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Can Persons with Alzheimer's Disease Express Their Aesthetic Preferences? Insights into the Design of Facilities

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Abstract

Background/Objectives: Facilities for persons with Alzheimer disease need to be adapted for them in terms of architecture and interior and exterior design, where the introduction of an artistic dimension is recommended. This raises the question of exploring the aesthetic preferences of the people concerned in order to optimise the design. We assessed whether individuals with Alzheimer's disease can make aesthetic judgements, and if so, their nature and how stable they were over time. **Methods:** We compared the aesthetic preferences of 23 persons with Alzheimer's disease matched to 23 controls. Preferences were collected using a Q-PEG questionnaire, which presents photographs of various artworks: paintings, sculptures, functional objects, and representation of living things: human, animal, and landscape, in various styles: figurative, stylized, abstract. This tool was created specifically by our team for this research; this is the first exploratory publication to use it. **Results:** We confirm the feasibility of collecting aesthetic judgements from individuals living with Alzheimer's disease using the Q-PEG tool. The aesthetic judgements of both participant groups proved to be stable over time. Furthermore, the aesthetic judgements of individuals with Alzheimer's disease did not differ from those of the controls, regardless of the style or type of artwork. These preferences are independent of the various cognitive functions assessed. Hypotheses about the Alzheimer-resistant nature of the cognitive register of aesthetic preferences are discussed. **Conclusions:** As they can express their artistic preferences, individuals living with Alzheimer's disease should be consulted. These results provide insights for the design of facilities and therapeutic gardens based on evidence-based design (EBD) criteria. The integration of an artistic dimension in line with these preferences and in compliance with the general recommendations makes it possible to create adapted, specific spaces that are appreciated by all.

Keywords: Alzheimer's disease; neuro-aesthetics; aesthetic preferences; design of facilities; quality of life

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1. Introduction

In France, according to a study by the Ministry of Health, in late 2019, 730,000 people were living in care facilities for the elderly, of which 93% of those under 70 had Alzheimer's disease (AD) or a related illness [1]. Therefore, these facilities should be adapted to their needs, both in terms of their architecture and interior design as well as the outdoor spaces, especially therapeutic gardens, with particular attention paid to the sensory dimension [2,3].

The benefits of art for individuals living with AD or other various pathologies and in the general population are evidenced both for the pursuit of previously practiced activities and for the initiation of a creative artistic experience, whether through "active" or "passive" practice [4]. The World Health Organisation (WHO) report "What is the evidence on the role of the arts in improving health and well-being?" analysed over 3000 articles from 200 journals between 2010 and 2019, highlighting their relevance in the fields of health prevention and promotion. A recent WHO publication suggests drafting a charter or declaration on arts and health, aimed at recognising engagement in the arts as a health behaviour and access to art and culture as a social determinant of health [5,6].

For participants living with cognitive impairments, the contemplation of artworks, such as through visits at the Museum of Modern Art in New York [7–9] and programmes by the ARTZ association in the USA or at the Louvre in France, serves as an example of an art-based intervention (https://www.assoartz.org, accessed on 31 March 2024). Individuals living with AD, even if they have no prior experience in the arts, demonstrate preserved skills and benefit from this practice [10]. Participation in artistic activities and exposure to artworks may lead to improvements in cognitive performance: recognition abilities for paintings presented repeatedly over a two-month period, even in the presence of distractors [11–13]. The contribution of the artistic dimension has also demonstrated that it fosters communication, semantic memory, and positive emotions [14].

An aesthetic experience encompasses various dimensions [15,16]:

- Processing of sensory properties during perceptual–cognitive processes;
- Attribution of meanings, particularly through connections with knowledge and representations stored in memory;
- Interaction between the characteristics of the object and the emotions of the observer.

Alzheimer's disease can have an impact on these different processes, and it is, therefore, important to understand the relationship between art and people living with AD in order to better define the modalities of an art-based intervention for them [17]. Recommendations have been established for the artworks: they aim to ensure safety and enhance their appeal [18,19] and to reflect regional cultural references, which helps appeal to ancient collective memory [14,20,21]. However, the opinions of users should be actively sought [22,23].

The work presented here on the exploration of aesthetic preferences among individuals living with Alzheimer's disease aims to explore several questions that remain unresolved: (i) What are the artistic preferences of persons living with AD? (ii) Can they express their aesthetic preferences? (iii) Are these preferences stable over time? (iv) Is there any influence of the environment on these preferences? (v) Do these preferences differ from those of healthy individuals? We will analyse the results in light of theories on aesthetic experience, the link with dimensions of the self, and works on functional neuroanatomy.

2. Materials and Methods

2.1. Collection of Aesthetic Preferences (Q-PEG Questionnaire)

The JAZ PEG study is part of a larger study, JAZ ART, in which participants are interviewed during guided walks in a therapeutic garden in order to define the psycho-

logical benefits of this garden. This prototype garden combines neuropsychological and artistic design principles in an integrative approach. It includes eighteen artworks and vegetation specifically selected for their potential to evoke well-being, communication, and reminiscence.

Participants' artistic and cultural practices were assessed to ensure that no participant had significant prior artistic knowledge or practice that might interfere with the study. Indeed, personal experience may modulate aesthetic judgement, which is explained differently by various aesthetic theories. Belke's studies [24,25] have, thus, demonstrated an effect of expertise and the reiteration of aesthetic appreciation for abstract works: preferences among experts, but not novices, increase due to enhancements in higher-order processing. Therefore, it seemed essential to verify the absence of an effect from prior artistic experience: we chose to establish for this study groups of "novices" for persons with Alzheimer disease and controls alike.

Aesthetic preferences using the Q-PEG were collected three times during two separate visits, at a maximum of eleven days apart. For each participant, before the "Discovery" interview of the garden and after a first "Mnemonic" interview which took place after the first accompanied walks in the garden—after the first exposure to artworks of various styles and the vegetative landscape dimension of a therapeutic garden—and then at a later interval, after a second exposure to the same garden after the second "Mnemonic interview". This makes it possible to assess the potential influence of the environment by conducting an evaluation in a conventional office setting before and after the walk in the garden, and the long-term stability of the aesthetic preferences were assessed. Reproducibility is ensured by administering the questionnaire three times. All participants followed the same procedure. The participants respond to a questionnaire regarding the photographs of Q-PEG.

Participants were not informed of their results. The psychologist administering the Q-PEG was also unaware of the results of the neuropsychological tests, which were conducted last [23].

