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ScienceDirect
Brain and Cognition 66 (2008) 65–72
Brain and Cognition
www.elsevier.com/locate/b&c

"I Know What I Like": Stability of aesthetic preference in alzheimer's patients ☆

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Accepted 28 May 2007
Available online 2 July 2007

Abstract

Two studies explored the stability of art preference in patients with Alzheimer's disease and age-matched control participants. Preferences for three different styles of paintings, displayed on art postcards, were examined over two sessions. Preference for specific paintings differed among individuals but AD and non-AD groups maintained about the same stability in terms of preference judgments across two weeks, even though the AD patients did not have explicit memory for the paintings. We conclude that aesthetic responses can be preserved in the face of cognitive decline. This should encourage caregivers and family to engage in arts appreciation activities with patients, and reinforces the validity of a preference response as a dependent measure in testing paradigms.

Keywords: Alzheimer's disease; Dementia; Memory disorder; Memory; Art; Visual perception; Aesthetic preference

1. Introduction

Participation and enjoyment of the arts is an important part of many senior citizens' lives. Patients with dementia are often exposed informally to the arts in their daily lives, and sometimes more formally in therapy (Gerdner, 2000; Kahn-Dennis, 1997); however, little is known about the effect of dementia on musical and artistic abilities.

A few studies have focused on the effects of dementia on art production. These seem to show a decline in the artistic abilities of patients with Alzheimer's disease, for both trained artists (Maurer & Prvulovic, 2004) and untrained people (Seifert, Drennan, & Baker, 2001). In contrast, studies of patients with frontotemporal dementia (FTD) have demonstrated that artistic talents may emerge or be relatively preserved in a subset of patients with FTD (Miller, Boone, Cummings, Read, & Mishkin, 2000; Miller et al., 1998). These tend to be patients with the semantic form of FTD, leading to the suggestion that in some cases, deterioration of brain areas involved in symbolic processing might "release" artistic skills mediated largely by right hemisphere structures.

Whereas art production is relatively rare in the general and patient population, art consumption, in the form of viewing art, is quite common. However, to our knowledge, a systematic analysis of art *appreciation* has not been conducted with dementia patients. We believe that a study of art appreciation can help us understand whether aesthetic appraisal is as affected by the disease as are cognitive abilities and also may inform caretakers about the probable value of art exposure and therapy in dementia, specifically early-stage Alzheimer's disease (AD).

Our interest in aesthetic judgment emerged in the context of a previous study that we conducted on the ability of AD patients to learn new music (Halpern & O'Connor, 2000). The implicit memory test in that study involved a

☆ We thank Albert Galaburda, Lissa Kapust, Tamara Fong, and Daniel Press for referring patients to us. We also acknowledge the help of Meredith Hickory who tested patients in Experiment 1 and Allen and Jason Schweinsberg who provided assistance in interpreting the mathematical properties of the rank change score.
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doi:10.1016/j.bandc.2007.05.008

pleasantness rating task for short unfamiliar melodies. Higher pleasantness ratings for previously heard vs. new melodies are taken to indicate implicit memory, which is known as the *mere exposure effect* (Zajonc, 1980). We found that unimpaired seniors demonstrated enhanced pleasantness ratings for old melodies, whereas AD patients did not show this effect.

We interpreted these findings as evidence of the AD patients' failure to encode new music, but the study raised the question of the integrity of aesthetic judgment in patients with AD. If AD impairs aesthetic judgment, then pleasantness ratings might not be a reliable measurement of any internal state, and thus a poor index of implicit memory. More fundamentally, we wondered whether aesthetic judgment can remain intact in the context of AD-related deterioration of language, memory, and other abilities.

