

Capability to Paint and Alzheimer's Disease: Relationship to Disease Stages and Instructions

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Abstract

Although quite many qualitative studies on painting in Alzheimer's disease (AD) have been conducted, there is a lack of quantitative studies, examining the ability to paint in people with AD in relation to disease stages, and to what extent instructions are associated with actual performance. The present study aimed at investigating the capability to paint among nonartist AD participants ($N = 17$) in an instructed painting condition versus a noninstructed painting condition. Differences in time spent and area of canvas used in the two painting conditions were assessed and related to scores on the Mini Mental State Examination (MMSE) and the Clock Test. Number of colors used and color preferences were also assessed. A within-subjects experimental design was used. Analyses revealed a statistically significant difference between time and area used in the two painting conditions, where both time and area were used more in the noninstructed condition. MMSE scores and scores on the Clock Test correlated significantly with time spent in both conditions. Higher scores predicted longer painting sessions. Mean number of colors used was 5. Color preferences were bright colors in general and green in particular. Possible artistic development was noted. The overall conclusion is that people with AD have a preserved capability to paint, with and without instructions, even those in the later stages of the disease. The results also indicate that an artistic development is possible and that painting can be used as an appreciated and beneficial activity for people with AD.

Keywords

Alzheimer's disease, art, painting, visuospatial, cognition, MMSE, instructions

Introduction

Alzheimer's disease (AD) is a universal and growing health problem. It is a degenerative disease that destroys brain cells and causes cognitive decline and loss of bodily functions. It has detrimental effects on individuals' everyday lives, as it slowly and painfully takes away a person's identity and abilities (Alzheimer's Association, 2014). More than 46 million people live with dementia worldwide (World Alzheimer Report, 2015), and AD is the most common type of dementia and accounts for an estimated 60% to 80% of cases (Alzheimer's Association, 2014). In general, people with AD receive an insufficient level of stimulating daily activities, and there exists an inappropriate use of antipsychotics to treat the behavioral and psychological symptoms of the disease (Barr, Riolacci-Dhoyen, Galbraith, & Leperre-Desplanques, 2012). The most frequent unmet needs reported by people with dementia concern the areas of daytime activities, company, and psychological distress (Miranda-Castillo, Woods, & Orrell, 2013). In the absence of near-future prospects for a cure for AD, treatments that improve neuropsychiatric symptoms and quality of life are much needed (Chancellor, Duncan, & Chetterjee, 2014), and art might be a

basis for a nonpharmacological complementary treatment (Hannemann, 2006). Severe deficits in visuospatial function normally occur later in the sequence of deficits associated with AD (Chancellor et al., 2014). Some studies have found that the visuospatial deficits in AD create difficulties with discriminating form, contrasts, and colors (Quental, Brucki, & Bueno, 2013), and that AD patients suffer more from color vision deficiencies than controls (Pache et al., 2003). The visuospatial deficits in AD have been found to lead to less precision and attention to spatial relationships (Miller & Hou, 2004). However, other studies have shown that AD patients do not show any impairment relative to healthy controls, concerning color discrimination (Rankin et al., 2007). In nonartist AD afflicted people, the ability to paint generally decreases with the progress of the disease (Palmiero, Giacomo, & Passafiume, 2012), but people with AD can still

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produce art by using their remaining strengths, such as colors or composition instead of shapes or realism (Cummings, Miller, Christensen, & Cherry, 2008; Miller & Hou, 2004). There are examples of talented artists with AD with the preservation of creativity until very late in the course of the disease (Fornazzari, 2005). With appropriate structure, people with AD can both produce and appreciate visual art (Chancellor et al., 2014), and there is a positive therapeutic value in encouraging people with AD to pursue an activity in which they can improve (Miller & Hou, 2004). Art and cultural programs, specifically participatory-based arts, provide opportunities to enhance the quality of life of those living with AD. Compared with group interactions and a guided art discussion, AD participants in one study rated art making as the activity they enjoyed the most (Flatt et al., 2015). In another study, where art therapy was compared with calculation training in patients with mild AD, significant improvement in the quality of life was observed in the art therapy group compared with the calculation-training group (Hattori, Hattori, Hokao, Mizushima, & Mase, 2011). In an artistic education workshop, AD participants' satisfaction and reinforced feelings of capacity were observed (Ullán et al., 2013). There are also indications of the potentially positive impact of art-making activities on verbal fluency and the stimulation of lifetime memories (Young, Tischler, Hulbert, & Camic, 2015). People with AD gain substantial help from color cues, and color should be taken into account when designing health care environments, as, for instance, orientational aid (Wijk & Sivik, 1995). A literature search on PubMed was done using different combinations of the following keywords: Alzheimer's disease, dementia, visuospatial memory, art, painting, creativity, MMSE, instructions. It revealed that, although quite many qualitative studies on painting and AD and related dementias have been conducted, there is still a lack of quantitative studies on the subject. There is also a shortage of studies exploring painting capability in relation to disease stages, and of studies examining possible progress in painting capability in people with AD. No study was found that examined how the ability to paint is related to level of instructions in painting conditions, despite it possibly being an interesting way of conducting an experiment on the nature of AD patients' artistic abilities. The present study was designed to examine the capability to paint in AD patients in two different painting conditions, one with instructions and one without instructions. Time spent and area of the canvas used in each condition were measured and related to participants' scores on Mini Mental State Examination (MMSE) and the Clock Test to see how disease stage affected the painting outcomes. Given the disagreement about what color preferences and deficits AD patients might have, the opportunity was also taken to examine what color preferences the participants displayed when they had an array of colors to choose from. Qualitative notes on motifs and styles used by the participants were also taken. Further studies are imperative for gaining a better understanding of

