

Watering Memory Trees

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Editor's Note: Along with the rising number of people suffering from dementia and Alzheimer's disease (due to longer life spans) come two main concerns: finding remedies and helping them live comfortable and contented lives. Our authors examine the latest research on what is called "retro environments" and "reminiscence therapy," which includes health-care communities that offer elements of nostalgia, as well as music, objects, and photographs from one's past.

The World Health Organization estimates that about 50 million people worldwide currently live with dementia, with almost 10 million new cases every year. The reason: increased longevity. In Denmark, the country where we live and work, life expectancy is 81.0 years; in the United States, where this article is published, 79.2 years. Since no known intervention can stop the brain deterioration causing the dementia, there is a growing emphasis on psychological and social interventions for managing the disease as people live longer.

Around the world, an increasing number of retro environments—nursing care facilities designed to resemble the world of earlier eras—have sprung up. Their aim is to stimulate memory and enhance well-being in people with dementia by immersing them in a setting reminiscent of everyday life in their youth. For example, [a care center in Dresden, Germany](#), has created an environment patterned on the formerly socialist East Germany when the center's inhabitants were young. In this setting, inhabitants are surrounded by once commonly-used items, which they may recognize and tell personal stories about.

Similarly, an American 1950s downtown milieu was inaugurated in August 2018 on the outskirts of San Diego, as part of a dementia nursing facility operated by [George G. Glenner Alzheimer's Family Care Centers](#). The construction consists of 24 buildings, including an old-fashioned diner, a grocery store, a petrol station, and a classic town hall, surrounding a green area. Many other places throughout the world are constructing retro environment facilities. Are there scientific reasons to believe that these and similar outdoor or indoor retro environments do in fact benefit individuals with dementia?

Autobiographical Memory Deficits

One of the first and foremost cognitive deficits in Alzheimer's disease (the most common type of dementia, accounting for 60-70 percent of all cases) is the impairment of autobiographical memory—that is, memory of one's past. Autobiographical memory is vital for functions beyond recalling personal details per se; it allows individuals to develop and maintain a sense of identity and supports daily problem-solving activities and social relationships. It is our autobiographical memory that enables us to recognize people and associate them with past experiences. Almost all social interactions in fact draw upon the ability to remember both our recent and remote past. Losing autobiographical memory is therefore debilitating in many areas of life.

Not all aspects of autobiographical memory are equally impacted by Alzheimer's disease. First, affected individuals have particular difficulty remembering so-called episodic information—that is, specific details pertaining to a particular event in the past (e.g., the day I forgot my umbrella in the music hall and only realized it when it started to rain on my way home). In contrast, so-called semantic information—that is, more factual aspects of autobiographical memory (e.g., I often go to concerts in the music hall)—may be spared.

Second, there is evidence that memory for experiences and knowledge originating earlier in life—childhood and young adulthood—is better preserved than memories from the more recent past. An individual suffering from Alzheimer's disease who has a hard time remembering what happened yesterday or last week or last year may be able to recount details of what they experienced 40 or 50 years ago. When asked to freely recall memories from their past, healthy, middle-aged and older adults also recall more memories from later childhood and early adulthood than from the surrounding periods, a phenomenon known as the reminiscence bump. But they do not exhibit impaired memory of the more recent past.

Third, individuals with Alzheimer's disease have deficits in executive functions, higher-order processes that regulate and guide thoughts and remembering. This reduces their ability to search for autobiographical memories. As a consequence, an event may still be stored in long-term memory but partly or wholly inaccessible for deliberate recollection. Such a memory may be recalled spontaneously, however, when an affected person encounters something strongly associated with it. Spontaneous (aka “involuntary”) memories of past events may be activated in response to concrete sensory impressions, such as odors, pieces of music, locations, or objects. For example, a visit to a specific location may spontaneously trigger memories of an earlier visit to the same place.

Brain imaging research with healthy individuals has shown that spontaneous memories involve less activity in the prefrontal brain areas associated with deliberate memory retrieval. Experimental studies measuring reaction time have shown that they are retrieved more quickly. Both lines of evidence suggest that they represent a less effortful way of recovering personal memories.