Leder, Belke, Oeberst, and Augustin (2004) have offered a model of aesthetic processing that may help focus this research question. The first stage of their model involves perceptual analysis. Taking art as their primary example, they consider aspects such as symmetry, color and grouping to be important in determining aesthetic experience. The next stage involves implicit knowledge in the form of familiarity with a work or a style. The third stage involves explicit classification of style or content, an ability that is especially robust in people versed in the artistic domain; personal taste may influence this stage as well. Taking these three stages together results in a cycle of cognitive mastering and evaluation yielding an aesthetic judgment of the quality of the work, based on cognitive mastery, and an aesthetic emotion, a positive or negative reaction to the artwork.

In the current study we studied preference rankings for art in AD patients and non-AD controls. We assumed the preference rankings would reflect a global judgment of liking, which might encompass both the quality and emotional judgment referred to by Leder et al. (2004). The objects we studied were small-scale color reproductions of unfamiliar paintings, in three different styles (described below). Because aesthetic preferences are personal judgments that cannot be quantified and compared against absolute standards, we elected to look at consistency of preferences over a two-week period.

A number of studies with healthy individuals have suggested that people vary reliably in their individual preferences for visual patterns (Jacobsen, 2004; McManus, 1980) and that this preference remains stable over the short time span investigated here (Höfel & Jacobsen, 2003). Our materials differed from these studies in being reproductions of real artworks instead of formal graphic patterns, but if anything, individual preferences could be even more important in this situation. Also, none of our participants were highly trained in art, again setting up a situation in which individual preference rather than any group difference should drive the judgments.

The only study we located on aesthetic preference judgments in people suffering from dementia was reported by Wijk, Berg, Sivik, and Steen (1999). As part of a larger study on color naming and discrimination, they found that patients were able to rank order a set of seven colors according to preference. The average rank order of preference did not depend on severity of dementia, and patients' ratings corresponded to ratings by normal control participants. Although judgment of monochromatic color chips allows for only a limited aesthetic response, this study at least suggests that asking AD patients to rank aesthetic objects is a feasible paradigm.

We designed the task to avoid taxing well-known cognitive and perceptual deficits in early to moderate AD, which might mask the aesthetic response we were interested in. First, we know that AD may be associated with some visual perceptual problems. Particularly relevant to art appreciation might be deficits in color discrimination and contrast sensitivity (Cronin-Golomb, 1995; Cronin-Golomb, Corkin, & Growdon, 1995). Failure to comprehend these basic dimensions might naturally lead to instability in the art appreciation preferences we wanted to measure. On the other hand, we measured stability of art judgment over a two-week interval. We thought that any perceptual difficulties would not increase over two weeks and thus should contribute only minimally to instability in preference rankings. In addition we attempted to assess and control for possible visual perceptual difficulties by presenting a control task, in which pictures of everyday objects that varied in real-world size were presented for sorting on the size dimension. This task, while not a detailed assessment of all perceptual difficulties, allowed us in a global way to determine whether participants could process depictions.

Nevertheless, global memory and naming difficulties in AD patients could potentially affect performance in our task. We dealt with these factors in several ways. First, our preference ordering task was simple and placed few demands on naming, as no titles or names of artists were presented and no verbal retrieval was required for the task. Working memory limitations were not relevant because all cards to be sorted were available for viewing until the participant was satisfied with the ranking. Episodic memory was not required for the task (although it may have assisted the task), as no reference at Session 2 was made to ranking at Session 1. And the paintings were not familiar ones to most untrained people, reducing the role of pre-experimental memory. Finally, we assessed recognition memory in Experiment 2, in order to investigate whether the expected worse performance of AD patients in explicit memory would also be found in stability of preference rankings.

Even though we thought that the art preference task was not heavily loaded on memory or naming skills, we nevertheless were interested in whether language or semantic problems in AD (Giffard et al., 2002; Grossman et al., 2003; Martin & Fedio, 1983) would affect appreciation of some types of art that might vary in the extent to which

they are easily verbalizable or for which a verbal code might assist memory. *Representational* paintings contained scenes that could be easily described and also could be distinguished from other paintings verbally, such as " a vase with flowers"; only one painting had that as a main figure. *Quasi-Representational* art showed items occurring in unusual configurations or distortions, and thus would require complex verbalization to describe, but that description would help people discriminate one painting from another in a memory test. *Abstract* paintings had simple geometrical forms and thus were easy to describe, but descriptions of many such paintings in our set were similar ("circles and squares"). We presented a variety of neuropsychological tasks to patients to see if performance might correlate with naming or memory measures.

