuff like that too”. Reflecting on these items, P6 says, “You expect it would be nice to see them... I don’t have to worry about them that much... they’ve been there for so long and I am so used to having them there that I don’t actually see them that much anymore”. However, P6 acknowledges their sentimental value, “I like that they are beaming with memories... they are nice memories. New Zealand, the US, yeah”. Thus, these objects, while becoming a part of the background in daily life, continue to preserve and reflect cherished memories.

Artifacts also serve as tangible carriers of past moments and reminders of special people for participants. S2 illustrates this by pointing to rocks on the table brought back by their children from their first trip together to Spain. “That holiday from those rocks”, S2 says, pointing to the rocks on the table, “That only comes to mind when I think of Spain”. She emphasizes how these objects are physical links to past experiences, holding stories and emotions that persist through time.

For P2 and S2, their home and the objects offer a tangible connection to their past, reflecting the passage of time across generations. The family home, passed down through generations, and the artifacts, such as paintings, act as slow carriers of time, linking past and present experiences. These objects encapsulate family history, connecting different generations through shared stories.

Overall, these conversations reveal how objects, from family heirlooms to travel souvenirs, act as tangible links to past experiences. They carry the weight of cherished memories and connect individuals with their histories, preserving stories that may extend beyond the participants’ lifetimes.

4.3.3 *Weight of enduring Memories.* Certain memories, particularly those involving significant people or events, hold a timeless quality that continues to influence participants’ lives. P2’s reflections on his childhood friend and their adventures in the forest highlight how these moments remain vivid and cherished, even as time progresses. On multiple instances, he recalls building huts and spending time in the forest as experiences that stand still in his memory, demonstrating the enduring value of these shared moments.

Similarly, S2 reflects fondly on past family gatherings, such as Christmas with parents, describing it as “a nice time, with the whole family together”. The fact that these gatherings are no longer possible with their parents makes the memories even more precious. S2 expresses, “It is mainly memorable because we can’t do it anymore with our parents. That makes it so memorable, I remember that fondly”. These reflections underscore how past experiences with loved ones create lasting impressions that continue to shape participant’s sense of what is meaningful and irreplaceable.

In contrast, P4 reflects on a significant negative memory from the famine of [year], recounting, “A very fundamental memory is the famine from [year]... When I was 9 years old... To [location]... To see if we could get something to eat from the farmers”. P4 goes on to describe the specific event in detail. Despite the painful nature of this memory, P4 states, “It’s kind of a story... Which no longer affects my emotions... (To me) it is just a story”. This illustrates how the emotional impact of memories can diminish over time, shifting from vivid experiences to distant recollections.

Thus, whether joyous or painful, enduring memories shape participants' understanding of what is precious, meaningful, and significant in their lives. These reflections highlight the lasting impact of lived moments and the way they continue to influence individuals' perceptions of their past in the present.

#### 4.4 Exploring futures from present realities

Participants' discussions reveal a nuanced approach to the future, blending contentment with their present routines and an openness to exploring new experiences, all while navigating the challenges of dementia. The conversations also highlight how participants recognise and celebrate both small and significant achievements, and adapt to the evolving sense of self that comes with changing circumstances.

*4.4.1 Navigating familiarity and exploration.* Participants show an inclination towards either finding comfort in familiar routines or present a desire to explore existing favorites and new possibilities. This interplay between the known and the unknown reflects how they manage their present while considering the future.

For instance, when asked about her goals, P6 responds, "I wouldn't know what kind of goal, special goal I have". S6 remarks, "You have no ideas, no ideals, no goal to do (for the) upcoming week or month. Just normal. Just normal (and) nothing special." To which P6 agrees, saying, "Normal (is) what I will... what I always do. Normal. Yes. My set routine.. what I always do." This exchange highlights how dementia has shifted P6's focus from actively pursuing new experiences to simply getting through each day, adapting to changes as they arise. When S6 gently probes further, P6 acknowledges her upcoming visit to the care facility, saying, "I'm going (to the care facility). When that is I don't know. Monday I believe, isn't it?". S6 confirms, and P6 concludes, "Monday to (care facility), and then the rest of the week I'll let that come over me".

A similar sentiment emerges in a conversation between P2 and S2 about upcoming goals. They both agree that they do not have a specific goal. S2 summarises, "No, there is nothing for a goal. Just enjoy the autumn evenings, right... I think that is a good idea. No, we don't have a goal. We did everything, we're ready for the winter". This conversation underscores the couple's contentment with their current state, focusing on simple pleasures like enjoying autumn evenings rather than seeking out new experiences.

