How nursing home residents respond to the interactive art installation 'Morgendauw': A pilot study

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Abstract

This paper reports the responses of nursing home residents who live in a psychogeriatric ward to the abstract interactive art installation 'Morgendauw', which was specifically designed for this study. All stakeholders were involved in designing and implementing Morgendauw. The artwork seems able to evoke responses in both the residents and their caregivers, but the amount and duration of the responses observed during the study were limited. 15 interactions over the course of 14 h were noted and almost all of them were initiated by the nursing home staff, physiotherapy students or visitors (n = 12). Interactions lasted for about 3 min on average. Although the nursing home residents initially did not seem to notice the artwork, the threshold of acknowledging and approaching the artwork was quickly overcome when staff nudged or directed the residents' attention towards the artwork. Beyond this point, nursing home residents generally needed little explanation of the interface to interact with the artwork. The location in which Morgendauw was placed during the study or the characteristics of the installation seemed to create a threshold. Further research should focus on the importance and the effects of context when designing and implementing an interactive art installation in a nursing home environment.

Keywords: dementia, interactive art, responses, elderly care, experience

Introduction

When art is present in the living environment of people who live with cognitive problems, it can have beneficial effects. A review by Daykin et al. compared 600 papers and found art can reduce anxiety and depression in people who reside in mental health care (Daykin et al. 2008). Graham et al. describe that people who live with Alzheimer's Disease still have aesthetic judgement, although their condition causes cognitive disruption in most other respects (Graham, Stockinger, and Leder 2013). This research was paraphrased by graphic Designer Stefan Sagmeister as follows: 'Even when we lose our mind, we can still recognise beauty' (Sagmeister 2016). A recent programme by MOMA New York, shows that art in a museum context positively changes the mood of both the persons with dementia and their caregivers (Rosenberg 2009).

Interactive art

An increasingly popular form of art that engages a combination of senses and reveals its aesthetics through interacting with it is called 'interactive art'. These types of artworks aim to provide an immersive experience that relies on intuition, curiosity and playfulness, rather than cognition.

One way to define interactive art is to oppose it to non-interactive art. An example of non-interactive art is a painting. When a painting is created, the artist is in complete control of the process. He or she lays every brush stroke and decides when the work is finished. Afterwards, a viewer can interpret it by looking at it from a distance.

In contrast, interactive art transforms a passive viewer into an active participant. Not only does the viewer become part of the artwork, but he/she has a role in the final outcome. Every interaction with an interactive artwork produces a different result. It makes the experience personal and catered to individual abilities. No prior knowledge is needed.

Because of the characteristics of interactive artworks, they seem to have potential to provide nursing home residents with a meaningful experience. Examples of interactive art include 'Water Light Graffiti' by Antonin Fourneau (Fourneau 2013) (Figure 1(A)), Audience by Random International (Random-International 2008) (Figure 1(B)) or Scattered Light by Jim Campbell (Campbell 2011) (Figure 1(C)).

Figure 1. Examples of interactive art

Abstract interactive art in elderly care

Just placing an existing interactive artwork in a nursing home residence, without taking the specific cognitive and physical conditions of the people living there into account, would be ill-considered. Previous studies have observed the responses of nursing home residents while interacting with interactive artworks that were explicitly designed with and for nursing home residents (Luyten, Braun, van Hooren, et al. 2018; Luyten, Braun, Jamin, et al. 2018). These artworks (VENSTER, Figure 2(A), CRDL Figure 2(B)) translated reminiscence therapy and expressive and therapeutic touch therapy into an interactive environment and object respectively. The results show that these types of artworks evoke responses in nursing home residents and provide (informal) caregivers with new, exciting ways to engage their residents.