To summarize, in Experiment 1, we presented postcards of artworks in three styles to patients and controls in two sessions, two weeks apart. We examined the similarity of preference ordering on those two occasions. In Experiment 2, we added a recognition task for the paintings at Session 2. We predicted that patients and controls would show about the same stability of rank orderings across the two weeks, despite cognitive deficits in memory and language among the patients. We took as a working assumption, in agreement with literature cited above, that adults generally have stable individual preferences and dimensions by which they judge art; we did not expect AD to affect these personal taste issues nor the ability of people with AD to express them in the simple task we devised. We left open the possibility that group differences might vary depending on the type of art: Impaired verbal skills might, for instance, particularly affect judgments or memory of Quasi-Representational art in the judgment task due to the complex depiction-description mapping.

2. Experiment 1

2.1. Methods

2.1.1. Participants

Alzheimer's Disease patients. Patients with probable AD were referred by neurologists, psychiatrists and neuropsychologists in the Division of Behavioral Neurology at the Beth Israel Deaconess Medical Center (BIDMC), Harvard Medical School. Patients were diagnosed according to the NINCDS-ADRDA criteria for probable AD (McKhann et al., 1984). All AD patients underwent an extensive evaluation in order to exclude other causes of dementia. Patients with neuroimaging evidence of significant ischemic changes were not included in the study, nor were patients who scored in the depressed range on the Geriatric Depression Scale (Brink et al., 1982). The final sample of 16 patients scored between 12 and 27 on the Mini-Mental State Exam (MMSE) (Folstein, Folstein, & McHugh, 1975) with a mean of 22.4.

Nondemented control participants. Nondemented control participants (NCs) were recruited from a senior citizen center in the Hartford, CT area and a retirement community in the Boston area. Family members of the AD patients, primarily spouses and siblings, were recruited during clinical visits to BIDMC. All NC participants scored above 28 on the MMSE (maximum = 30). The final sample included 27 people. As shown in Table 1, participant groups were matched according to age, years of education, and self-rated interest in art.

Neuropsychological tests. Patients underwent comprehensive evaluation with a broad range of neuropsychological tests. A few patients were referred directly from behavioral neurologists and their testing was more restricted. We examined performance on the GDS, MMSE, Dementia Rating Scale (DRS) and the DRS Memory subscale (Mattis, 1988) and the Boston Naming Testing (BNT, Kaplan, Goodglass, & Weintraub, 1983). These tests were administered to AD participants during the first session. NCs were administered the MMSE during the first session. Both groups were asked to indicate their interest in art on a scale from 1 (No interest) to 10 (Very interested). Means

Table 1
Demographic characteristics and neuropsychological test scores

	NC (Exp1)	AD (Exp1)	NC (Exp 2)	AD (Exp 2)
Women	19	9	11	13
Men	8	7	9	7
Age				
M	73.4	76.8	77.9	79.4
SD	10.9	9.6	7.6	7.3
Education (years)				
M	15.0	15.4	13.6	14.7
SD	2.5	4.2	2.7	3.0
MMSE				
M	29.2	22.4	28.3	22.0
SD	.7	3.9	1.3	4.5
DRS Total				
M	—	119.5	—	119.5
SD	—	9.3	—	15.6
DRS Memory				
M	—	14.9	—	15.2
SD	—	4.1	—	5.4
BNT				
M	—	37.0	—	41.7
SD	—	10.4	—	11.7
GDS				
M	—	3.4	7.3	8.8
SD	—	2.9	3.9	6.2
Interest in Art				
M	6.3	5.6	—	—
SD	2.3	2.3	—	—

Note. NC, Normal controls; AD, Alzheimer's patients. MMSE, Mini-Mental State Examination; DRS, Dementia Rating Scale; BNT, Boston Naming Test; GDS, Geriatric Depression Scale. In Experiment 2, data were missing for some AD patients: $N = 19$ for DRS, $N = 17$ for BNT, $N = 18$ for GDS. $N = 15$ for GDS in NC group. GDS was not administered to NC group in Experiment 1; Interest in Art was omitted from Experiment 2.

and standard deviations of test results are shown in Table 1.