The Q-PEG assessment measures aesthetic judgement on artwork-by-artwork basis rather than a comparative evaluation. It allows for the appreciation of the more or less positive judgement. In contrast, a preference ranking does not necessarily indicate that the subject holds a qualitatively positive judgement of the artworks. Thus, this test is better suited to inform us about the types of artworks to propose in living environments, both indoors and in therapeutic gardens, for individuals living with a progressive neurocognitive disorder.

The Q-PEG collects participants' evaluations of 20 artworks [24], none are universally known. These photographs are taken from the online stock of resources of the mentioned museums in Table 1. The colour photographs are presented in 21 × 29.7 cm format in a random order consistent for all participants. Each artwork was classified according to its style (Figurative, Stylized, Abstract), category (Living, Non-Living, indeterminate), and theme (Human, Animal, Landscape, Functional Object). The two categories of non-living objects selected are functional objects: designer furniture and means of transport. The Q-PEG Questionnaire divides the works into only three categories in order to avoid ambiguity as much as possible. This classification is analogous to that used in the article by Halpern 2008 [26]. The photographs were selected and classified by a university professor. In addition to this expert, the classification was evaluated by:

- A sculptor and designer with over 30 years of experience who participates in international exhibitions.
- Three healthcare, non-artistic professionals, who assisted in verifying with the artist the consensual nature of this classification. It corresponds to common usage among people who do not practice art, such as the participants in the study. It should be

noted that participants were not asked to classify the works according to their style but rather to indicate their preferences.

Table 1. Classification of artworks.

Style	Genre	Category	Medium	Artist	Artwork Name	Creation Date
Figurative	Human	Living	Sculpture	Edgar DEGAS	Little Dancer Aged Fourteen	1880–1881, cast c.1922
Figurative	Animal	Living	Sculpture	Jean Louis Ernest MEISSONIER	Cheval au trot (a)	Second half of the 19th century
Figurative	Landscape	Living	Painting	John GLOVER	Thirlmere	1820–1830
Figurative	Transport means	Non-living	Model	Un marin du "Pourquoi Pas?"	"Pourquoi Pas" Navire Charcot (b)	20th century
Figurative	Functional object	Non-living	Designer furniture	Jean PROUVÉ	Chaise standard dite "Métropole" (c)	1950 (c)
Figurative	Functional object	Non-living	Designer furniture	Antoni GAUDÍ	Two-seat sofa (d)	1904–1906 (d)
Stylized	Human	Living	Sculpture	Leon UNDERWOOD	Herald of New Day	1932–1933
Stylized	Animal	Living	Sculpture	Marino MARINI	Cavallo (e)	1950 (e)
Stylized	Landscape	Living	Painting	Evelyn CHESTON	Betchworth Lane	October 1917
Stylized	Not applicable	Not classified	Sculpture	Not specified	Not specified (f)	Not specified (f)
Stylized	Landscape	Living	Painting	Wassily KANDINSKY	Lake Starnberg	1908
Abstract	Not applicable	Non-living	Painting	Piet MONDRIAN	Composition C (No. III) with Red, Yellow and Blue	1935
Abstract	Human	Not classified	Sculpture	Henry MOORE, OM, CH	Four-Piece composition: Reclining figure	1934
Abstract	Human	Not classified	Sculpture	Jean ARP Hans ARP	Sculpture to be Lost in the Forest	1932, cast c.1953-8
Abstract	Not applicable	Indeterminate	Sculpture	Henry MOORE, OM, CH	Three Points	1939–1940
Abstract	Not applicable	Non-living	Sculpture	Peter LANYON	Porthleven Boats	1950–1951
Abstract	Not applicable	Indeterminate	Design	Ron ARAD	Chaise sculpture "Bodyguard" (g)	2007 (g)
Abstract	Not applicable	Indeterminate	Sculpture	Dame Barbara HEPWORTH	Hollow Form with White	1965
Abstract	Not applicable	Not classified	Sculpture	Marcel DUCHAMP	Wedge of Chastity	1954, cast 1963
Abstract	Animal	Not classified	Sculpture	Raymond DUCHAMP-VILLON	Large Horse	1914, cast 1961

Museum where artworks are exhibited: (a) Musée des Beaux-Arts de Bordeaux (France); (b) Musée de la Région Centre (France); (c) Musée d'Art Moderne de Saint-Etienne Métropole. (France); (d) ("Marino Marini (1901–1980), Cavallo", s. d.); (e) British Museum, (Great Britain) ("Image gallery", s. d.); (f) Museo National d'Art de Catalunya (Espagne); (g) Centre Georges Pompidou (France).

When administering the Q PEG, three questions help to clarify the aesthetic judgement made by the subject.

- For each photograph, the participant was asked to indicate what he thinks of it. Persons with Alzheimer's disease may have difficulty verbalising their aesthetic judgement [27]. Thus, we used a vertical Lickert scale. One end corresponds to the maximum imaginable beauty. The other end corresponds to something very ugly or not beautiful.
- "Do you like this?" Answer: yes or no.
- "Would you like to have this at home?" Answer: yes or no.

An example using a photograph that does not belong to the series is provided to verify the understanding of the instructions.

Scoring

The first score ranges from 0 to 10. The maximum score for this Q-PEG metric is 200.

For the second score, "No" answers are scored 0, and "Yes" 1 point: the maximum score is 20.

For the third score, "No" answers are scored 0, and "Yes" 1 point: the maximum score is 20.

Each artwork is scored out of 12 points; the maximum total score is 240. We used a score ratio because of the varying number of artworks in each sub-category.

2.2. Neuropsychological Evaluation

All subjects underwent an assessment of their socio-cultural level [28] as well as the Edinburgh Handedness Inventory [29]. For persons with Alzheimer's disease, the Reisberg Scale [30] was used to evaluate the overall severity of the disease, and depression was assessed using the Cornell Scale [31,32].

The cognitive assessment comprised the Montreal Cognitive Assessment (MoCA) to measure the global cognitive efficiency [33]. Episodic memory was evaluated through the "Free Recall/Cued Recall with 16 Items" (RL/RI-16) [34]. Language assessment was based on "Oral Comprehension of Images" and "Image Naming" from the Montreal–Toulouse battery, version MT1α, as well as "Category Verbal Fluency" and "Alphabetical Verbal Fluency" [35,36]. Working memory tests: involved two tasks "Corsi Blocks" [37] for the "Visual–Spatial Span" of working memory and "Letter–Number Sequences" of the Wechsler Memory Scale [38]. Executive function evaluation was conducted using the "Frontal Assessment Battery—FAB" [39], visuo-spatial abilities through "Bells Test" [40], and apathy using Marin's Apathy Evaluation Scale [41].