Abstract forms of interactive art have yet to be studied in the nursing home environment. Abstract multi-sensory experiences, such as provided by multi-sensory rooms, and therapy have shown to increase social behaviour, counteract boredom, increase alertness and improve sleep quality in people with dementia (Baker et al. 2001; Sánchez, Ana Maseda et al. 2016; Sánchez, Marante-Moar, et al. 2016; Sánchez et al. 2013; Todder, Levartovsky, and Dwolatzky 2016). An abstract interactive art installation might provide a similar experience without the need for a dedicated room, a fixed timeslot or the need for a professional caregiver to be present.

Figure 2. The interactive artworks Venster and CRDL

Morgendauw

Morgendauw ('Morning Dew' in English) (Figure 3) is an abstract, interactive artwork. It draws inspiration from multi-sensory rooms and experiences. The artwork was designed to provide short, meaningful interactions to escape the routine of daily life and promote introspection.

Physically, Morgendauw is a black, table-like installation, shaped like the silhouette of a larger-than-life oak leaf. The surface of the leaf consists of touch-reactive LED panels.

Morgendauw shows a constant stream of coloured particles, which resemble a stream of water flowing downhill. The colour, direction and velocity of the particles are influenced by the current weather conditions in one of five pre-programmed cities (Eindhoven, Quebec, Spitsbergen, Tokyo and Kaapstad). Every five minutes a different city is automatically selected.

When the surface of Morgendauw is touched, or an object (e.g. stone) is placed on it, the stream of particles will react and find a way around the hand or object. This results in a change of composition and a distortion in the particle system that will try to find a new balance. This choreography of light is augmented with an ambient soundtrack and subtle nature sounds.

The appearance and interactions of Morgendauw were developed in cocreation with people who work closely with the residents of the nursing home (managers, activity supervisors and caregivers) as early as the initial concept and iterated and tested in dialogue with these stakeholders and the residents themselves (Luyten et al. 2017a).

In this study we investigated how nursing home residents responded to the abstract interactive art installation 'Morgendauw', which was specifically designed for the study.

Figure 3. The interactive installation Morgendauw

Methods

This study was set up and carried out as an explorative observational study. It took place at a nursing home facility in the south of the Netherlands. The installation was located at an indoor public square, where an open and a closed ward intersect. Both facilities house people who suffer from psychogeriatric disorders, often combined with physical limitations.

Design

The installation was observed for two days, from 10 AM to 5 PM in a semipublic square (Figure 4). The square was semi-public because it was freely accessible by caregivers, visitors and residents from other wards at any time. Residents of the closed ward, however, were unable to enter the square without guidance. Morgendauw (Figure 4(A)) was turned on, its soundscape audible when passing by and five 3 D printed rocks were scattered on the surface.

The researcher was seated outside direct view at a nearby table (Figure 4(B)). A single wide-view video camera (Figure 4(C)) captured the participants' responses, which allowed repeated display afterwards.