2.1.2. Materials

Twenty-four 4.5×6.5 in colored art cards of paintings were selected from The Art Box (1998) from three categories. One set showed *Representational* art. An example was *People in the Sun* by Edward Hopper. This shows a group of people seated in deck chairs on a patio, bathed in bright sunlight, and facing a landscape. An example of our next category, *Quasi-Representational*, was *Weeping Woman* by Pablo Picasso: a recognizable portrait of a woman, but painted in a Cubist style with distorted features and unusual colors. The third category was completely nonrepresentational *Abstract* art. An example was *Composition* by Piet Mondrian, depicting several quadrilaterals with black borders, in white, red, blue, and yellow. A list of artists and titles may be seen in Table 2. The control task used eight 4.5×6.5 in black and white digitized line drawings of familiar objects (Snodgrass & Vanderwort, 1980).

2.1.3. Procedure

Participants were told that this was a study in art appreciation and it would involve sorting four sets of art cards. All procedures were approved by the Institutional Review Board at BIDMC. After obtaining informed consent (a family member or caretaker serving as a witness for the AD patients), participants were administered a set of neuropsychological tests. Next they were shown the three sets of art cards, one set at a time, and were asked to sort the cards in the order from best to least liked based on their individual preference. Two rows of four cards were displayed on a desk at which the participants were seated. Participants were told this was an untimed task, that they could change their mind at any time during the task until they were satisfied with their choices, and that there were no right or wrong answers. The Representational (Rep), Abstract (Abs), and Quasi-Representational (Quasi) tasks were presented in different orders for different people. All possible orders were used across the experiment, although not equally often. The final task was always the control task, which required the participants to look at eight cards with line drawings of familiar objects (e.g., truck, key) and order them in terms of their real-world size from largest to smallest.

Two weeks later, all participants were asked to complete the same tasks without any mention of trying to reproduce preferences from the first session. Tasks were presented in the same order in Session 1 and Session 2 for a given participant.

Table 2
Artists and paintings used as stimuli

Style	Artist	Painting
Representational		
	Alma–Tadema	A Coin of Vantage
	Audubon	Roseate Spoonbill
	Chardin	The Young Schoolmistress
	Fantin–Latour	White and Pink Roses
	Gainsborough	Mr and Mrs Andrews
	Hammershoi	Interior with a Girl at the Clavier
	Hopper	People in the Sun
	Sargent	Paul Helleu Sketching with his Wife
Quasi-Representational		
	Basquiat	Untitled
	Bonnard	The Open Window
	Dine	My Name is Jim Dine
	Dubuffet	Jazz Band (Dirty Style Blues)
	Kitaj	If Not, Not
	Leger	The Builders
	Miro	Women, Bird by Moonlight
	Picasso	Weeping Woman
Abstract		
	Baumeister	Mortaruru with Red Overhead
	Diebenkorn	Ocean Park No. 67
	Heron	Fourteen Discs: July 20, 1963
	Hodgkin	Lovers
	Mondrian	Composition
	Rodchenko	Composition (Overcoming Red)
	Turner	Snowstorm: Steamboat off a Harbour's Mouth
	van Doesburg	Arithmetic Composition

2.2. Results

2.2.1. Measurement of stability

Stability of preference (from Time 1 to Time 2) was calculated by first determining the average change in rank per item for each participant for each of the four tasks. That is, the rank order at Time 1 was compared to the rank order for the same item at Time 2. Difference Scores (Time 1–Time 2 rank) were calculated for each item. Changes in ranks were summed across the cards with an art style and the total change score was divided by 8 to give a mean rank change. If the two orders were identical, the change score was 0. The smallest possible change was .25 (an interchange of 2 ranks averaged over 8 items) and the maximum possible score was 4. Larger change scores indicated less consistency from Time 1 to Time 2.