2.3. Subjects

The research focuses on a sample of 46 subjects: Two groups of 23 participants matched by age, gender, and cultural level were compared: Group A consisted of healthy control subjects without cognitive impairment while Group B comprised individuals monitored for Alzheimer's disease in a Resources and Research Memory a Memory Clinic.

2.4. Inclusion and Exclusion Criteria

- Group A—Healthy control subjects: no dementia according to the NINCDS-ADRDA criteria [42] and normal performance on the Folstein Mini-Mental State Examination (MMSE), based on the GRECO (Group for Reflection on Cognitive Assessments) norms [43,44].
- Group B—Subjects living with Alzheimer's disease: the study was offered to all subjects who met the inclusion criteria and were followed up at the CMRR consultation in order of arrival. Inclusion criteria: aged 60 to 100 years, diagnosed with probable Alzheimer's disease according to the NINCDS-ADRDA diagnostic criteria [42], at a mild to moderate stage, Folstein MMSE scores between 7 and 24 inclusive, stable pharmacological treatment for AD, no changes in psychotropic medication in the 48 h preceding inclusion, and independent ambulation.

Exclusion criteria for both groups: sensory deficits, language disorders, neurological or psychiatric diseases interfering with the study tasks, history of traumatic brain injury with loss of consciousness, chronic alcoholism, severe depression (score > 20/30 on the Geriatric Depression Scale at inclusion) [45].

2.5. Statistical Analyses

A descriptive analysis was conducted on all variables collected within each group, employing frequencies and percentages for qualitative variables, and medians and quartiles for quantitative variables. Comparative analyses were subsequently performed using Wilcoxon signed-rank tests to compare patients with their matched controls. The significance threshold was set at $p = 0.05$. This is an experimental study, so no NSN calculation was initially planned in the protocol. In order to assess whether aesthetic preferences were stable over the three assessment periods in the two groups independently, repeated measures tests were performed. The software used for the analysis was SAS v9.4.

3. Results

3.1. Subjects Description

- Group A (Healthy Controls subjects)

This group comprised 8 men and 15 women, with a median age of 73 years (71–79 years) and a median MMSE score of 29 (28–30). Of the participants, nine had a socio-cultural level 2 (secondary school enrolment), six had level 3 (high school enrolment), and eight had level 4, (university education). Two participants were lost to follow-up between the two visits. The mean interval between visits was 7.76 days (ranging from 4 to 11 days). The median score on Marin's AES is 62 (58–64), indicating the absence of apathy; this score does not vary significantly at the three time points of the two visits.

- Group B (Subjects living with Alzheimer's disease)

This group also consists of 8 men and 15 women, with a median age of 78 years (75–84 years) and a median MMSE score of 18 (16–21). Similarly, nine had a socio-cultural level 2 (secondary school enrolment), six had level 3 (high school enrolment), and eight had level 4 (university education).

The results from the RL/RI-16 test indicate a floor effect: Immediate free and cued recall could only be performed by 11 and 10 patients, respectively. Delayed recall was completed by 9 out of 23 patients due to significant memory impairments in order to avoid making the situation overly challenging for the patients. One participant was lost to follow-up between the two visits. The mean interval between these visits was 7.14 days (ranging from 4 to 10 days). The median score on the Cornell Scale is 2 (1–5) (with a threshold score of 10), indicating no significant depressive disorder. This score remains stable across the three time points of the study, showing no significant variation. The median score on the Marin's AES is 61 (54–64), reflecting mild apathy; this score does not vary significantly across the three assessments.

3.2. Comparisons Between Groups A/B (Controls/Patients)

3.2.1. Socio-Demographic Variables

Matching for sex and socio-cultural level was verified. The matching for age allowed for a variation of ± 5 years, revealing a statistically significant difference, with controls being younger (73 years vs. 78 years; Wilcoxon signed-rank test $p < 0.0001$). There was no significant difference between controls and patients regarding prior artistic practice.

3.2.2. Neuropsychological Assessments

As expected, subjects living with Alzheimer's disease exhibited significantly lower scores compared to controls, except for the alphabetical fluency test: for this test we observe a trend without reaching the significant threshold (Table 2).

Table 2. JAZ PEG. Neuropsychological test comparison between the two groups.

	Matched Persons with Alzheimer's Disease N = 23 (50.0%)				Matched Control N = 23 (50.0%)				
	N	**%/Med ***	**Q1**	**Q3**	**N**	**%/Med ***	**Q1**	**Q3**	***p* ******
MoCA Score total	22	14.0	9.0	16.0	22	26.0	23.0	27.0	<0.0001
RL-RI16 RL 1/2/3	10	6.5	5.0	16.0	10	28.5	25.0	36.0	0.0078
RL-RI16 R Total 1/2/3	9	26.0	17.0	33.0	9	48.0	47.0	48.0	0.0039
RL-RI16 RL Delayed	8	2.0	0.0	7.0	8	11.5	9.0	14.0	0.0313
RL-RI16 R Delayed total	8	8.0	5.0	13.5	8	16.0	16.0	16.0	0.0313
Letter–Number Sequencing	22	1.5	1.0	3.0	22	7.0	5.0	9.0	<0.0001
Bells test	21	30.0	22.0	32.0	21	34.0	34.0	35.0	0.0001
Corsi Blocks OD	21	5.0	4.0	5.0	21	8.0	6.0	9.0	<0.0001
Corsi Blocks OI	21	2.0	1.0	5.0	21	6.0	6.0	7.0	<0.0001
FAB Total	21	11.0	8.0	14.0	21	15.0	14.0	16.0	0.0004
Verbal Fluency P	22	12.0	6.0	17.0	22	16.0	11.0	21.0	0.0702
Verbal Fluency Animals	22	10.5	8.0	19.0	22	23.0	18.0	29.0	<0.0001
MT1α Oral Comprehension of Images	22	10.0	9.0	10.0	22	11.0	10.0	11.0	0.0090
MT1α Image Naming	22	8.0	7.0	8.0	22	8.0	8.0	8.0	0.0313
AES	23	61.0	54.0	64.0	23	62.0	58.0	64.0	0.1053

* Median. ** Wilcoxon signed-rank tests. MoCA: "Montréal Cognitive Assessment", RL-RI16 RL 1/2/3: "Free Recall/Cued Recall with 16 items" Total Free Recall, RL-RI16 R Total1/2/3: "Free Recall/Cued Recall with 16 items" Total Recall, RL-RI16 RL Delayed: "Free Recall/Cued Recall with 16 items" Free Delayed Total Recall, RL-RI16 R Delayed total: "Free Recall/Cued Recall with 16 items" Delayed Total Recall, Letter–Number Sequences: "Wechsler Memory Scale (WMS-III)", Bells Test: "Bells cancellation task" test, Corsi Blocks OD score: "Wechsler Memory Scale (WMS-III)", Corsi Blocks OI score: "Wechsler Memory Scale (WMS-III)", FAB Total: "Frontal Assessment Battery", Verbal Fluency P: "Alphabetical Verbal Fluency", Verbal Fluency Animals: "Category Verbal Fluency", MT1α Oral Comprehension: "Montreal–Toulouse Battery version MT1α, oral comprehension of Images".