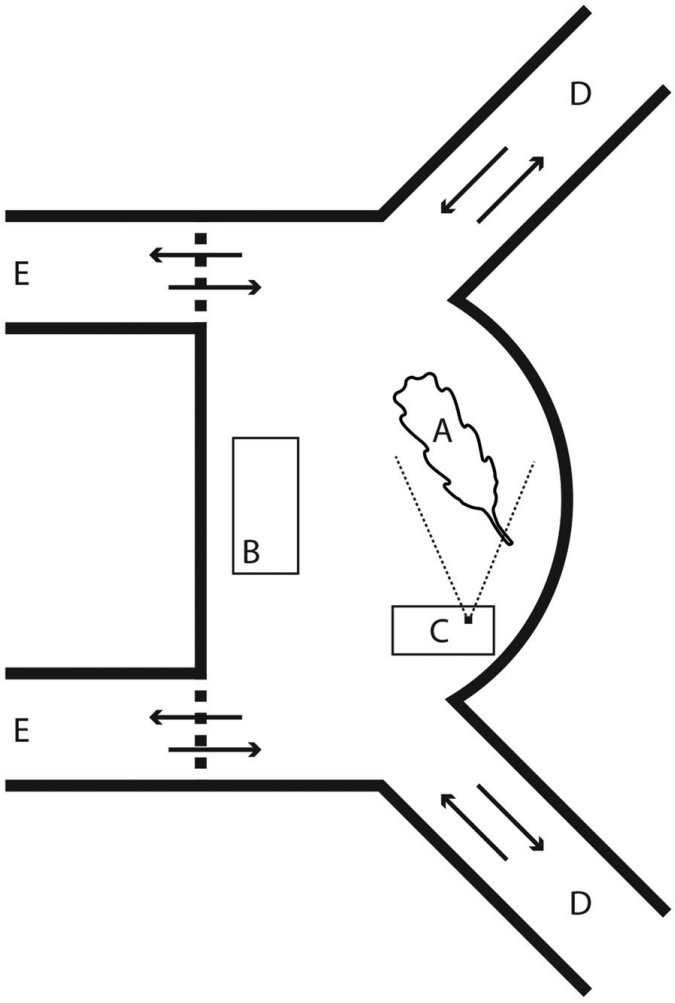

Figure 4. Overview of the location, position of Morgendauw, the camera and surroundings. A: the interactive installation Morgendauw, B: position of the researcher, C: position and viewing angle of the camera, D: hallways of the open ward, E: hallways of the closed ward (doors secured by a numeral code)

Ethical considerations

The research protocol was approved by the local ethics committee (METC Atrium, Orbis, Zuyd; 14-N-100). The ethical committee approved the spontaneous way participants were selected and included. No actual consent form was completed and this was given an exempt status. All residents, their legal representatives, the professional caregivers and physiotherapy students doing an internship were informed about the upcoming study through an information letter, two weeks before to the study. They could refuse participation up to and during the study.

Study population

During the time of the study, 22 residents were living in the open ward, another 22 in the closed ward, all of whom were unable to live independently due to a combination of cognitive and physical problems. No prior selection of participants was made. Participants were included in the study as soon as they expressed interest in Morgendauw by approaching or touching the installation during the days this study was carried out.

Data collection

A researcher (TL) was present during each observation. The observer kept his involvement to a minimum. He only interfered when addressed directly by someone to answer questions regarding the installation. Field notes were taken to complement the recordings. Every time a resident, visitor or caregiver expressed interest in Morgendauw by approaching it, touching it or discussing it from a distance, a recording was remotely started. The recording was ended when the person in question stopped interacting with Morgendauw and left. The moment from start to finish is referred to in this article as an 'interaction'. An interaction is a combination of many responses.

Data analysis

All recorded visible and audible responses were transcribed and coded. When the coding of a response was unclear, two other researchers could be consulted (SB, SvH) to reach consensus.

The framework, based on the results of a literature review on 'Participant Responses to Physical, Open-ended Interactive Digital Artworks' (Luyten et al. 2017) (Figure 5), distinguishes between human-human and human-artwork responses, divided further into verbal, physical and cognitive/emotional responses. Cognitive/emotional responses were not noted in this study. Interpretation of facial expressions or body language of the participants concerning

emotions or cognitive processes is unreliable due to the complexity of some of the residents' cognitive condition and the absence of the voice of the residents themselves. All coded responses were organised in mind maps, using MindJet MindManager © to provide a general overview.