2.2.2. Control task

All participants in both groups, with two exceptions, ordered the objects in the appropriate size order at both sessions. Two individuals (one in each group) each interchanged the order of two items on one occasion. No further analyses were conducted on this task.

2.2.3. Preference task

Mean change scores for each group for each task are shown in Table 3. Scores were in a narrow range of 1.29–1.58, with four of the six outcomes nearly identical at around 1.5. The absence of any group and art style differences was supported by a two-factor ANOVA, with the between factor of group and within factor of task. Neither main effect was significant [$F(1,41) = 1.09$ for group and $F(2,82) = .55$ for task] and the critical interaction term of group $\times$ task was near 0 [$F(2,82) = .34$]; power to detect a

medium-size difference, $d = .50$, with this average sample size is approximately .80. For neither group did interest in art correlate with mean rank change, all r's $= -.23$ to $+.21$.

2.2.4. Neuropsychology tests

Because Experiments 1 and 2 were similar with respect to the neuropsychological tests administered, we combined the AD samples for a larger N, and report correlations for the combined sample in a later section.

2.2.5. Item consistency

It is possible that consistent preference rankings could be due to the fact that some paintings are universally preferred or disliked, as opposed to the individual differences in preference we were hoping to capture. In order to address this issue, we calculated the average ranking for each painting in each condition at Time 1, separately for AD and NC groups. We examined the standard deviation of these rankings to get one idea of preference agreement for the paintings. The mean standard deviations for the two groups × three art styles were all approximately 2.0. Given that the most preferred painting in the experiment earned a mean rank of 2.21 and the least preferred earned a rank of 6.61, the standard deviation is rather large and indicates a fair amount of disagreement on the most and least preferred painting.

We also examined how many paintings elicited an average ranking at the extreme of the scale. We defined "extreme" as a mean ranking under 3.5 or over 5.5, which are one rank below and above the median possible ranking on a 1–8 scale (4.5), respectively. Mean rankings within the extreme ranges indicate high agreement on most or least preferred paintings. For five of the six groups of paintings (two groups × three tasks), a maximum of two paintings fell in the "extreme" range. The exception was the Quasi task among the NC's, where five of eight paintings had mean ranks outside of this range. Considering all 24 paintings in the two groups, typically at least one person ranked the painting as most or second most preferred, at the same time that at least one person ranked it as least or second least preferred. Only in four instances (out of 48) was this not the case.

2.3. Discussion

First, we note that AD and NC participants performed nearly flawlessly on the control task of ordering pictured objects according to real-world size. The success of the AD participants allows us to eliminate the possibility that they were unable to perform the task due to problems understanding instructions or an inability to order items. The AD patients' normal performance on the control task indicated that they have sufficient visual perceptual skills to interpret pictures and associate them with real objects. This result gives us the confidence to interpret the results from the tasks of interest.

A second overall observation concerns the magnitude of the change scores. We had no previous benchmarks by which to predict how often anyone would change a preference judgment over a two-week period. The range of the mean change score varied between 1.29 ranks changed per item and 1.58 ranks. This strikes us as relatively stable performance given a two-week period between sessions, and no foreknowledge of the second task.

The most notable main result was the lack of group difference in change scores. AD patients and NC's did not differ significantly in their consistency of art preference over a two-week interval of time. Thus despite impairments in various areas of cognition, as indexed by the neuropsychological profile presented in Table 1, the AD patients were as able as their nondemented counterparts to react to the paintings, order them according to personal preference, and reproduce a similar ordering two weeks later. We interpret this ability as reflecting a stable core of art appreciation abilities, even for previously unfamiliar works.