the visuospatial memory, by itself and in relation to global cognitive functions in AD. Additional large-scale studies are needed to better assess artistic capability and potential artistic development in people with AD, and to recognize painting activities' potential beneficial effects on quality of life.

Method

Participants

In total, 17 participants (11 women and 6 men), mean age 88.5 years (youngest = 69, oldest = 100), with diagnosed AD living in special care housing or attending daytime care centers in southern Sweden were selected for the study. The mean number of participants from each individual housing and care center was 2. The participants were recruited through contact with care personnel and relatives. To be included, participants had to have a confirmed AD diagnosis. Informed consent from both participants and their relatives was required for participation. Excluded from the study were those with unclear or multiple dementia diagnosis, those with severe motoric dysfunction, and those with visual impairment. The participants scored from 9 to 23 on the MMSE: 4 with mild AD (MMSE scores 20-23), 12 with moderate AD (MMSE scores 19-11), and one with severe AD (MMSE score 9). The maximum score attainable on the MMSE is 30. No one included in the study had any prior expertise in art or painting; they were all to be considered nonartists. If the participants had encountered painting in adult life, they had typically done so through a limited amount of painting activities in care centers after they got their AD diagnoses. This was validated in most cases (12 out of 17) by relatives or other caregivers. Among the 20 participants initially drawn for the study, 17 were able to participate. The reason for nonparticipation was in all cases due to unexpected illness.

Design and Procedure

The study was based on an experimental within-subjects design, allowing registration of additional qualitative observations. The participants were initially tested on MMSE and the Clock Test, where they were asked to "draw a clock showing 3 o'clock." They were then exposed to two painting conditions: (a) painting with motif instructions given by the test leader, and, a couple of days later, (b) without any motif instructions. The participants met with the test leader individually on three occasions, within a span of 2 to 5 days ($M = 4$ days) in between. On the first occasion, they were introduced to the test leader and underwent the MMSE and the Clock Test. For those living in special care housing, the testing and the subsequent painting sessions were performed in their private rooms. For those living at home and attending daytime care centers, the study was conducted in a separate room at the care centers.

During both painting conditions, the participants received a smock to cover their clothes and then sat down next to the test leader at a table where a canvas (40 cm × 40 cm), colors on a palette, a jug with water, paper towels, and three brushes were placed. Besides the painting supplies, the table was empty. In both painting conditions, the test leader placed 11 colors (black, white, light blue, dark blue, light green, dark green, yellow, orange, red, brown, and beige) on the palette, always in the same order. The variety of colors was a decision made to avoid the extra effort of participants having to mix colors. Participants were told that they could clean the brushes in the jug of water and dry them with the paper towels when changing colors if they desired. They were also told that if they, in spite of the number of colors available, wanted any other nuance, the test leader would mix it together. A few participants found the palette to be insufficient (the additional colors asked for were pink, purple, and gray). Three size brushes, small, medium, and large bristle, were presented, and the participants were told that they could use any or all of them.

During the first painting condition, participants were given three motif instructions to follow. They were instructed to paint a house in a garden and a flagpole in the garden. This motif was chosen on the basis of it being gender-neutral and a subject that most people in Sweden are familiar with. The participants were told that they could paint any kind of house and garden and with whatever colors they wanted. At the second painting condition, no instructions of motifs were given but the same practical arrangements were made. At both painting sessions, participants were informed that there was no time limit for the painting task and that they could quit the activity whenever they wanted. They were also told that they were allowed to ask any questions they desired. Two of the participants asked for a pen to first sketch up the painting, and their request was granted. Emphasis was made to avoid prompting or influencing the participants in the activities. However, the painting activities were anything but silent. When participants communicated about issues not directly related to the painting task, the test leader responded. If they asked questions about the actual task, they were answered in a nondirecting manner. In the instructed condition, the instructions were repeated only if the participants asked for them.