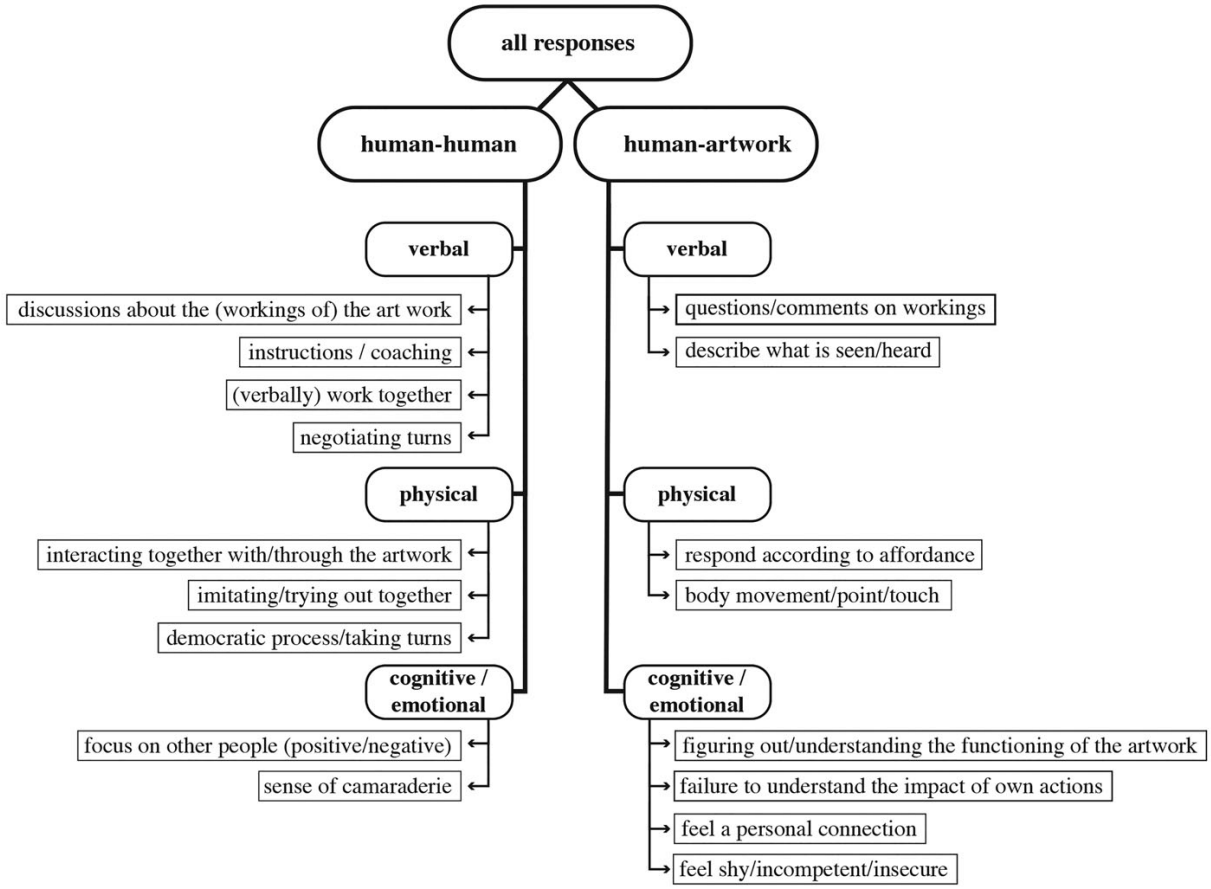

Figure 5. An overview of the coding framework

Coding of responses

When only one person was involved, and his/her response was directed towards Morgendauw, the response was coded as 'human-artwork'. Responses in which two or more people were involved and their responses were directed towards each other were coded as 'human-human'. When people simultaneously directed a response towards Morgendauw and each other, it was coded as both human-human and human-artwork.

All understandable verbal feedback, either directed towards Morgendauw or to another person while interacting with Morgendauw, was categorised as 'verbal responses'. The same accounts for all distinguishable physical actions/responses. Responses were also placed into one or more corresponding categories of the framework, or got the label 'open' if they did not fit an existing category. By clustering similar responses, sub-categories emerged which are specific to Morgendauw. For example, the category respond according to affordance holds the subcategories move rock on Morgendauw and pick up/ place rock on Morgendauw.

All actions unrelated to the installation were coded as 'not important to this study' and disregarded (e.g. conversation about the upcoming concert).