We also found no interaction between style of art and group. In light of investigations demonstrating that AD may involve degradation of language functions and semantic memory (Giffard et al., 2002; Grossman et al., 2003; Martin & Fedio, 1983), we predicted that the AD participants might show specific vulnerabilities for paintings that were difficult to describe (Quasi), but this did not turn out to be the case.

A limitation of this study pertained to the possibility that stability in art judgment across the two-week period was enhanced by intact explicit memory. It is possible that participants remembered their preferences for at least some paintings two weeks later. On the face of it, the lower than "ceiling" performance among the NCs makes it unlikely that they were merely retrieving a memorized order of card preference over the two-week period. Also, remembering three orders of eight items each over two weeks would seem to be a very difficult task for even unimpaired seniors, and impossible for AD patients. However, to verify this possibility, Experiment 2 was a near-replication of Experiment 1, with an added explicit memory recognition test at the beginning of Session 2. We predicted that the similarity of art preference stability would persist in the face of poor explicit memory among the patients. We also looked at correlations of memory performance with stability of art preference among the control participants to see if the memory and preference judgments might depend on one another.

3. Experiment 2

3.1. Methods

3.1.1. Participants

Patients were drawn from a pool similar to that in Experiment 1. The final sample of 20 patients scored between 13 and 28 on the MMSE with a mean of 22. The majority of the 20 NC participants were family

members of the AD patients, primarily spouses and siblings, who were recruited during clinical visits to BIDMC. Some NC's were recruited from a retirement community in the Boston area as well. All NC ($N = 20$) participants scored above 28 on the MMSE, ranging between 26 and 30 on the MMSE, with a mean of 28.3.

3.1.2. Materials

Art materials were identical to those of Experiment 1 for the preference study. For the recognition study, we chose eight additional paintings in each style from the same source, to serve as new items.

3.1.3. Procedure

Session 1 was identical to that of Experiment 1 except that the Interest in Art question was omitted, and most of the NC group received the GDS. Participants who scored above 20 on the GDS were not included in the study. In a few cases, not all neuropsychological tests could be administered to an individual; the number of people who took each test may be seen in the Note to Table 1. In the memory task at Session 2, participants were shown 16 art postcards, half old and half new and asked to pick out the eight cards seen two weeks previously. This was done separately for each art style. We elected this constrained procedure because in our experience, some AD patients who are aware of their memory problems are reluctant to answer "old" to any items, introducing a strong response bias. Because recognition was constrained to choosing exactly eight cards, percent correct is based on hits (percentage of old cards that were selected as old), as false alarm rates are simply 1-hit rate.

3.2. Results

3.2.1. Control task

Seventeen control participants ordered the objects in the appropriate size order at both sessions and three interchanged the order of two items. Among AD patients, nine performed perfectly and an additional seven interchanged two items. Although four patients had higher scores than any NC participant, only one interchanged more than three ranks. The average rank score change was only .34. Because the average performance on the control task was still quite good, even if slightly less so than in Experiment 1, we did not further analyze this measure.

3.2.2. Preference task

Mean change scores for each task are shown in Table 3. Scores ranged from 1.28 to 1.94. An ANOVA, with the between factor of group and within factor of task showed no main effect of group [$F(1,38) = .51$], a main effect of art style [$F(2,76) = 5.08$; $p = .01$], and no interaction [$F(2,76) = .49$]. Power to detect a medium size group difference, $d = .50$, was .78 in this experiment. Follow-up tests using Tukey's HSD showed that the Abs style was significantly less stable than Quasi.

3.2.3. Memory task

The average number of hits for NC participants was 5.7 out of 8, or 72% ($SD = 1.05$) and for AD patients, 4.2, or 52% ($SD = .91$). An ANOVA tested for differences among group and art style, and revealed a large main effect of group [$F(1,38) = 23.5$, $p < .001$], but no effect of art style [$F(2,76) = 2.15$, $p = .12$], or interaction [$F(2,76) = 1.10$]. The 95% confidence interval for the memory scores of the AD group includes 50%, and thus we may consider that group's performance to be at chance.