3.2.3. Total Score on the Q-PEG Questionnaire

Group A: Controls. Prior artistic practice, sex, and socio-cultural level did not significantly influence Q-PEG scores at any assessment time point. At T0, age did not significantly affect the total score, while at T1 it did (0.005), though this effect did not persist at T2. The order of preferences for artworks at T0 is as follows: Art—Figurative: 42.8% ± 10.3, Abstract: 37.8% ± 13.7, Stylized: 26% ± 6.7; Category—Living: 41.7% ± 9, Non-living: 26.1% ± 7.8, Indeterminate: 14.2% ± 5.9; Genre—Human: 20.4% ± 7.5, Landscape: 18.7% ± 3.9, Animal: 15.7% ± 4.2, Functional Object: 15.6% ± 5. This order of preference remains stable at T1 and T2.

There is no significant correlation between the total Q-PEG score and the scores on the various neuropsychological assessments.

Group B: Subjects with Alzheimer's disease or a related illness. No significant differences were found at T0, T1, and T2 with regard to age and sex and for prior artistic practice at T0 and T1. For prior artistic practice, a significant influence was noted on the total score (0.02) at T2 only (0.05). The socio-cultural level significantly influenced the total Q-PEG score at T0 (0.04), with higher scores observed for higher socio-cultural levels; however, at T1 (0.01) and T2 (0.04), this significance was not maintained. The order of preferences for artworks at T0 is as follows: Figurative: 42.9% ± 9.1, Abstract: 34.7% ± 17.3, Stylized: 25% ± 8.7, Living: 39.6% ± 10.4, Non-living: 27.5% ± 8.8, Indeterminate: 12.4% ± 5.9, Human: 19.2% ± 8.1, Landscape: 17.1% ± 5.6, Animal: 15.1% ± 4.4, Functional Object: 17.6% ± 4.5. This order of preference remains stable at T1, except for the Functional Object category, which slightly surpasses the Animal category at 16.4% ± 4.7 and 15.7% ± 3.9. At T2, the Functional Objects category (18% ± 4.3) achieves higher scores than the Landscape (17.4% ± 6.1) and Animal (17.2% ± 4.6) categories.

There is no significant correlation between the total Q-PEG score and the scores on the various neuropsychological assessments.

Comparison of Group A Control Subjects/Group B Alzheimer's Disease Persons (Table 3). No significant differences are observed between the two groups regarding preferences regardless of the type of artwork considered and between cases and matched controls concerning aesthetic preferences.

Table 3. JAZ PEG. Aesthetic preferences at T0 between cases and matched controls.

	Matched Persons with Alzheimer's Disease N = 22				**Matched Controls N = 22**				
	N	**%/Med ***	**Q1**	**Q3**	**N**	**%/Med ***	**Q1**	**Q3**	***p* ****
TOT PEG	22	116.0	100.0	128.0	22	104.0	94.0	137.0	0.888
TOT Figurative	22	37.5	31.0	41.0	22	34.0	31.0	41.0	0.667
Ratio Figurative	22	6.3	5.2	6.8	22	5.7	5.2	6.8	0.680
TOT Stylized	22	25.0	22.0	30.0	22	25.0	22.0	31.0	0.789
Ratio Stylized	22	5.0	4.4	6.0	22	5.0	4.4	6.2	0.802
TOT Abstract	22	38.0	21.0	48.0	22	39.0	29.0	47.0	0.788
Ratio Abstract	22	4.2	2.3	5.3	22	4.3	3.2	5.2	0.788
TOT Living	22	40.0	36.0	49.0	22	42.0	34.0	48.0	0.615
Ratio Living	22	5.7	5.1	7.0	22	6.0	4.9	6.9	0.626
TOT Non-Living	22	27.0	23.0	35.0	22	27.0	21.0	32.0	0.363
Ratio Non-Living	22	4.5	3.8	5.8	22	4.5	3.5	5.3	0.353
TOT Indeterminate	22	14.0	8.0	17.0	22	14.0	11.0	18.0	0.281
Ratio Indeterminate	22	4.7	2.7	5.7	22	4.7	3.7	6.0	0.265
TOT Human	22	18.0	15.0	25.0	22	19.5	15.0	26.0	0.826
Ratio Human	22	4.5	3.8	6.3	22	4.9	3.8	6.5	0.826
TOT Animal	22	15.0	12.0	19.0	22	16.0	13.0	19.0	0.549
Ratio Animal	22	5.0	4.0	6.3	22	5.3	4.3	6.3	0.488
TOT Landscape	22	17.0	15.0	21.0	22	18.0	16.0	21.0	0.436
Ratio Landscape	22	5.7	5.0	7.0	22	6.0	5.3	7.0	0.447
TOT Functional objects	22	18.0	14.0	21.0	22	16.5	12.0	18.0	0.178
Ratio Functional Objects	22	6.0	4.7	7.0	22	5.5	4.0	6.0	0.147
TOT Not Applicable	22	30.5	17.0	36.0	22	31.0	23.0	38.0	0.626
Ratio Not Applicable	22	4.4	2.4	5.1	22	4.4	3.3	5.4	0.638

* Median. ** Wilcoxon signed-rank tests.

3.2.4. Comparison of Scores According to the Three Evaluation Time Points

The test did not reveal any statistically significant differences based on the time point and group for the total Q-PEG score (Figure 1).