At the first painting condition, some participants were nervous about the activity and needed some initial encouragement to get started. If they claimed that they could not paint, they were ensured that artistic talent did not matter. If they still were not convinced, they were told that even if they painted something that nobody would be able to interpret, they could call it “modern art and sell it for enormous sums.” This little hint of humor was enough for those hesitating to relax in the activity. If participants during the noninstructed condition had problems finding a motif, they were encouraged to paint something they liked. If they asked about where on the canvas they should paint, they were told that the whole canvas was theirs to use. If they asked if the painting was finished, they were told that this was up to them to decide. The canvases were put to dry in places where the participants

could not see them to ensure that the instructed paintings would not influence the ones to be produced during the non-instructed condition.

Outcome Measures

Two primary outcome measures were used to analyze the paintings:

- A. *Time* (minutes) was measured from the first brushstroke to when the participants claimed they had finished. The participants did not paint with a nonstop frenzy, but if they got lost in talking for a prolonged period, they were gently reminded of the task to paint.
- B. *Area* was measured between the farthest color marks in height and length on the canvas.

Of equal interest were the possible correlations between scores on MMSE and the time spent and area used in the two painting conditions. The correlations between scores on the Clock Test and the time spent and area used were also analyzed. Paired *t* test, correlation, and regression analysis were used to analyze the data.

Secondary outcome measures used to analyze the paintings were number of colors used, colors used the most, and number of instructions followed in the instructed painting condition. Additional qualitative observations were made, primarily concerning chosen motifs in the noninstructed painting condition and painting styles. Degree of concordance between the two painting conditions for each participant was also observed.

Ethical Considerations

The ethical board in Gothenburg was informed about the study and gave their approval. After receiving names of relatives or other significant caregivers from the various heads of the special elderly housing or daytime care centers, the relatives to the AD participants were phoned and asked whether they agreed to have their relatives participate in the study. The aim of the study and its practical procedure was described and it was also clarified that the participants would be kept anonymous and the results confidential. All contacted relatives were positive to the study and the painting activity and approved to the test leader meeting with their AD relatives. At the elderly housing and daytime care centers, the personnel were informed about the study and also informed about the importance of confidentiality. The test leader then individually asked the selected participants whether they wanted to meet and talk and paint with the test leader. Instead of informing participants that they were selected because of their AD diagnosis, they were told that they would be offered a conversation with the test leader and asked some questions (the MMSE). They were also told that if they did agree to it, the test leader would then return to see them on two more occasions where they would engage

Table 1. Summary of Mean, Minimum and Maximum Values, and Standard Deviation.

	<i>M</i>	Minimum	Maximum	<i>SD</i>
MMSE scores	15.6	9	23	4.3
Clock Test scores	2.1	0	4	1.4
Number of instructions followed	2.4	0	3	1.1
Time spent in instruction condition	39.8	9	85	24.7
Time spent in noninstruction condition	57.1	9	130	34.5
Mean area used in the instruction condition (cm ²)	665.8	70	1,600	506.3
Mean area used in the noninstruction condition (cm ²)	921.4	156	1,600	512.0
Number of colors in instruction condition	4.6	2	7	1.4
Number of colors in noninstruction condition	5.0	3	7	1.1

Note. MMSE = Mini Mental State Examination.

in a painting activity. They were told that they were one of quite many seniors selected from different elderly housing and daytime care centers in southern Sweden. It was clarified that the paintings would be kept anonymous and that it was not a question about artistic talent but rather a simple creative activity. The question of participation was asked before every meeting to ensure voluntary engagement. Although participants on a few occasions showed an initial hesitation, they all decided to participate after some everyday friendly phrases from the test leader. The emotional benefits of participating in the creative activity should be considered as outweighing the possible initial anxiety and the dilemma with not confronting participants with the actual purpose of the study.

Results

Differences Between the Two Painting Conditions

Paired *t* test revealed a significant difference in time spent in the two painting conditions, $p < .001$. More time was spent in the noninstructed condition (mean time used in instructed condition = 39.8 min, in the noninstructed condition = 57.1 min). There was also a significant difference between area of canvas used in the two conditions, $p = .049$, where more area was used in the noninstructed condition (mean area used in the instructed condition = 656 cm², mean area used in the noninstructed condition = 921 cm²).

MMSE Associations With Primary Outcomes

MMSE scores correlated significantly with time spent painting in the instructed condition ($r = .578$; $p = .015$), where higher scores on MMSE predicted longer painting sessions. MMSE also correlated significantly with time spent in the noninstructed painting condition ($r = .682$; $p = .003$). Again, higher scores on MMSE predicted longer painting sessions. The correlation between MMSE scores and area used in the instructed condition was $r = .347$ ($p = .172$) and with area in the noninstructed condition was $r = .361$ ($p = .154$).