3.2.4. Correlations

Correlations with memory. Among AD participants, memory for a style was not correlated with change score. Among NC participants, this was also true except, marginally, for the Abs style: Change score and memory correlated $r(18) = .434$, which is just slightly under r(crit) of .44. To get a global view of the relationship between the depression score and memory, we correlated the GDS with mean memory score (averaged over the three styles); the correlation was not significant for either group ($r = -.27$ for AD and .27 for NC).

Neuropsychology tests. We combined the AD samples for the two studies, yielding N's of 33–35, depending on the test (see Table 4). DRS Memory, BNT, and GDS all failed to predict change score, either considering styles separately or averaging over styles. The only significant predictors were MMSE and DRS Total, which predicted change score for the Quasi style, and the average of the three styles.

3.2.5. Item consistency

As in Experiment 1, an item analysis looked at data from Session 1. Once again, the mean standard deviations for the two groups × three art styles were all about 2.0, indicating a fairly large SD and thus disagreement. The most preferred painting in the experiment earned a mean rank of 2.45 and the least preferred earned a rank of 6.50.

For three of the six groups of paintings (two groups × three tasks), a maximum of two paintings fell in the "extreme" range. The other groups/tasks had three or four

Table 3
Mean change scores for each group in both experiments

Art Style	NC (Exp1)	AD (Exp1)	NC (Exp 2)	AD (Exp 2)
Representational				
M	1.29	1.56	1.62	1.60
SD	.75	.64	.65	.61
Quasi-Representational				
M	1.32	1.53	1.28	1.55
SD	.71	.73	.66	.83
Abstract				
M	1.52	1.58	1.84	1.94
SD	.76	.82	.96	.79

Note: Change score can range from 0 (no change in order) to 4 (maximum possible change). NC, Normal controls; AD, Alzheimer's patients.

Table 4
Correlations of neuropsychological tests with outcomes for patients over both experiments

Measure	Rep	Quasi	Abs	Mean 3 Styles
MMSE	−.12	−.42*	−.18	−.36*
DRS Total	−.16	−.41*	−.18	−.36*
DRS Memory	−.25	−.19	−.22	−.30
BNT	−.09	−.18	.20	−.01
GDS	.22	.00	.04	.10

Note: *N*'s vary slightly in each test, but are between 33 and 35.
* $p < .05$.

paintings with "extreme" ratings. This indicates somewhat more agreement on most and least liked paintings than in Experiment 1. However, considering all 24 paintings in the two groups, in only two instances (out of 48) did a painting fail to elicit at least one first- or second-place rank, and at least one seventh- or eighth-place rank.

3.3. Discussion

The most striking outcome of Experiment 2 was that similarity in art preference stability between the groups was found at the same time the groups diverged greatly in memory performance. In fact, the AD group on average remembered none of the paintings, as assessed by explicit recognition. This memory failure was expected in Alzheimer's disease, where amnesia is a hallmark feature of the disease. We also note that neuropsychological test scores for the AD group revealed characteristic deficits on tasks of naming, and other cognitive skills. However, the tests by and large did not predict the change scores, with the exception of the MMSE and the DRS Total. These tests are commonly viewed as global indices of dementia severity. They showed a modest correlation with change scores for the styles combined, and the Quasi style by itself. The correlations may be telling us that more severe dementia levels may eventually affect preference stability, but not in the majority of mildly demented participants tested here (26 of 35 patients scored 20 or higher on the MMSE).

Several comparisons with Experiment 1 are of interest. Change scores were approximately the same overall in the two studies, and in neither case did AD patients show less (or more) stability than nondemented participants. This stability in preference is likely not due to the artifact of our paintings being universally preferred or nonpreferred. As in Experiment 1, even the Picasso *Weeping Woman*, which on average elicited the highest nonpreferred rank among controls, was the second most preferred painting of three of these participants. Rank-order correlations show that the same paintings changed rank over the two experiments (Spearman rhos ranging from −.79 to .45 for the two groups × three styles), again showing that preference for particular paintings varies among people both within the same or different experiments.