For each response, an identifier in the form of a letter was added to mark the persons role (e.g.: student, caregiver, resident); when two or more people were involved, the identifier of the initiator was put first. If a person displayed two or more types of response at the same time, the response was recorded in all corresponding categories (see Supplementary Material 1).

Results

After sending the information letters, no rejection to participate was received. 14 h of observation, spread over two days, resulted in 42 min of recorded responses. 15 interactions took place, involving 23 people (10 residents, three physiotherapy students, four caregivers, one manager, four visitors and one researcher). The average duration of an interaction was 3:18 min. The shortest interaction lasted 21 s, the longest was 8:44 min long. In total, 333 responses were recorded (100%).

The data is presented in Tables 1–3, showing absolute numbers. Categories and subcategories are arranged in descending order from most to least occurrence. Two numbers between brackets respectively show the number of responses initiated by professional (a caregiver, manager, physiotherapy student or researcher) and the number of responses initiated by a resident.

Table 1. An overview of all responses

All responses	**Human-artwork**	**Physical**
333 (168,165)	199 (72,127)	198 (72,126)
	Human-human	**Verbal**
	134 (96,38)	1(0,1)
		Verbal
		111 (82,29)
		Physical
		23 (14,9)

A general overview of all responses (Table 1) shows that human-artwork responses make up for 60% (n = 199) of all recorded responses. All but one response was physical of nature and most of the human-artwork responses were directed towards Morgendauw by a resident (n = 127). Human-human responses amount for 40% (n = 134) of all responses and most of them are initiated by professionals (caregivers, physiotherapy students, managers or a researcher) (n = 96). They are predominantly verbal of nature (n = 111), while physical responses amount for 17% of all human-human responses (n = 23).

Human-artwork responses

Physical responses

All human-artwork responses are presented in Table 2. Most of the physical human-artwork responses involved the 3 D printed rocks that were present on the surface of Morgendauw (n = 108). People responded according to the affordances (n = 108) of a rock in a stream of water: they moved (n = 45), touched (n = 10), flicked (n = 16), picked up and placed (n = 29) the 3 D printed rocks on the surface, thereby blocking and altering the particle flow or touched/caressed the surface of Morgendauw itself (n = 8). Most of these responses were carried out by residents (n = 60), largely verbally initiated and/or encouraged by a physiotherapy student or caregiver (n = 48).

The open sub-category (n = 57) mostly comprised residents looking at the flow of particles on Morgendauw with focus (n = 50). The mesmerising characteristic of the particles flowing down and arranging themselves around the rocks seemed to fascinate. Four residents directed a smile directly towards Morgendauw while interacting. Lastly the instruction sheet was read five times by visitors and physiotherapy students and Morgendauw was raised or lowered by physiotherapy students on three occasions to accommodate residents.

In the sub-category Body movement/point/touch residents got rolled towards Morgendauw by a physiotherapy student or caregiver (n = 8) or visitors and residents approached Morgendauw themselves (n = 6). Physiotherapy students or caregivers gestured from a distance (n = 6), explaining something or encouraging someone else. One resident tapped on Morgendauw as if it were a tablet.

Table 2. Human-artwork responses divided in verbal and physical responses and further categorised in main and sub-categories

	Type	Category	Sub-category
Human-artwork responses 199 (72,127)	**Physical** 198 (72,126)	**Respond according to affordance** 108 (48,60)	Move rock on Morgendauw 45 (22,23)
			Pick up/place rock on Morgendauw 29 (19,10)
			Flick rock on Morgendauw forward 16 (0,16)
			Touch rock on Morgendauw 10 (3,7)
			Touch/caress Morgendauw surface 8 (4,4)
		Open 69 (14,55)	Look at Morgendauw with focus 57 (7,50)
			Read instruction sheet 5 (4,1)
			Smile/expression of joy 4 (0,4)
			Lower/raise Morgendauw 3 (3,0)
		Body movement/point/touch 21 (10,11)	Walk/roll towards Morgendauw 14 (6,8)
			Point/gesture from distance 6 (4,2)
			Tap surface 1 (0,1)
	Verbal 1	**Describe what is seen** 1 (0,1)	Counting knobs on bottom of rock 1 (0,1)
		Questions/comments on workings 0	
		Open 0	

Verbal responses
Only one verbal response towards Morgendauw was recorded. It involved a resident counting the cushioning feet on the bottom of one of the 3 D printed rocks aloud.