The Clock Test Associations

The Clock Test correlated significantly with time used in the instructed condition ($r = .700$; $p = .002$) and with time used in the noninstructed condition ($r = .729$; $p = .001$). There was little correlation between the Clock Test and the area used in the instructed condition ($r = .001$; $p = .996$), and between the Clock Test and the area used in the noninstructed condition ($r = .367$; $p = .147$).

Number of Instructions Followed and Color Preferences

The mean number of instructions followed, of the three given instructions, in the instructed painting condition was 2.4 (for a summary of mean numbers, ranges, and standard deviations, see Table 1). The correlation between MMSE scores and number of instructions followed was $r = .475$ ($p = .054$). Mean number of colors used in the instructed condition was 4.7 and in the noninstructed condition 5.0. The most frequently used color in both conditions was light green followed by yellow, red, and dark blue. The least preferred colors were black, white, and beige. The participants did wish to blend colors on four occasions and asked for help mixing gray, pink, and purple shades.

Explaining Variance in the Two Painting Conditions

Regression analysis was used to try to explain variance in time spent in the two painting conditions. It showed as follows:

- Scores on MMSE and the Clock Test together accounted for 46.9% (adjusted $R^2 = .469$) of the variance in time spent in the instructed condition. The model was significant ($p = .005$).
- Scores on MMSE and the Clock Test together accounted for even more, 58.2% (adjusted $R^2 = .0582$), of the variance in time spent in the noninstructed condition. The model was significant ($p = .001$).

- The regression analysis showed that in both painting conditions, the effect of scores on the Clock Test was significant (instructed condition: $p = .027$, noninstructed condition: $p = .024$), whereas the effect of scores on MMSE was not (instructed condition: $p = .262$, noninstructed condition: $p = .068$).

Qualitative Observations: Motifs and Artistic Development

Participants with higher MMSE scores used a more condensed and complex painting style and more paint on the same area. They also showed more attention to detail in the painting process than did those with lower scores. Four participants chose to paint a house in the noninstructed painting condition too, even though two of them had no spoken memory of having painted once before. Fourteen of the participants chose to paint elements of nature (trees, flowers, grass, etc.) in the noninstructed condition. Common for participants with lower MMSE scores than 15 was that they, both in the instructed and the noninstructed conditions, started painting with a declared goal of motif. However, during the painting process, they forgot the motif and painted something else, declaring that that was now their goal. For example, they would start painting a line for the side of a house, which would turn into a tree, which then would turn into something else. The participants displayed a general consistency concerning painting style. In most cases one could see what noninstructed painting belonged to what instructed painting. Even so, when comparing the first (the instructed) painting with the second (the noninstructed) painting of each individual, one could say that most of the participants had refined their painting style and showed an artistic improvement. See the appendix for the actual paintings and the accompanying brief descriptions of the participants.

Discussion

The present study was designed to examine the capability to paint in people with AD. It investigated differences between an instructed painting condition and a noninstructed painting condition, measuring time spent painting and area of canvas used in both conditions. It also analyzed how disease stage, measured through MMSE and the Clock Test, affected the outcome of the two painting conditions. Number of instructions followed, number of colors used and color preferences were also assessed, and qualitative observations about motifs and possible artistic development were noted.

Differences in Time Between the Two Painting Conditions

Contradictory to what one could assume in people with AD, sometimes perceived as easily worried and distressed when confronted with ambiguous instructions or surroundings, the

participants engaged longer and seemingly with more enjoyment during the noninstructed painting session. That the participants spent more time painting in the noninstructed condition could be due to a practice effect as the noninstructed condition followed the instructed one. If so, that indicates some sort of memory formation, even though the participants usually were unable to express an overt memory of the instructed painting session. It is known that deficits in visuospatial functions normally occur later in the progress of AD (Chancellor et al., 2014), and if any memory formation took place, it supposedly would be located in the visuospatial areas of the brain. Another theory of why the participants painted longer in the noninstructed painting condition is that it might be easier for people with AD to go directly to the task of painting without cognitively first having to process instructions. However, it was qualitatively noted that the participants with MMSE scores above 15 expressed more interest and joy during the noninstructed condition; they seemed enthusiastic about the creative freedom. Personnel at the different care centers gave complementary supporting information to this enhanced enjoyment. A better setup for this kind of study, with a larger sample, would be to counterbalance and divide participants into two groups: one group that would start with an instructed condition and one that would start with a noninstructed condition. Such a design might show smaller differences in time between the instructed and noninstructed conditions.