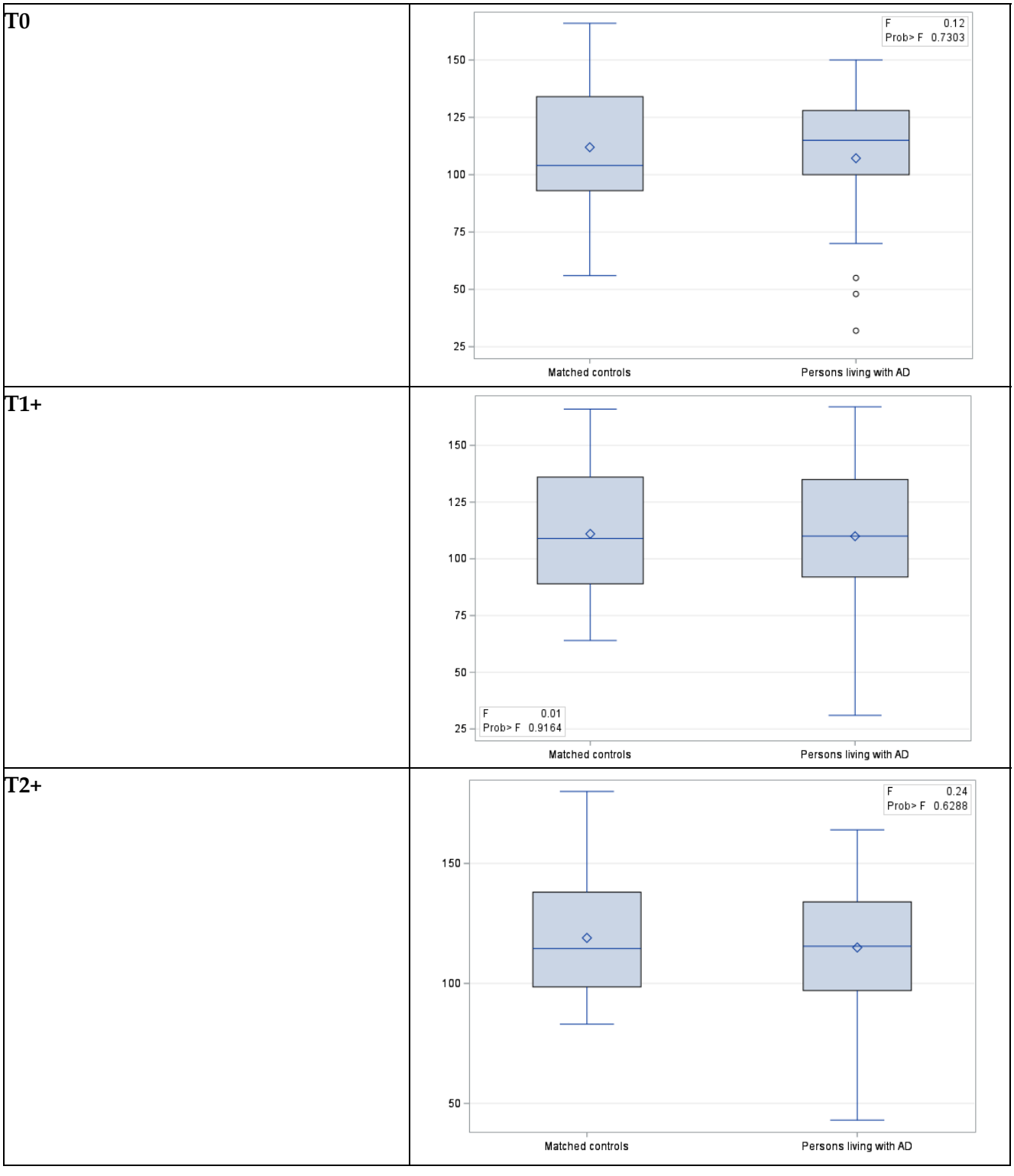


Figure 1. JAZ PEG. TOT PEG scores based on time and group. Repeated measures test: p-value = 0.742.

4. Discussion

First, we present a discussion of the summary of our results in response to the question this study sought to clarify, followed by the theoretical hypotheses we propose to explain them.

4.1. Discussion of the Results of This Study

4.1.1. Feasibility of Exploring Aesthetic Preferences in Individuals Living with Alzheimer's Disease

We confirm the feasibility of collecting aesthetic judgements from individuals living with Alzheimer's disease using the Q-PEG tool. The approach adopted differs from that of Halpern and Leder [15,16], which relied on ranking artworks in order of preference rather than on an independent, individualised judgement of each presented work as in the Q-PEG. In the study by Silveri [46], participants were required to evaluate works on a scale of 0 to 4. The scoring used here for the Q-PEG is more detailed; however, it did not pose difficulties for the participants: none failed to complete the assessment or refused to participate. We can conclude that persons with AD can express aesthetic preferences.

4.1.2. The Aesthetic Preferences of Individuals with AD Are Stable

We presented a sample of artworks, equivalent in number, with 20 pieces instead of 16 or 24, as in previous studies [15,26,46]. The time interval between the two assessments, at a maximum of eleven days apart, allows for engagement with long-term memory. Our findings about the stability of aesthetic preferences in both controls and persons living with AD support earlier research while offering more insight. The consistency of judgements is confirmed across three assessments rather than two. Thus, as observed across different countries, despite socio-cultural variations and with different series of artworks, the robustness of this finding on the stability of aesthetic preferences, both among controls and persons with Alzheimer's disease, is further reinforced.

4.1.3. The Aesthetic Preferences of a Broad Variety of Artworks Were Explored: Figurative Art Seems to Be the Most Appreciated

The Q-PEG tool facilitated the exploration of aesthetic preferences concerning a diverse range of artwork types, including not only paintings but also sculptures and elements of design furniture. Additionally, it allowed for the comparison of different styles—"Figurative", "Stylized", "Abstract"; various categories—"Living", "Non-living", "Indeterminate"; and artistic genres—"Human", "Animal", "Landscape." To our knowledge, this is the first study to extend aesthetic preferences to mostly sculptures and functional pieces, such as furniture. Indeed, only Silveri et al. [46] included two vases and one bronze sculpture among eight figurative and eight abstract works presented in their study involving 16 individuals with mild to moderate AD and 15 caregivers, while all other works were paintings.

The preference for figurative art, both in controls and in people living with AD, is found again, and concerns different genres and categories; it thus seems to be generalised and considered a constant at least in this age group. Artworks depicting living things are preferred over those depicting non-living things. Within the category of living things, preferences predominantly lean towards representations of landscapes, which aligns with the findings of Carpman and Grant [47], who asked a group of 300 persons with AD to choose their preferred image from 71 colour photographs for their hospital room; representations of nature were favoured over diverse categories. Personal experience constitutes a necessary stage for aesthetic judgement emergence; the influence of personal experience may be more marked among non-experts for figurative art than for abstract art [48].