Because of executive deficits, then, individuals with dementia are more reliant on features of the environment to stimulate their memories. So, to optimize their ability to remember, their environment should match the period from which more memories are preserved—that is, the time of their youth. This reasoning would suggest that the care center environment in Dresden, Germany, the San Diego-based 1950s downtown nursing home milieu, and similar retro environments are on the right track. By turning back the hands of time, they have created settings that match the inhabitants' preserved memories and knowledge, which—in theory at least—is likely to increase their ability to recall and communicate.

In other words, such environments may be regarded as ways of compensating for the lack of memories from the more recent past. As such, they restore a vital psychological connection between memory and knowledge and the external environment—a relation healthy individuals take for granted.

Although theoretically credible, it is important to remember that there is little scientific evidence that such retro environments are, in fact, associated with improved quality of life and increased cognitive and communicative abilities, when compared to more conventional nursing home settings. The question, to the best of our knowledge, has not been studied. The nearest approach to the issue is research examining the effects of reminiscence activities in individuals with dementia, to which we now turn.

Effects of Reminiscence Interventions

In healthcare settings, a variety of activities, often labelled “reminiscence therapies,” aim to stimulate personal memories. The idea behind them, that remembering one's past can have therapeutic benefits, was introduced in the 1960s by the psychiatrist Robert Butler, who proposed that reviewing one's personal past was a means to attaining integrity in old age.

Today, there is no shared definition of reminiscence and there is a wealth of different kinds of reminiscence therapies, some group-oriented, and others that work with the individual. In group-based reminiscence therapy, conversations about the past take place in social settings, facilitated by professional caregivers. Individual therapy, on the other hand, typically aims at reconstructing that person's unique life course, which may involve collaborating to develop a

personal time line in which key events, locations, and significant others are organized into a life story.

Both group-based and individual-based reminiscence may use memory prompts, such as photographs, letters, objects, or music, to stimulate remembering. Despite some promising findings, research on the effects of reminiscence activities, when viewed as a whole, has had mixed results, according to a recent [Cochrane review](#), which concluded:

“...the effects of RT [reminiscence therapy] vary, depending on the way it is given and whether it takes place in care homes or the community. However, there is some evidence that RT can improve quality of life, cognition, communication, and possibly mood in people with dementia in some circumstances ... More research is needed to understand these differences and to find out who is likely to benefit most from what type of RT”.

Even these mixed findings have limited relevance to the potential benefits of retro environments. This is because most studies of reminiscence therapy have used a longitudinal design akin to the Randomized Control Trials (RCTs) applied to medical interventions. A typical such study would randomly assign individuals with dementia either to 5-10 weekly sessions of reminiscence therapy or to a control condition of usual care during the same period. After the intervention period, outcome variables (such as well-being) would be measured in both groups compared with their measures at baseline. If the intervention worked, more improvement would be seen in the intervention group than the control group.

This methodology is highly relevant if the interest is in examining lasting effects of reminiscence therapy. But it has serious shortcomings if the goal is evaluating results in the “here and now” of the intervention, because such immediate effects typically are not measured. In trying to capture lasting effects, in other words, standard RCTs may overlook potential immediate benefits of reminiscence activities, or of being in a retro environment.

The few studies designed to examine immediate effects have, for the most part, shown positive outcomes. Some of these have taken advantage of museum settings in which highly skilled curators have meticulously recreated realistic everyday environments associated with specific

time periods. Recently, five open-air museums in Sweden, Norway, Denmark, Hungary, and the United Kingdom (UK) collaborated on a [large-scale study](#) to examine the immediate benefits of reminiscence activities conducted in their settings. They collaborated with researchers from Newcastle University in the UK, Linnaeus University in Sweden, and Aarhus University in Denmark.

In the five museums, 129 people with dementia participated in immersive reminiscence sessions together with 75 professional or family caregivers. All sessions took place in small groups. Immediately after each reminiscence session was over, the caregivers filled out a questionnaire detailing their observations. The results were promising. Across the museums, the caregivers indicated that during the session individuals with dementia showed more sustained attention, more interest, and more positive affect compared to their usual response. Qualitative statements obtained from some of the patients supported these observations: "I think it's amazing. Lovely. It has to make you happy; when you see it, it's fun."