Differences in Area of Canvas Used

One reason why less time was spent in the instructed condition could be that it somehow was easier for the participants than the noninstructed condition. However, that does not explain why the area of canvas used was greater in the noninstructed condition. The participants might as well have chosen to paint a very big house and garden in the instructed condition and a tiny subject in the noninstructed condition. Rather, the difference in area could, as mentioned, be attributed to a familiarity (conscious or not) with the activity. This hypothesis, combined with a visual inspection of the actual paintings created in this study, implicates a possible general artistic development. To sum up, the results support earlier findings of painting as an activity in which people with AD can improve (Miller & Hou, 2004). The practical importance of the results found with instructions versus no instructions is that it urges further investigation into what level of instructions people with AD, in different stages of the disease, will best benefit from in everyday life activities.

MMSE

Unsurprisingly, MMSE scores correlated positively with time spent in both painting conditions; participants with higher MMSE scores were able to concentrate on the task for a longer period of time. The positive correlation between MMSE

scores and number of instructions followed was also expected. Those with higher MMSE scores used a more condensed painting style, using more paint on the same area, which might explain why there was a strong correlation between MMSE scores and time used but not with area used. In people with AD, scores on MMSE have been shown to correlate with number of errors in color discrimination tasks; the lower the MMSE score, the higher the number of color discrimination errors (Salamone et al., 2009). The present study did not examine color discrimination, but overall the test leader did not notice any problems among participants with identifying colors. However, it was noted that those with higher MMSE scores were more pleased with having the abundance of colors to choose from than were those with lower MMSE scores. The only participant where the painting activity, as designed in the present study, in hindsight maybe was not suitable was the participant with the lowest MMSE score. The activity appeared a bit too complicated for this participant. For people with AD and scores on MMSE below 10, the painting activity would in the authors' opinion benefit from some simplification. The activity could be simplified by providing fewer colors fewer instructions and just one paintbrush. In more demanding settings—for example, a busy ward with stressed personnel—it is likely that participants in the late stages of AD would have more difficulties engaging and benefiting from the painting activity. The abundance of encouragement and absence of stress in this study were possibly vital for the success, especially for the participants with lower MMSE scores. It is also unlikely that they would have painted as long as they did if they had been left alone with the material. The participants showed pride in their work in both painting conditions. This was especially noticeable for those with higher MMSE scores, who often wanted to show the other people at the care centers what they had painted. It has been suggested that there exists a longer retention of visuospatial capabilities in relation to other memory functions (Fornazzari, 2005), and the present study supports that notion.

The Clock Test

Sketching a clock is an assignment closer to painting than answering the questions on the MMSE. That could explain why the Clock Test in the regression analysis was the significant predictor of painting capability. However, the grading of the Clock Test scores is more subjective than the grading of MMSE, and thus, the results should be considered with some caution. The Clock Test should primarily be seen as a complement to MMSE. Just like with the MMSE, the Clock Test significantly correlated with time used in both painting conditions, but not with area. This supports the theory that AD stages affect the concentration span but not necessarily the possibility of forming familiarity with a novel task and showing improvement at it. There might be other factors, not accounted for in this study, that overlap and explain some of

the variance in time that the Clock Test and MMSE in the analysis of this study were attributed to.

Instructions and Colors

The participants with higher MMSE scores had an easier time following the instructions than those with lower MMSE scores, which was to be expected. Only three participants managed to follow all three instructions, including a flagpole in the painting. It appeared as most participants got lost in the subject that they were painting at the moment. When they were painting the garden, they forgot the flagpole. From the present study, it is not possible to say how many painting instructions people with AD can follow, but the results indicate that the number is relatively low. If the instructions had been repeated during the painting session, there would obviously have been a greater chance of success. Out of 11 colors available, on an average the participants used five (4.6 in the instructed condition and 5.0 in the noninstructed). There is most probably no harm in using a great array of colors when working with painting and people with AD. Had the participants in the present study received more guidance during the painting conditions, it is possible that they would have used more colors. Especially the participants with higher MMSE scores expressed appreciation of having many colors to choose from. The revealed color preferences were not in line with those found by, for example, Rankin et al. (2007), where people with AD often chose a muted color palette made up of grays, browns, and blacks. In this study, the colors chosen were mostly bright. Why the paintings in this study mainly turned out very colorful is difficult to explain. It is already known that people with AD gain help from color cues (Wijk & Sivik, 1995), but further studies are needed to examine color preferences. The practical goal of gaining knowledge of what colors are presumably most favorable to people with AD is, among other things, to be able to better design their everyday surroundings.