In contrast, P5 and S5 exhibit a proactive approach to life, embracing new activities. During a conversation about past visits to [location], S5 says, "We have not been there either. I don't know what we have done in [location]", prompting the researcher to suggest planning a visit the following weekend. Looking at P5, S5 enthusiastically says, "Yes, yes, we can do that... those cards (cards with a subscription for train travel and museum entry) also expire and we really need to do that", and P5 agrees saying, "Alright". Their shared willingness about the opportunity reflects their openness to new adventures. Later, a discussion about an upcoming family reunion sparks S5's memory of an invitation, and when she asks P5 if he wants to attend, he immediately agrees. As they talk about who they might see and what they might do at the event, it further highlights their proactive mindset and willingness to plan and embrace new experiences together.

These varied approaches, whether through exploring new places or embracing the mundane, demonstrate how participants and their partners navigate the future through routines and aspirations.

*4.4.2 Celebrating wins.* Participants' conversations reveal that the perception of accomplishments can vary, especially in the context of dementia. While small, everyday tasks may not always be seen as significant victories, they are still important to recognize and validate. Similarly, long-term achievements tied to personal identity provide a profound sense of fulfillment and purpose.

A conversation between S5 and P5 illustrates this variability in how accomplishments are perceived. S5 prompts P5 to reflect on a recent small victory, asking, “Yesterday we went to the musical. Was that a victory?” P5, uncertain, responds, “Yes, I don’t know that”. S5 then mentions their Christmas decorating efforts, highlighting P5’s contribution, “You helped me with carrying the boxes up and down. Was that a victory?” P5 replies, “No, actually not”, and S5 says, “Actually not, right?” This dialogue shows how everyday tasks, which might be seen as small victories by one person, may not be perceived as such by another. S5’s attempts to identify and celebrate these small achievements reflect a supportive approach, aiming to validate and appreciate P5’s contributions, even as P5 may not see them as significant. This conversation underscores the varying perceptions of what constitutes an accomplishment and the importance of recognizing and validating each other’s efforts.

A similar theme of accomplishment is explored in a conversation between P2 and S2. When prompted by S2, P2 initially struggles to identify what makes him feel proud, “No, I have nothing”, he says. However, P2 later recalls, “The renovation, I renovated”, and S2 replies, “Yes, renovating this house... that’s a very good one”. S2 further suggests crossbow shooting as another achievement, “That was something you did very well. You won prizes with it. Are you proud of that? No? Okay”. S2 is surprised and curious to which P2 responds, “(I) was busy with it for a long time”. S2 emphasizes the value of the renovation, noting, “It is a part of ourselves... Something you made out of your own hands”, highlighting the personal significance of long-term dedication. P2’s ongoing engagement in activities like arts and crafts and crossbow shooting continues to provide him with a sense of purpose and joy, illustrating how meaningful achievements are often rooted in long-term dedication and the personal connections built through them.

These conversations highlight the importance of celebrating achievements, whether small or significant, and the supportive role that partners play in fostering a positive and affirming environment.

**4.4.3 Adapting to Changing Self.** Participants with dementia reflect on the changes they experience in themselves as their condition progresses, highlighting the impact on their present and future outlooks.

Reflecting on the time when he first noticed something was wrong, P3 describes the progression of dementia, acknowledging his current state with a mix of optimism and concern, “It’s not that serious yet, but... (it is changing) quickly, and (it is) a bit unnerving”. Despite his efforts to cope, he confesses, “It really keeps me awake at night, but there is something there... That is sitting and nibbling”. However, P3 remains hopeful, stating, “Luckily it’s still small scale. And I, of course, hope... that stays like this for a while”. This dialogue illustrates his ongoing adaptation to change, the uncertainties he faces, and his attempts to find stability.

Similarly, P6 navigates the challenge of maintaining a connection with her past self as her memory fades. She notes, “Memories are starting to become less [clear]” and observes that specific details are disappearing linking it to her future, “The exact memories of the things you did there will disappear.” She further links it to losing the emotional intensity of those past experiences, remarking, “The feeling... will also disappear further”. She explains that the vividness of past experiences is diminishing, stating, “What I had then and only then had I been there. But no, that has moved on, that is all disappearing again”. Despite this, P6 retains a general sense of enjoyment and value from past experiences, “I do remember that it was all a lot of fun and a very yes, quite an experience, of course, to make such a trip”. However, she acknowledges the difficulty in fully reconnecting with those past emotions, “But to really go all the way back? I can no longer achieve that. No, that is no longer possible”.