4.1.4. The Aesthetic Preferences Expressed Do Not Seem to Be Influenced by the Context

Our results support the absence of an effect on the aesthetic preference collected due to prior exposure to artworks immediately before the test during a visit to the garden which incorporates works of art. In Halpern's [26] study, there was no prior exposure to artworks before the aesthetic judgement task. In Silveri's [46] study, aesthetic preferences were collected following visits to the National Gallery of Modern Art in Rome. The question

of whether guided museum visits influence aesthetic judgements about the presented works may arise. In our study [23], the subjects were exposed to original works of art of different styles independent of those proposed in the Q-PEG questionnaire. We observed no significant differences between the first two assessments conducted before and after the first garden walk nor between those and the assessment conducted after the second walk. Thus, the stability of aesthetic preferences is noted, regardless of whether subjects had been previously exposed to artworks.

4.1.5. Aesthetic Preferences of Persons with AD for Different Art Forms Are No Different from Those of Matched Controls

Graham's study with individuals living with AD demonstrates that aesthetic judgements regarding paintings depicting landscapes or faces do not differ from those of controls [49]. Our study broadens the observation of aesthetic judgement similarity regardless of art styles such as "Figurative", "Stylized", "Abstract"; category such as "Living", "Non-living", "Indeterminate"; or genre including "Human", "Animal", "Landscape", and "Not Applicable." The convergence of artistic preferences between the two groups of participants, controls, and persons with AD, suggests that the artistic dimension, based on these results, can be positively appreciated by both groups. Questionnaires and interviews assessing the satisfaction of persons with AD, visitors, and professionals reflect the positive and converging appreciation expressed regarding the artistic dimension of a garden [21,50].

4.2. What Hypotheses Might Explain These Results

4.2.1. Are Aesthetic Preferences a Cognitive Register Resistant to Brain Damage in Alzheimer's Disease

The absence of a significant difference between persons with AD and matched controls further supports the hypothesis of a particular resilience of aesthetic preferences against the pathological processes underlying AD. The lack of correlation with the neuropsychological evaluations indicates the independence of aesthetic preferences from these dimensions, thus highlighting their uniqueness within the realm of cognition. This memory of aesthetic preferences, which seems to be preserved in people living with AD, raises the question of its very nature. This "memory of tastes and preferences" cannot be linked to the components of Tulving's model [51]. It seems distinct from the episodic memory, which does not appear to influence it. Furthermore, an absence of connection between aesthetic judgement and the memorization of artworks to be ranked by preference was observed [15,26]. Nor does this memory of aesthetic preferences belong to the semantic register of the knowledge associated with these works. Semantic memory relates to the connoisseur or the informed amateur who identifies the artist, period, or artistic movement of a piece. We observe this stability without semantic information being provided about the works to be appreciated, regardless of whether participants were previously exposed to other artworks during their visit to the garden. In fact, in Silveri's study [46], the semantic information provided about the presented works did not enhance their memorization. For novices, aesthetic preferences do not arise from an explicit register but rather from an "inner movement" initiated within the implicit domain. An argument supporting this is provided by Kliem's study [52] involving 15 persons living with AD, with a mean MMSE of 18.9 $\pm$ 3.68. Participants were required to make aesthetic judgements twice, two weeks apart; these judgements proved to be stable, despite the absence of explicit memorization as explored through a recognition task with distractors.

4.2.2. Figurative Art Is the Most Popular: What Interpretations Can Be Offered Based on Theories of the Artistic Experience

Studies in the general population reveal a significant majority preference for figurative art (Delvani cited in [19]), Cheng [53]. Does the degree of familiarity and concreteness of figurative art, which closely resembles a "faithful" representation of reality, sufficiently explain this preference? Several theories and models have been proposed to account for aesthetic experience.

The psycho-evolutionary theory posits that interest in survival and/or reproduction is the foundation of a positive appreciation that evolves into an aesthetic preference over time. Human interactions with their environment have gradually influenced their perceptions, thoughts, and actions in a similar manner, leading to an attraction to certain types of visual information that are deemed "favourable." This theory posits little effect of personal experience of the environment. This could explain the universal nature of the feeling of beauty [17,54]. This adaptive approach establishes a link with the emotions experienced innately, which are rapid responses that contribute to survival. For instance, regarding the attractiveness of faces, this emotional response exists whether the subject is performing a beauty judgement task or an identification task, activating the reward neural circuit [55–57]. In terms of landscape attractiveness, this theory is exemplified by Appleton's "savanna hypothesis" [58], which posits that this type of landscape is preferred because it provides humans with sustenance and refuge. Visual arts that do not serve a reproductive purpose, such as the "decoration" of nests by "bowerbirds" (ptylonorhynchidae), are a uniquely human characteristic. Artistic production may serve as an indicator of intelligence and a means of cohesion within social groups. The term "aesthetic fitness" has been proposed to describe this phenomenon, suggesting that it contributes to the survival of the group [59]. Relying on this theory would lead to the interpretation of the lesser preference for abstract works due to their lack of connection to the "archaic" attractiveness of concrete elements related to survival [60,61].

The pleasure–interest model (Graf 2015) [62] assumes the existence of two associated systems: an ascending system initiated by the stimulus, which is rapid, automatic, and constant, and a descending, high-level system initiated by the subject, which is voluntary and, therefore, slower. This model uses the notions of perceptual and conceptual fluencies. The concept of perceptual fluency [63] is significant in aesthetic appreciation. A fluent work requires only low-level processing, which plays an essential role in aesthetic pleasure, while a disfluent work in perceptual terms initially leads to negative appreciation; it is through higher-level processes that aesthetic interest is subsequently mobilised. Thus, a fluent work facilitates the encoding and perceptual processing of the stimulus, as observed in cases of symmetry, balance, and prototypicality [64–67]. Perceptual fluency influences beauty and creativity judgements regarding a work of art differently [63]. Here, personal experience is considered to play a modest role in aesthetic emotion concerning so-called fluent works but a more notable role for nonfluent works that involve the implementation of higher-level processes. However, alongside perceptual fluency, conceptual fluency involves the understanding and evaluation of the artwork, leading to distinct aesthetic emotions. When expectations are violated, the subject must engage more extensive cognitive processes; thus, nonfluent works induce a transition from an initial state of uncertainty, or even displeasure, to a more elaborated interpretation. This cognitive effort can be highly pleasurable [67–69]. Here, personal experience is considered to play a more notable role for nonfluent works that involve the implementation of higher-level processes. Could the preference for figurative art, which possesses higher perceptual fluency, stem from its more immediate accessibility through low-level processes that are better preserved for longer durations in individuals with AD? Conversely, stylization, followed by a move towards abstraction with increasing

conceptual fluency, would make cognitive processing of the work increasingly "costly". This might explain the preferences expressed by persons living with AD and controls for figurative artistic styles.