Qualitative Observations: Motifs and Artistic Development

Four participants chose to paint a house also in the noninstructed painting condition, even though they had no spoken memory of having painted a house once before, which could suggest memory formation. That a lot of the participants chose to paint elements of nature in the noninstructed condition is an observation that deserves further investigation. Compared with healthy controls, people with AD show a similar aesthetic stability, even in the absence of explicit memory (Graham, Stockinger, & Leder, 2013; Halpern, Ly, Elkin-Frankston, & O'Connor, 2007). In the present study, a general consistency and stability in painting style was found, where one in most cases could see what noninstructed painting belonged to what instructed painting. It is important to

remember that visual impairment can be relatively independent of memory impairment (Kirk & Kertesz, 1991), and that the stability of aesthetic preference in people with AD is quite independent from cognitive abilities such as memory (Silveri et al., 2015). When comparing the first (the instructed) painting with the second (the noninstructed) painting of each individual in the present study, one could say that most of them displayed some sort of progress. In general, the paintings grew bigger, more detailed or more complex in the noninstructed condition. As mentioned earlier, this supports the notion that painting is an activity in which people with AD can show development. Possible artistic progress can be vital in gaining a better understanding of the brain in AD and also beneficial for afflicted people's self-esteem.

Proposals for Future Research

Moderating factors to the results not accounted for in this study might be aspects such as general self-confidence and mood. These variables can be investigated in future studies. Further research with repeated painting sessions over time, with different levels of instructions, would provide valuable information

about artistic capability, and possible painting memory formation and development in people with AD. Future studies using physiological techniques such as functional magnetic resonance imaging (fMRI) could help us to better understand the brain regions that are activated during the artistic process in people with AD (Miller & Hou, 2004) and gain a better understanding of the visuospatial memory in general. It is probably not too bold a statement to say that people with AD sadly enough often are infantilized and their remaining capabilities left unused. Level of cognitive function and dependency should not be used as a sole predictor of a person's quality of life. People with dementia rate mood as the main predictor of their quality of life (Hoe, Hanock, Livingston, & Orrell, 2006), and a positive painting experience can be one of many things promoting an improved mood (Miller & Hou, 2004). The initially very skeptical personnel in the present study expressed great surprise at the success of the AD participants' paintings. The skepticism first displayed suggests that caregivers often underestimate people with AD and their abilities, and fail to promote an adequate level of creative challenges. Hopefully, further studies on art and AD can help to change those attitudes and make positive painting experiences more accessible to people with AD.

Appendix

A (instructed condition)



B (noninstructed condition)



Woman (MMSE 23), living alone on a farm. She had worked with everything from teaching to local politics. She painted her own house in the instructed condition and her house seen from above in the noninstructed condition. She described every road and where it led. She was very eager and happy to show her pictures to everyone.



(continued)

Appendix (continued)

A (instructed condition)



B (noninstructed condition)

Woman (MMSE 22), living with her husband in an apartment. She had worked as a nurse and as a teacher educating other nurses. She had moved a lot in Sweden and had also lived in Africa. She was a bit unsure of herself in the instructed condition. However, in the noninstructed condition, she was very sure about what she wanted to paint and meticulous with the details.



Woman (MMSE 22), living alone. She had worked mostly in school kitchens. Before moving to her current location, she had lived many years in northern Sweden and talked about the deep forests there. In the noninstructed condition, she was influenced by these memories and said that she tried to paint a bear, but that it turned into a weird dog.



Man (MMSE 20), living alone in an apartment. He had worked as a carpenter and in the harbor. He had never painted before but praised artistic freedom and creativity. He was lonely and had aches but proclaimed that imagination and daydreaming were the key to happiness. He wanted the test leader to say what she saw in the pictures and was thrilled every time she found a little face and figure.



Woman (MMSE 19), living alone in a house in a small town. She had worked as a bookkeeper, running her own bookshop. In the instructed painting condition, she started to paint a flagpole several times that then partly turned into trees. In the noninstructed condition, she spent more time talking than painting.

(continued)

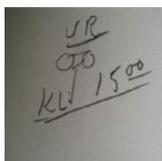
Appendix (continued)

A (instructed condition)

B (noninstructed condition)



Woman (MMSE 18), living with her husband in an apartment. She had worked as a language teacher her whole life. She was very enthusiastic about the painting activity. She focused on details and asked for a pink color for the flag. In the noninstructed condition, she said that she had decided days ago that she wanted to paint a big tree.



Woman (MMSE 18), living in special care housing. She had worked as a farmer her whole life. She was almost deaf and spent her days wandering in the corridors. She laughed heartily at the surreal houses she painted. In the noninstructed condition, she painted two people in the house looking out from the upper floor windows.