These reflections underscore the ongoing process of adapting to change and the challenge of maintaining a vivid sense of self in the face of evolving conditions.

## 5 Discussion

The findings from the Temporal Snapshots probe offer significant insights into how people with dementia and their partners navigate temporal experiences, shedding light on the complexities of memory, identity, and time in dementia care. These insights underscore the potential of HCI to move beyond traditional linear concepts of time, creating more person-centered and meaningful interactions.

### 5.1 Bridging Temporal Boundaries

The Life Continuum Cones provides a visual representation of how people with dementia and their partners blend past, present, and future experiences into a unified narrative. This visual tool broadens the conventional linear progression of time that dominates most HCI designs. Instead of treating time as a series of isolated events, the Life Continuum Cones demonstrates how past memories, present reflections, and future anticipations are deeply interconnected in the lived experiences of individuals. This aligns with Hawkins's perspective that well-being should be viewed comprehensively, incorporating the full span of an individual's life instead of concentrating solely on isolated instances [24].

Speculative futures research is valuable not only for its methodological rigor but also for its ability to inspire novel ways of conceptualizing future scenarios [3, 5, 63]. By expanding the boundaries of what is considered possible, probable, and preferable, researchers have encouraged the HCI community to engage with future scenarios more imaginatively and critically [23]. This approach has led to a deeper understanding of how technology can be designed to meet future needs and challenges [3]. However, speculative futures research often focuses on future scenarios while neglecting the integration of past experiences. Similarly, reminiscence therapy widely used in dementia frequently emphasizes the past, overlooking future-oriented considerations [50, 65].

Participants engage with the prompts, connecting events from the past and future. These recollections span different contexts, with overlaps in social settings, location, spatial environment, activity, and emotion [58]. People reflect on artifacts as preservers, embodiments, and reminders of specific memories in their present time [61]. Objects in the house from different time-periods and belonging to different people carry stories across generations, maintaining temporal continuity. The blending of past experiences with present reflections and future anticipations enriches the shared narratives and contributes to a more integrated perception of time, where memories are not strictly confined to their original temporal context. Participants often utilize different granularities ranging from changing seasons and recurring social and cultural events to weekly activities and routines to help calibrate experiences in daily life and discussions of time. During the working years, life is governed by fast-paced, linear rhythms driven by capitalist demands, contrasting with the slower, more fluid experience of time in retirement. Participants acknowledge the shift from a high-pressure, accelerated work life to a relaxed retirement, and the changes in behavior and lifestyle they had to make. Moreover, the results indicate how participants collaboratively construct life events, often triggering each other's associations and enhancing their collective memory and understanding of each other. The social dynamics between participants play a crucial role in how memories are evoked, recalled, and discussed. This process not only preserves individual memories but also strengthens social bonds, creating a shared narrative encompassing a wider temporal spectrum.

Our results show that all associations made reflected on moments inspired by their lifetimes or across generations, even if the details were not always entirely accurate and were corrected by partners. Recollections are dynamically formed during associations, causing memories to change over time as no two recollections of the same event are identical, and forgetting occurs when reconstruction becomes impossible due to many changes [60]. Thus, what is recollected and narrated is a blend of factual events and the participant's interpretation of those moments in the present

through hypothetical thinking of past events [14]. The use of generic prompts facilitated a deeper engagement with participants' lifetimes, allowing for imagination when making associations. This is possible because the generic nature of prompts and the lack of specific details remove the need for precision, opening options for creativity and exploration [2, 25].

While the Temporal Snapshots probe largely triggered positive associations filled with joy, it also involved people and pets who were no longer alive. Despite the passage of time and inevitable changes, memories retain their emotional weight and significance. One participant vividly recalled a negative memory of the famine and the associated trauma, contrasting sharply with other happier moments. The recall and narration of painful memories are often avoided due to their visceral nature. This hints at a selective recall of moments and a natural bias in the narration of associations, with a tendency to focus on positive aspects while avoiding negative ones. Despite negative and traumatic memories being less frequently shared, they significantly impact the overall temporal experience. However, reclaiming the future involves revisiting and embracing the past, including negative events. This underscores the need for further exploration of prompts that engage with both joyful and painful moments when considering temporalities in dementia.