Although the validity of such observations is debatable, due to possible biases in the reports from both caregivers and patients and the lack of control conditions, they do agree with objective assessments from more rigorous studies. Our group conducted a study in collaboration with Den Gamle By [The Old Town], the national open-air museum of urban history and culture in Aarhus, Denmark. Here, 12 older participants with dementia conversed (Mini-Mental State Exam: $M = 20.58$; $SD = 3.09$) in either a modern, everyday setting at a nursing center (control condition) or a museum setting furnished in early 20th century style (reminiscence condition) while being presented with condition-matched object cues.

For example, in the museum setting, participants passed an old-fashioned telephone around, while in the modern setting, they handled a modern cell phone. In the museum setting, the participants were served cookies baked according to a period recipe and coffee from an old-fashioned pot, whereas in the modern setting, they had modern chocolate chip cookies and drank coffee from a thermos. In both settings, the conversations were audio-recorded and transcribed, and coded by independent judges using standardized coding schemes. The results showed that participants spoke more about their personal memories in the museum setting, and these memories were more elaborated, more spontaneous, and more detailed, compared to memories discussed in the modern condition.

In another [study](#) from our group, we tested 49 older adults diagnosed with Alzheimer's disease (MMSE: $M = 19.88$; $SD = 4.07$) and 50 healthy age-matched control participants to determine whether everyday objects dating from the participants' youth in the 1950s (e.g., a milk bottle), or verbal cues (i.e., the words referring to the objects, e.g., the word "milk bottle") more efficiently gave access to autobiographical memories. We found that both groups recalled significantly more when cued by objects, and the advantage was significantly larger in the Alzheimer's disease group. In both groups, memory descriptions were longer and significantly more episodic in nature in response to object-cued recall.

In addition, in a different study, we have [shown](#) that after five weekly sessions of total immersion in a 1950s museum environment, 22 older adults with Alzheimer's disease (MMSE: $M = 20.77$; $SD = 4.52$) demonstrated improved subsequent autobiographical memory when asked to retrieve personal memories in response to old everyday objects a few days after the intervention period had ended. Their performance was improved relative to a control group of 21 Alzheimer's disease patients (MMSE: $M = 19.24$; $SD = 4.52$), who had received standard care during the same period. Other studies conducted in different labs have shown that music cues are effective in eliciting autobiographical memories, and that experimental manipulations to induce nostalgia can enhance well-being generally in adults, including those with dementia.

We conclude that the effects of retro environments constructed to stimulate memory and well-being in older adults with dementia are consistent with evidence that memories and knowledge from earlier periods of life (childhood and young adulthood) are better preserved in these individuals than memories of experiences they have had later in life, and that evoking such early memories can improve well-being and cognitive and communicative skills, at least transiently. Thus far, however, evidence for the effects of retro environments is indirect, and systematic studies comparing retro environments with conventional caring environments are needed.

The gaps notwithstanding, one take-home message from the research conducted so far is clear: autobiographical memory performance in dementia is not static. For individuals with dementia as for others, the dynamic interplay between cues in the immediate environment and knowledge stored in the brain largely determines what we remember. Consequently, adjusting the environment to fit affected Individuals' residual memories and knowledge seems a

promising strategy. Not only may this support such individuals' sense of personal identity by providing easier access to memories of their personal past, it may also support a sense of social and collective identity by bringing to the foreground the history and life conditions they have shared with their peers.

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Bios

Dorthe Berntsen, Ph.D., is a professor of psychology at Aarhus University, Denmark. Her major research interest is autobiographical memory, which she studies in healthy cognition, in relation to mental disorders, and developmentally across the life span. She has pioneered and written extensively on research about involuntary (spontaneous) autobiographical memories. She is the leader of Center on Autobiographical Memory Research funded by the Danish National Research Foundation, hosting about 30 autobiographical memory researchers from different parts of the world.

Marie Kirk, Ph.D., is a postdoc at the Department of Psychology and Behavioral Sciences at Aarhus University, Denmark. She holds a master of cognitive neuroscience from University of York and a master of psychology from Aarhus University, where she also obtained her Ph.D. As a psychologist and cognitive scientist, she investigates the cognitive mechanisms of autobiographical remembering, and is particularly interested in understanding how dementia compromises the ability to remember one's personal past. A key focus for her research is examining how we may ease access to and stimulate these memories in dementia despite impaired cognitive abilities.