Man (MMSE 15), living alone in an apartment in a small town. He had worked with several different types of jobs, all in the same town he was born in. He did not hesitate in either of the painting conditions. He painted effectively and then went on to talk about his life.



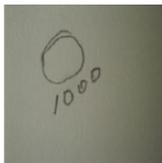
Appendix (continued)

A (instructed condition)

B (noninstructed condition)



Woman (MMSE 14), living with her husband in a house in the countryside. She had worked with old people. She started painting one motif that then ended up as something totally different. In the noninstructed condition, she started painting a tree that turned into a bonfire that, in turn, turned into a hedgehog. She was very happy with the activity.



Man (MMSE 14), living at home with his wife in a small town. He had worked as a butcher and joked about the gruesomeness of that job. He tried to paint people in both painting conditions and could not stop laughing at the result, which he thought looked more like monkeys and ghosts than people.



Woman (MMSE 13), living in special care housing. She had worked as a nurse and had lived in several different cities in Sweden. She was rather pessimistic about her own artistic ability and was irritated with the first painting session. The painting during the noninstructed condition went much better, and to her surprise, she found the task fun.



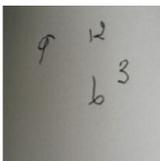
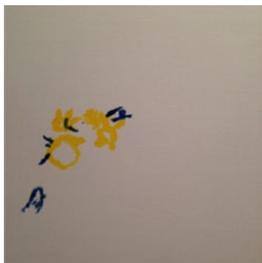
Woman (MMSE 13), living in special care housing. She had worked with different administrative jobs since she turned 16. She painted little figures with great enthusiasm and wanted the test leader to guess what they portrayed. In the middle of the painting sessions, she would start to cry over the fact that she felt so alone and abandoned. The next moment she was happy and laughing at the painting task.

(continued)

Appendix (continued)

A (instructed condition)

B (noninstructed condition)



Man (MMSE 12), living in special care housing. He had mostly worked as an officer in the military. He talked a lot about the hard times he had experienced. He was frustrated with the result of the painting in the instructed condition. With the noninstructed painting, he was happier and laughed at its abstract aspects.



Man (MMSE 12), living with his wife in a house in the countryside. He had worked mostly as a police. He did not say much during the painting activities but smiled a lot. He did not understand the instructions, or did not care about them, but was very content painting his stripes and doodles.

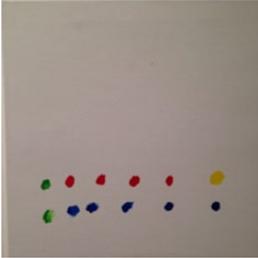
Missing item.



Woman (MMSE 11), living in special care housing. She had worked many years in a local store. In the instructed condition, she started painting sides of a house that then became a table, which then became an animal. In the noninstructed condition (painting unfortunately gone missing), she again had no control over where the painting was going, but was very proud over the colorful result.



Appendix (continued)

A (instructed condition)	B (noninstructed condition)
	<p>Woman (MMSE 11), living in special care housing. She had been a stay-at-home mom and housewife her whole life. She was convinced that she could not paint at all. In the noninstructed session, she was in a better mood and more confident. She painted flowers and talked about a garden she used to have.</p>
	
	<p>Man (MMSE 9), living with his wife in a house. He had lived in the same small town his whole life and had worked with heavy, blue-collar jobs (this information was given by his wife). He said the colors available were beautiful but was a bit puzzled with the task of painting. He said he preferred drinking coffee.</p>

Note. MMSE = Mini Mental State Examination.

Authors' Note

Emelie Miller formulated the research questions, and designed and carried out the study. Boo Johansson supervised the data collection and the statistical analysis and assisted Emelie Miller's writing of the article.