The prompts and questions in the Temporal Snapshots probe provide a reflective space that allows participants to not only relive past moments but also reflect on present moments and relate them to future ones. This reflective engagement was crucial in helping participants articulate and organize their thoughts, leading to the emergence of narratives of life events that have played or are playing a core part in their lives. Participants value mundane, recurring experiences in the present, with some preferring to celebrate small wins from their everyday lives. Our results show that people are more aware of the limitations dementia has imposed on them and acknowledge that their capabilities will degrade in the future, limiting activities they can do by themselves and together. When reflecting on their past, a time when they were busy yet active, and contrasting it with their present, where abundant free time is hindered by health limitations, couples cherish and consciously savor special moments in the present and upcoming events.

When studying the evolving aspects of self over time, research indicates that people with dementia can maintain a sense of identity for their past and present selves through long-term memory, episodic and semantic memory, and mental time travel, but not for their future selves [15]. However, through prompts in the Temporal Snapshots probe, participants imagine what they would like to do and reflect on what is still possible. Perceptual prediction is more beneficial than mere reaction, as it allows people to adapt flexibly and timely to new situations ahead of time, enabling successful social interaction [52]. While some couples chose to try out new experiences and used the discussion to make concrete plans, others embraced routines and familiarity when thinking of possible futures. Current approaches to reminiscence therapy may limit the understanding of temporality in dementia to a narrow time-period, focusing mainly on the past. Our results show that people can reflect on their present and envision futures. Thus, there is a need to broaden the approach of reminiscence to include speculating futures and appreciating the present, foregrounding the small joys of daily life and highlighting the perspectives and values central to people's identity. A balance of reminiscence and prospection by blending past reflections with future imaginings will help create a fuller, richer experience in the present for people with dementia and foster a stronger sense of self and well-being.

## 5.2 Limitations

The Life Continuum Cones offers a first step to bridging the existing gap in research by incorporating both reminiscence and future speculation, providing a more rounded and inclusive approach to dementia care and design. While the Life Continuum Cones extends the temporal framing for people with dementia to include vivid futures, this linear approach is still insufficient. Linearity distinguishes between past, present, and future, but temporality is not primarily

about linearity. Signs of temporality appear when participants talk about moments in the past, present, and future that go beyond linear time. It is linearity that gets disrupted in dementia and so, the linear-leading model does not fully support the relation of time or encapsulate the entire temporal experience because the experience of time is directionless. The cones offer a promising way to visualize people's lifetimes, showing that people with dementia do have futures and should not be stigmatized by imposing temporal limitations. However, to take this research forward, we need to consider "the age of atomization where there is zero direction" as Han describes when reflecting on human experiences in the fast-paced world [22]. This has deep implications for HCI research that extends beyond dementia, especially for other vulnerable groups who experience time beyond the socially accepted norm of temporality. This calls for a reevaluation of how temporal experiences are framed and understood in HCI research. Using dementia as a critical example, we illustrate the importance of moving beyond linear temporal models and propose a starting point to better capture the complex, multifaceted nature of human temporal experience.

## 6 Conclusion

In this paper, we present findings from a field study exploring how people with dementia experience time using the *Temporal Snapshots* probe. Our study contributes to the existing literature by demonstrating how engaging with subjective temporal experiences can enrich the lives of individuals with dementia. By employing image prompts and reflective questions, we facilitated meaningful interactions that blurred the boundaries between past and future, providing a deeper understanding of participants' lived experiences. The findings highlight the potential for designing assistive technologies that go beyond conventional time constructs, such as clocks and calendars. Through *Life Continuum Cones*, we propose a visual framework to unpack the subjective time of individuals that can inspire the design of personalized and intuitive interactions, ultimately enhancing the well-being of people with dementia. This study underscores the need for a pluralistic approach to time-related interactions in HCI, emphasizing the importance of integrating subjective experiences of time into the design of technological interventions. The results of this study could potentially be applied to people with other disabilities who also struggle with conventional temporal constructs in daily life. However, more research is needed to build on these exploratory findings and to further investigate how subjective temporal experiences can be used to develop more effective and empathetic assistive technologies. Future work should continue to explore the potential of temporal reflections in dementia care, involving both people with dementia and their caregivers in the design process. With this work, we aim to inspire future design research that prioritizes the subjective lived experiences of individuals, ultimately improving their quality of life and providing more comprehensive support.

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