Human-human responses

Verbal responses
All human-human responses are presented in Table 3. The larger part of all human-human responses were recorded in the verbal category (*n* = 111). The most prominent sub-category consisted of asking for instructions or providing instructions (n = 59). Almost all encouragement was given by physiotherapy
students and caregivers (n = 40), while residents were mostly the ones asking for instructions (n = 16).

The sub-category on discussions about the (workings of) the work accounts for 45 of all human-human responses. Residents and personnel equally comment on the function and concept of Morgendauw (n = 25) and ask or provide each other with opinions about it (n = 10). Other sub-categories show some people commenting on the music (n = 3), on the visuals (n = 2) and one instance of someone commenting on the warmth of the Morgendauw surface (n = 1). Finally, physiotherapy students and caregivers asked residents to remember something connected to the Morgendauw experience (e.g. playing a game of shuffleboard with the rocks) and one resident mentioned the water reminds him to go to the toilet.

Other verbal human-human responses included residents asking for clarity and asking to stop (n = 3), or expressing their wonder (n = 3). Only one instance of residents and personnel verbally working together was noted (n = 1).

Physical responses
Most physical human-human responses consist of imitating someone else, or trying out Morgendauw together (n = 15): Physiotherapy students, caregivers, and one resident provide example movements and interactions (n = 10), others mimic those movements. Three caregivers and two residents look at another person while they are interacting, supposedly to learn (n = 5). Interacting with and through the artwork is made up of four people smiling at each other or making non-verbal contact (n = 4), equally initiated by personnel and residents.

In three instances a stone was handed to another person, all initiated by caregivers or physiotherapy students (n = 3) and lastly one resident looked amazed towards personnel (n = 1).

Discussion

The aim of the study was to investigate how nursing home residents respond to the abstract interactive art installation Morgendauw. The interactive artwork draws inspiration from multi-sensory rooms and therapy and presents a similar experience, without the limitation of a set time and place and the need of a professional to guide the resident. It was developed in cocreation with all stakeholders in the nursing home and thoroughly tested with nursing home residents.

Overall, residents did not seem to notice Morgendauw. Although the soundscape should have been audible for most people while passing the installation and a constant stream of moving particles was clearly visible, residents as well as staff largely ignored the installation when passing it during their daily routine. Only 15 interactions over the course of 14 h were noted and almost all of them were initiated by someone of the nursing home staff, physiotherapy students or visitors (n = 12). Interactions lasted for about 3 min on average.

The one resident who did engage herself on three occasions appeared in a good cognitive state.

When prompted and/or directed, the initial threshold of noticing and approaching the installation was quickly overcome. Beyond this point, residents in general needed little explanation of the interface. The visuals seemed mesmerising and resulted in a concentrated gaze upon the installation. The physical rocks placed in the abstract water were moved around and the effects it had on the particle system were observed.

The location in which Morgendauw was placed during the study seemed to create a threshold to notice and/or engage with the artwork. It appears that an interactive artwork simply put in a space is ignored by residents with psychogeriatric complaints if the staff does not draw attention to it.