Leder's sociocognitive model [15,16] describes the link between various automatic and deliberate cognitive processes, including perceptual analysis of stimuli, integration of perceptual information in implicit memory, an explicit classification stage, cognitive control and finally evaluation. According to this model, two processes emerge: a cognitive-based aesthetic judgement, linked to the evaluation of the qualities of works of art, the thoughts they trigger, the level of understanding achieved, or the ambiguity present; and an aesthetic emotion, driven by an affective pathway, which may manifest as feelings of surprise, pleasure, and a myriad of other emotions associated with art. The influence of personal experience is clearly taken into account here. More recently, Leder et al. [16] asserted that aesthetic experience possesses a phenomenological or affective dimension, in that it is subjectively felt and appreciated, thereby capturing our attention. Do the preserved aesthetic preferences observed in AD rely predominantly on the engagement of an emotional sensory register associated with beauty, even as the stages of cognitive mastery and evaluation in other areas are compromised by the disease? This beneficial effect of emotional valence on various cognitive processes during AD is well-established and extends to self-awareness [70].

4.2.3. Are Artistic Preferences a Dimension of the Self

In the realm of visual arts, the primary sensory dimension of the artwork cannot be overlooked. One of the earliest studies investigating aesthetic preferences in AD focused on colour, employing a task that required ranking seven colours by preference; this ranking also proved to be stable [71]. A synthesis of research on the benefits of sensory stimulation has highlighted its importance in AD, particularly regarding its effects on self-awareness [70]. Self-awareness, or reflective consciousness [72,73], allows individuals to be the object of their own consciousness [74–76]. Self-awareness is inextricably linked to memory, which constructs and maintains the identity of each individual. Self-awareness encompasses multiple facets [77,78]: it includes awareness of one's perceptions and bodily sensations, knowledge of personal intentions [79], subjective judgements concerning one's own thoughts and actions, and self-knowledge mediated by autobiographical memory [51,80–85]. Furthermore, self-awareness is expressed through our relationships with others. Alterations in self-awareness are considered a significant feature in individuals living with AD or related illness [78,79]. However, while the integration of new experiences involving self-adjustment may be impaired, the prior sense of self (self-maintenance), or the petrified self, persists [84]. Self is also expressed through our relationship with the outside world. A neural network, *the medial prefrontal cortex, precuneus, temporoparietal junction, and temporal lobe*, involved in the development and consolidation of a sense of identity has been described as the "brain map" of the self. The prefrontal regions are thought to coordinate representations of the Self and the Other understood in a broad sense as others and the external world, essentially the non-self, thus contributing to social cognition [75]. Alterations in certain dimensions of the self, have been highlighted in AD through the use of a systematic self-awareness exploration questionnaire (QCS) developed by Gil et al. The sense of identity develops gradually, and our tastes, which are expressed early in life, play a role in this process: they are profoundly personal; thus, should they not be connected to the dimension of the self? It is indeed interesting to compare our findings on aesthetic preferences in AD with studies examining the evolution of self-awareness; the leisure dimension is considered to be partially preserved [85]. Art-mediated interventions, such as music therapy [86] or access to therapeutic gardens [87], have been shown to

enhance self-awareness. In the case of music, only listening to pieces chosen according to the person's tastes has demonstrated effectiveness in terms of personal identity, affective state, knowledge of body representation, and moral judgements [86].

When they are in the garden, persons living with AD express positive emotions of joy and surprise, and mainly when viewing the artworks than when observing the vegetation [22]. Additionally, benefits for self-awareness, including the stabilisation of anosognosia and improved body perception, are observed [87]. Thus, could aesthetic preferences and the self-maintain special links mediated by the sensory component and the emotion that underlies the feeling of beauty experienced when these preferences are fulfilled? [21,70,88]. To be beneficial for self-awareness, the artistic medium, music or visual art, must resonate with the individual's preferences.

4.2.4. What Are the Contributions of Functional Anatomy Explored by Imaging?

The study of the neural bases of the perception of objective beauty reveals a correlation between the experience of beauty and the activity of the medial orbitofrontal cortex, which becomes evident when subjects view appreciated artworks [89–91]. This finding is further supported by similar orbitofrontal cortex activations observed during beauty judgement tasks involving photographs of faces or during music listening, akin to responses evoked by viewing artworks. Moreover, in healthy individuals, functional MRI patterns of activation during the observation of natural landscapes or gardens indicate that, while there are differences depending on the type of images presented, the activation of the medial orbitofrontal cortex for both natural landscapes and gardens may correspond to the involvement of the feeling of beauty and could be associated with its effect on self-awareness [92]. When other emotions associated with the feeling of beauty are compared, whether joyful or sad, additional areas typically linked to emotions, especially those of a social nature, are activated [91]. In the sadness versus joy comparison, activation involves the left inferior parietal lobe and the bilateral precuneus and middle frontal gyrus. The inverse comparison of joy with sadness activates the right temporoparietal junction including the supramarginal gyrus, areas involved in empathy [93]. Functional imaging also reveals a connection between aesthetic emotion and the self through activation of the "default mode network", which includes the posterior cingulate cortex, precuneus, ventral and dorsal medial prefrontal cortex, and inferior parietal cortex, including the temporoparietal junction. Its activation is observed during tasks with reference to the self or with floating attention which is not focused on external stimuli. In the field of music, its activation is observed when individuals listen to their preferred music but not when listening to music to which they are indifferent [94]. This network is involved in self-awareness, daydreaming, and imaginative thought [95]. This can be compared with Kaplan and Kaplan's theory on the beneficial role of nature, attributed to its capacity to evoke a state of soft fascination, which corresponds to a diffused, unfocused attention [96–99], as suggested by Hopman [100]. As noted, aesthetic judgement is part of this dimension of the self. The medial frontal cortex is regarded as crucially involved in self-awareness. Its proximity to areas associated with the experience of beauty supports an interrelationship between aesthetic judgement and self-awareness through the default mode network [101]. A connection between the sense of existence and the awareness of beauty may also be linked to the activation of the reward system [102,103], which also involves the medial orbitofrontal cortex. The experience of beauty and aesthetic emotion entails a pleasurable dimension. Furthermore, the engagement of this reward system helps to sustain both aesthetic judgement and awareness of that judgement, thus ultimately contributing to the formation of an "island" of resistance to the disease at the level of self-awareness [50]. Indeed, while the impact of neurocognitive diseases on the reward system is well-established, it is noteworthy that the "hedonic"