Declaration of Conflicting Interests

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References

- Alzheimer's Association. (2014). Alzheimer's disease facts and figures. *Alzheimer's & Dementia*, 10(2). Retrieved from https://www.alz.org/downloads/Facts_Figures_2014.pdf
- Barr, C., Riolacci-Dhoyen, N., Galbraith, M., & Leperre-Desplanques, A. (2012). Sharing knowledge to advance health-care policies in Europe for people living with dementia and their carers: The ALCOVE project. *Archives of Public Health*, 70, Article 21.
- Chancellor, B., Duncan, A., & Chetterjee, A. (2014). Art therapy for Alzheimer's disease and other dementias. *Journal of Alzheimer's Disease*, 39, 1-11.
- Cummings, J. L., Miller, B. L., Christensen, D. D., & Cherry, D. (2008). Creativity and dementia: Emerging diagnostic and treatment methods for Alzheimer's disease. *CNS Spectrums: First in Applied Neuroscience*, 13, 1-20.
- Flatt, J. D., Liptak, A., Oakley, M. A., Gogan, J., Varner, T., & Lingler, J. H. (2015). Subjective experiences of an art museum engagement activity for persons with early-stage Alzheimer's disease and their family caregivers. *American Journal of Alzheimer's Disease & Other Dementias*, 30, 380-389.
- Fornazzari, L. R. (2005). Preserved painting creativity in an artist with Alzheimer's disease. *European Journal of Neurology*, 12, 419-424.
- Graham, D. J., Stockinger, S., & Leder, H. (2013). An Island of stability: Art images and natural scenes—but not natural faces—show consistent esthetic response in Alzheimer's-related dementia. *Frontiers in Psychology*, 7(4), Article 107.
- Halpern, A. R., Ly, J., Elkin-Frankston, S., & O'Connor, M. G. (2007). "I know what I like": Stability in aesthetic preference in Alzheimer's patients. *Brain and Cognition*, 66, 65-72.
- Hannemann, B. T. (2006). Creativity with Dementia Patients. Can creativity and art stimulate dementia patients positively? *Gerontology*, 52, 59-65.
- Hattori, H., Hattori, C., Hokao, C., Mizushima, K., & Mase, T. (2011). Controlled study on the cognitive and psychological effect of coloring and drawing in mild Alzheimer's disease patients. *Geriatrics & Gerontology International*, 11, 431-437.
- Hoe, J., Hanock, G., Livingston, G., & Orrell, M. (2006). Quality of life of people with dementia in residential care homes. *The British Journal of Psychology*, 188, 460-464.

- Kirk, A., & Kertesz, A. (1991). On drawing impairment in Alzheimer's disease. *Archives of Neurology*, *48*, 73-77.
- Miller, B. L., & Hou, C. E. (2004). Portraits of artists: Emergence of visual creativity in dementia. *Archives of Neurology*, *61*, 842-844.
- Miranda-Castillo, C., Woods, B., & Orrell, M. (2013). The needs of people with dementia living at home from user, caregiver and professional perspectives: A cross-sectional survey. *BMC Health Service Research*, *13*, Article 43.
- Pache, M., Smeets, C. H. W., Fontana Gasio, P., Savaskan, E., Flammer, J., Wirz-Justice, A., & Kaiser, H. J. (2003). Colour vision deficiencies in Alzheimer's disease. *Age and Ageing*, *32*, 422-426.
- Palmiero, M., Giacomo, D. D., & Passafiume, D. (2012). Creativity and dementia: A review. *Cognitive Processing*, *13*, 193-209.
- Quental, N. B., Brucki, S. M., & Bueno, O. F. (2013). Visuospatial function in early Alzheimer's disease—The use of the Visual Object and Space Perception (VOSP) Battery. *PLoS ONE*, *8*(7).
- Rankin, K. P., Liu, A. A., Howard, S., Slama, H., Hou, C. E., Shuster, K., & Miller, B. L. (2007). A case-controlled study of altered visual art production in Alzheimer's and FTL. *Cognitive and Behavioural Neurology: Official Journal of the Society for Behavioral and Cognitive Neurology*, *20*, 48-61.
- Salamone, G., Di Lorenzo, C., Mosti, S., Lupo, F., Cravello, L., Palmer, K., . . . Caltagirone, C. (2009). Color discrimination performance in patients with Alzheimer's disease. *Dementia and Geriatric Cognitive Disorders*, *27*, 501-507.
- Silveri, M. C., Ferrante, I., Brita, A. C., Rossi, P., Liperoti, R., Mammarella, F., . . . De Luca, M. (2015). "The memory of beauty" survives Alzheimer's disease (but cannot help memory). *Journal of Alzheimer's Disease*, *45*, 483-494.
- Ullán, A. M., Belver, M. H., Badia, M., Moreno, C., Garrido, E., Gómez-Isla, J., . . . Tejedor, L. (2013). Contributions of an artistic educational program for older people with early dementia: An exploratory qualitative study. *Dementia: The International Journal of Social Research and Practice*, *12*, 425-446.
- Wijk, H., & Sivik, L. (1995). Some aspects of colour perception among patients with Alzheimer's disease. *Scandinavian Journal of Caring Sciences*, *9*, 3-9.
- World Alzheimer Report. (2015). *The global impact of dementia: An analysis of prevalence, incidence, cost and trends*. The Global Voice on Dementia, Alzheimer's Disease International. Retrieved from <http://www.alz.co.uk/research/WorldAlzheimerReport2015.pdf>
- Young, R., Tischler, V., Hulbert, S., & Camic, P. (2015). The impact of viewing and making art on verbal fluency and memory in people with dementia in an art gallery setting. *Psychology of Aesthetics, Creativity, and the Arts*, *9*, 368-375.

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