When we compare the way residents and staff initially (did not) respond to Morgendauw with responses we saw when residents interacted with VENSTER (Luyten, Braun, van Hooren, et al. 2018) or compare them with responses noted during the MOMA programme for people who live with dementia (Rosenberg 2009), it looks like expectations and mental models of the residents need to match with the physical context. In the case of VENSTER, the context was intuitively correct: A (digital) window was placed on an existing wall. This immediately resonated with the existing mental models and expectations of residents and staff about their environment. When we look at the programme of MOMA for people who live with dementia, the physical context is also matched these expectations. People enter an actual museum and are prepped and guided by a tour guide. This puts them in a mental state ready to perceive everything in this context as works of art. In contrast, Morgendauw was placed at a location that was primarily associated with quickly passing and providing daily care. The presence of an abstract work of art in this context was therefore not noticed or interpreted as such and initially largely ignored.

Additionally, the characteristics of the artworks and the general appearance of it might also have communicated wrongly that the artwork was not meant to be touched. Artworks in general are not meant to be touched or interacted with and Morgendauw might have failed to communicate that in this case it was allowed. These results show the importance of context and the relation it has with interaction and perception. From earlier studies we know that an abstract interactive artwork could work in a nursing home environment (Luyten, Braun, van Hooren, et al. 2018). Further research should focus on the importance and the effects of context when designing and implementing an (abstract) interactive art installation in a nursing home environment.

Study limitations

The limited timeframe of the observations (2 days) and the variable availability of staff and residents may have influenced the amount of the recorded responses. Because of the observation method used (video observation) and the inability of the residents to reflect on their own behaviour, no cognitive/ emotional responses were recorded. The duration of individual responses was not measured and the duration of the interaction as a whole was not taken into account when presenting the total number of responses. This might have distorted some results. When someone looked at Morgendauw with focus for instance, this was counted once, regardless of the time that this stare held.

If a resident carried out two or more responses at the same time, these were coded in all corresponding categories. This influenced the total number of responses recorded, possibly over-recording some responses.

Implications for practice

Based on the results of this study, the sounds and visuals of Morgendauw seem to be mesmerising and promote a moment of interaction. The installation can be used and enjoyed without the need to understand what's going on exactly, much like a multi-sensory room. The interface of Morgendauw is easily understood when shortly explained and/or demonstrated by staff.

When Morgendauw is to be used in daily care, it is crucial that all staff and preferably also visitors are informed about the use and possibilities of the artwork. This study shows that autonomous use of Morgendauw is impossible for most nursing home residents. Some nudging and encouragement to interact is needed. If staff, caregivers or visitors who are guiding a nursing home resident are crucial to the engagement with an interactive artwork, then the extent to which they understand how and when to use the artwork in daily practice is directly linked to the quality of the experience.

Future research and experimentation are needed to understand the exact role of the physical context, artwork characteristics and appearance in creating a threshold to engage with abstract interactive art in the nursing home. A future study should experiment with and study the effects of bringing the museum-context into the nursing home environment as well as provide a multitude of diverse interactive artworks to learn about the differences in responses with regard to the characteristics of varying interactive artworks. Data aggregation could be automated to identify larger trends. By counting the amount of times and duration artworks are being used over time, it can be identified what type of artworks are more successful in this context. Lastly, exploration on which methods could be used to measure the experience of nursing home residents with regard to interactive artworks is needed. The personal experiences of the residents would be the most valuable research outcome.

Conclusion

It appears that an interactive artwork simply put in a space is completely ignored by residents with psychogeriatric complaints if the staff does not draw attention to it. When residents were invited and nudged towards Morgendauw, they expressed interest, understood the interface and interacted with the artwork. However, the installation itself failed to entice nursing home residents to interact.

In order to successfully implement an (abstract) interactive artwork in the nursing home environment, it looks like the expectations and mental models of the residents need to match the physical context. This means the artwork should be adapted to the context or vice versa. More experimentation and research are needed to determine the 'sweet spots'.

Staff, caregivers or visitors are crucial to the engagement with an interactive artwork. Therefore, the extent to which they understand how and when to use the artwork in daily practice is directly linked to the quality of the experience.

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Disclosure statement

No potential conflict of interest was reported by the author.

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