impact of Alzheimer's disease is associated with apathy [104]. Wong's research broadens this view, linking emotional apathy with aspects of reward, pleasure, and hedonism [105]. Interestingly, apathy is mild or absent in the persons with AD in our study. This suggests a link between emotion, hedonic, and reward dimensions, arising from aesthetic preference, self-awareness, and the experience of beauty, all correlated with the involvement of the orbitofrontal cortex and the default mode network. These various studies support the uniqueness and specificity of the experience of beauty, while connecting it to processes broadly related to social cognition in the broad sense and to the self.

4.3. Perspectives and Recommendations

4.3.1. For Designing Living Spaces for Individuals with Alzheimer's Disease

Beyond these hypotheses, which require further confirmation, across health, agronomy, architecture, and landscape disciplines embodies a true "evidence-based de-sign" approach. The dissemination of this approach among relevant professionals could enhance the quality of living spaces offered to persons with AD and residents in healthcare and social care facilities as well as to their visitors and the professionals working there. This article is intended to enrich and refine the design criteria for a comprehensive artistic approach and their individual, "made-to-measure" adaptation to the particularities and specific features of a site and its users: it is particularly important to regard the profile of the individuals being hosted, regional cultural references, and the aesthetic preferences of those who primarily reside there, namely, the persons with AD and residents. The resources and skills of the team, must also be evaluated following a thorough assessment of the site, including its strengths and constraints, as well as maintenance requirements, landscape and agronomic dimensions. This is a clearly multidisciplinary approach that should be used to guide the design of the facilities and the gardens.

4.3.2. Gathering the Views of Users Is Necessary

Consulting users is not always straightforward when it involves individuals living with cognitive impairments affecting memory, communication, and other areas. Too often, only a few residents, those without cognitive impairments or with mild deficits, are asked to participate in the social life councils of institutions and to express their opinions. Indeed, our study demonstrates that individuals living with Alzheimer's disease can express their preferences, which are stable over time and do not differ from those of healthy subjects with similar socio-demographic characteristics. This consistency in responses reflects the persistence of decision-making abilities, as observed in studies examining the information provided to persons with AD to gather their opinions and consent for examinations or research. While individuals living with a progressive neurocognitive disease may struggle to articulate the reasons behind their agreement and the implications of their choices, the maintenance of their decision emerges as a fundamental indicator of their assent, rather than resorting to the more demanding term of consent. Thus, it is both possible and necessary to rely on the opinions of these individuals during the design phase of a facility, including its architecture, interior design, and the conception of a therapeutic garden that incorporates an artistic dimension.

4.4. Implications for More Effective AD Therapies

These results may be of interest to professionals in their non-drug interventions with persons with AD, such as art therapists and cultural mediators who offer museum visits.

4.5. Limitation of Our Study

The limitation of this study lies in the small number of participants and its monocentric nature. However, the participant count in this study is equivalent to or greater than that

of previous studies in this field and explores a broader range of artistic expressions. The two groups of participants in our study are matched for age, sex, and cultural level, which helps to minimise interpretive biases. Our results indicate the absence of effects from age, sex, cultural level, and previous artistic practices, and also confirm that marked apathy or depression did not interfere with the administration of the Q-PEG questionnaire, which complements the existing data on the artistic preferences of individuals living with Alzheimer's disease.

5. Conclusions

This study explored the aesthetic sentiments of individuals living with Alzheimer's disease and found a persistence of aesthetic preferences that are stable and similar to those of matched control participants. Despite their impairments, these individuals can and should be consulted regarding the design of the spaces in which they live. The collection and consideration of their expressed preferences reflect a fundamental respect for the principle of autonomy for these persons. Artistic tastes in the relevant age group of people living with a neurocognitive disease can be expressed using simple, well-accepted materials. The similarity of expressed preferences also allows for the design and integration of an artistic dimension within care facilities and their therapeutic gardens, creating spaces that are accessible for all: persons with AD and residents as well as their visitors. In both participant groups, expressed preferences predominantly favour "Figurative" art with representations of the "Living" and particularly the "Landscape" category. This provides an additional argument, if needed, for the development of therapeutic gardens in healthcare and facilities. This preference may indicate a persistence of the sense of "biophilia" among individuals living with Alzheimer's disease. This concept, derived from the work of sociologist and psychoanalyst Erich Fromm, was referenced by E.O. Wilson in his book [106,107] to explain the attraction that nature holds for humans. The introduction of an artistic dimension in the living environments of individuals with Alzheimer's disease has proven beneficial. Through this approach, art fundamentally aims to uphold the "Right to Beauty" for individuals living with a progressive neurocognitive disorder, as articulated in the report submitted to the French National Assembly regarding nursing homes [108].

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Informed Consent Statement: Informed consent was obtained from all subjects involved in the study. All participants received an information leaflet on the study and were given time to reflect. The study investigator answered their questions about their participation before they gave their consent to the study. The consent form was signed by the participant and the doctor in charge of the study. A copy of the information leaflet and a copy of their signed consent form were given to each participant.

Data Availability Statement: The data supporting the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy and ethical restrictions.

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Abbreviations

AD	Alzheimer's disease
DREES	Directorate of Research, Studies, Evaluation and Statistics
EBD	Evidence-based design
RL/RI-16	Free Recall/Cued Recall with 16 Items
GRECO	Group for Reflection on Cognitive Assessments
Marin's AES	Marin Apathy Evaluation Scale
MMSE	Mini Mental Status Examination
MoCA	Montreal Cognitive Assessment
MT1α	Montreal–Toulouse Battery MT1α version
NINCDS-ADRDA	National Institute of Neurological and Communicative Disorders and Stroke–Alzheimer's Disease and Related Disorders Association
Q-PEG	Questionnaire General Aesthetic Preferences
QCS	Self-Consciousness Questionnaire
WHO	World Health Organisation

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