One different outcome from Experiment 1 was that people showed significantly more change in preference for the Abstract style, compared at least to the Quasi style (Rep was intermediate). Although it is difficult to see why this might have changed between the studies, it is of note that this difference from Experiment 1 was true for both groups, again underscoring the similarity in preference performance. This outcome, along with the lack of predictive power of language tests among the AD patients, suggests that particular language or semantic disabilities are not large factors in performance on these tasks for the patients.

Two factors may have contributed to the dissociation between specific cognitive skills and stability of art preference. As noted in our Introduction, we tried to arrange the testing situation to reduce dependence on working memory and other cognitive skills in carrying out the task. Alternatively or in addition, computation of preference may not depend heavily on explicit memory or language processes for anyone, regardless of AD status. Some evidence for this conclusion comes from the lack of a strong relationship between explicit memory and change scores in the control group. Ability to interpret artworks may be considered more akin to a procedural than declarative skill, in that it may develop over a lifetime of exposure without necessarily depending on conscious analytical processes. We also know that procedural learning is relatively more preserved in AD than is declarative learning (Deweer et al., 1994), and in a recent study, was found to be uncorrelated with plaque and tangle density in brain tissue (Fleischman et al., 2005).

Taking a somewhat broader view, Leder et al. (2004) model of aesthetic processing involves perceptual analysis at an early stage and involves "cognitive mastery" at a later stage. Our patients had at least grossly intact abilities to interpret pictures, as shown by fairly good performance on the control task. However, it would be interesting to test dementia patients whose primary impairment is visuospatial, for instance those with Lewy body disease (Ferman et al., 2004; Tiraboschi et al., 2006). The symptoms of this illness also tend to fluctuate over time, and thus we would expect to see more instability in art preference among these individuals. Conversely, patients with extensive art background would be interesting to follow longitudinally, as they presumably would have more access than the average person to mastery of art. This extra layer of mastery might extend the period during which art preference remains coherent, in the face of other deteriorating abilities.

One aspect of aesthetic judgment not yet discussed is emotional response. It is likely that preference has both a cognitive and emotional component (Leder et al., 2004). Although we did not isolate emotional response in this study, it is worth noting that the preponderance of evidence suggests that processing of emotion is not foremost among the vulnerabilities in early AD (Hamann, Monarch, & Goldstein, 2002; Padovan, Versace, Thomas-Antérion, & Laurent, 2002). Therefore, to the extent that emotional processing contributes to preference judgments, we should again not be surprised at the preservation of preferences over our two-week interval.

Returning to some of the motivation for this study, we conclude that patients with Alzheimer's disease respond

to art, as indicated by preference, in as consistent fashion as do unimpaired individuals. This should be encouraging to art therapists and other caretakers, who may want to offer art appreciation experiences to AD patients. We also showed that aesthetic response does not seem to be highly dependent on explicit memory, as the AD patients' preference responses were unimpaired even in the face of complete amnesia for the paintings presented two weeks earlier. Thirdly, we provide evidence that preference ratings are a valid measure to use with early-stage AD patients, either directly or as indices of implicit memory.

Finally, we return to the item analysis to emphasize that the preference responses by both groups seem to be stable but individualistic responses. This finding supplements other studies showing the stability and individuality of preferences for sparser materials (Höfel & Jacobsen, 2003; Jacobsen, 2004; McManus, 1980). Although some compositional principles such as symmetry can account for preferences in formal patterns (Cardenas and Harris, 2006; Jacobsen and Höfel, 2003), clearly, these individual preferences suggest aspects other than formal properties contribute to preference since our participants disagreed with one another quite considerably in preference rankings. Therefore, in judging artworks, people with and without dementia really *do* know what they like.

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