

Neuroanatomical Basis of Art Therapy and Dementia: A Correlative Review and Implications

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How to cite this paper: Benjamin, R., Jeon, J. and Benjamin, S. (2025) Neuroanatomical Basis of Art Therapy and Dementia: A Correlative Review and Implications. *World Journal of Neuroscience*, 15, 222-239.
<https://doi.org/10.4236/wjns.2025.153018>

Received: February 2, 2025

Accepted: August 17, 2025

Published: August 20, 2025

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Abstract

Dementia involves two or more of the six key domains of cognitive function that interfere with activities of daily living. It affects not only memory, but also speech, perception, and visuospatial orientation. The severity of amnesia varies with the type of dementia. Certain clinical presentations of dementia, such as auditory or visual hallucinations and disinhibition and impulsivity, arise from pathology in particular regions of the brain that include the cingulum, prefrontal cortex and parietal lobe. It is also known that objective and nonobjective drawing tasks (drawing faces, tracing, or creating abstract geometric figures) evoke distinct neuronal networks that activate the frontal, temporal, occipital and parietal lobes. The Expressive Therapies Continuum (ETC) serves as a theoretical framework for assessing and structuring art therapy interventions by identifying the cognitive and emotional processes engaged during creative activities with the use of certain artistic media. The hierarchical structure of the ETC allows therapists to analyze how individuals process information, link artistic expression to specific areas of brain function, and adapt interventions accordingly. Art therapy offers promising ways to enhance the cognitive, emotional, and social well-being of adults with dementia by stimulating multiple neural pathways associated with memory and cognitive function, perception, motor coordination, and symbolic processing, potentially reducing the rate of clinical decline due to dementia. Knowledge of neuroanatomy can thus help provide a means of localizing targeted interventions to those with Alzheimer's disease, Lewy body dementia, Frontotemporal dementia and Benson's syndrome, as each of these neurodegenerative diseases initially disturbs unique regions of the brain. By integrating neuroanatomical insights with the framework of the ETC, this review seeks to establish a cor-

relative model that informs evidence-based art therapy interventions for individuals with dementia.

Keywords

Art Therapy, Expressive Therapies Continuum, Neuroanatomy, Dementia

1. Introduction

Art Therapy employs any nonverbal creative medium (painting, sculpture, doodling, etc.) to facilitate communication of an individual's internal conflicts with the external environment. The ETC suggests that each medium has properties that stimulate unique responses in the individual through that medium's qualities pertaining to texture, color, movement, rhythm, boundaries, and the potential for risk taking, concrete or abstract application, and control [1]. Although far from a complete list, generally accepted categories of media from resistive to fluid and cognitive to affective include sculpture, clay, pencil, collage, crayon, marker, oil pastel, paint, and watercolor. Combining this information with knowledge of the neurosciences then allows for assessment of the severity of the conflict, which in turn guides therapeutic interventions to amend or recover from the affliction. Art therapy has demonstrated its ability to improve self-expression, mental health, and interpersonal skills. As a form of augmentation strategy in addition to pharmacotherapy (much like cognitive behavioral therapy (CBT), motivational enhancement therapy (MET) and contingency management), art therapy has also shown benefits in the treatment of several mental illnesses such as depression, anxiety, and addiction [2]-[6].

Its application in recognizing and treating various types of dementia poses new theoretical models and mediations [7]. Pairing of specific therapeutic modalities with a particular type of dementia would be the ideal *modus operandi*, but for this synthesis to occur, the effects of each on the neurocircuitry of the brain must first be appreciated. Researchers working with adult populations recognize the importance of art therapy in balancing their physical, cognitive, emotional, and social well-being [8]-[14]. Dementia is often characterized by a progressive decline in cognitive functioning, impacting memory, language, and reasoning abilities, leading to emotional and psychological distress [15]. Art therapy interventions provide a nonpharmacological avenue for addressing these concerns by helping individuals maintain cognitive engagement, express emotions, and enhance their overall well-being [16]-[18].

Art therapy's effectiveness for individuals with dementia is increasingly supported by evidence-based assessment frameworks, particularly the Expressive Therapies Continuum (ETC) [19]. The ETC provides a structured approach to understanding how individuals engage through art materials and how this engagement reflects underlying cognitive and emotional processes. Assessing the formal

elements in a work of art can provide insight into an individual's cognitive functioning and emotional processing, guiding targeted interventions for those with dementia. Art therapy shows promise in stimulating cognitive reserves and slowing the progression of dementia-related cognitive decline [20].

This review will explore the neuroanatomical basis of art therapy in dementia care, specifically examining how different art therapy interventions influence brain function and structure in individuals diagnosed with Alzheimer's disease, Lewy body dementia, Frontotemporal dementia, and Posterior Cortical Atrophy (Benson's syndrome). By integrating neuroanatomical insights with the ETC this review aims to provide a correlative understanding of how art therapy can be leveraged as an evidence-based intervention for dementia, addressing cognitive, emotional, and social dimensions of care.

2. Art Therapy

Painting provides a channel for expressing sensitive emotions to circumstances lived, which may stabilize emotional dysregulation or enhance human reward centers and contentment. The ability of individuals to express themselves via art traverses a series of hierarchical development, better known as the Expressive Therapies Continuum (ETC). The developmental stages or sequences can be classified by art therapists from the simplest to more complex, that is from 1) kinesthetic/sensory, where individuals respond to movement and tactile inputs; 2) perceptual/affective, emphasizing visual differentiation and emotional expression; followed by 3) cognitive/symbolic, where abstract thinking and representational imagery emerge; and 4) creative, integrating all levels into a cohesive, flexible expression [19]. The Kinesthetic level involves interconnections among the limbic system, somatosensory cortex, and cerebellar motor systems, which can be elicited in making sculptures and other tactile-based activities, whereas complex artworks may enhance cognitive processes by using the frontal lobe in executive function, exacting attention, and planning [21]. Visually guided drawing like tracing geometric figures activates the occipital lobe, but drawing from memory stimulates the frontal and parietal lobes, mostly in the left hemisphere (see **Figure 1** and **Table 1**) [22]-[26].

Emerging neuroimaging studies have begun to validate these ETC levels with distinct neural activations. For example, the Kinesthetic/Sensory level, associated with tactile and movement-based engagement, has been linked to somatosensory cortex, cerebellum, and premotor areas, as demonstrated by King and Kaimal (2019), who found increased alpha and theta activity in participants engaged in clay manipulation—a material aligned with sensory grounding—suggesting activation of low-arousal, body-based neural networks [27]. The Perceptual/Affective level, focused on emotional resonance and visual sensitivity, is hypothesized to involve limbic structures and ventral visual stream regions, although further empirical validation is needed. The Cognitive/Symbolic level has shown stronger neural engagement in the dorsolateral prefrontal cortex and parietal cortex, as seen in

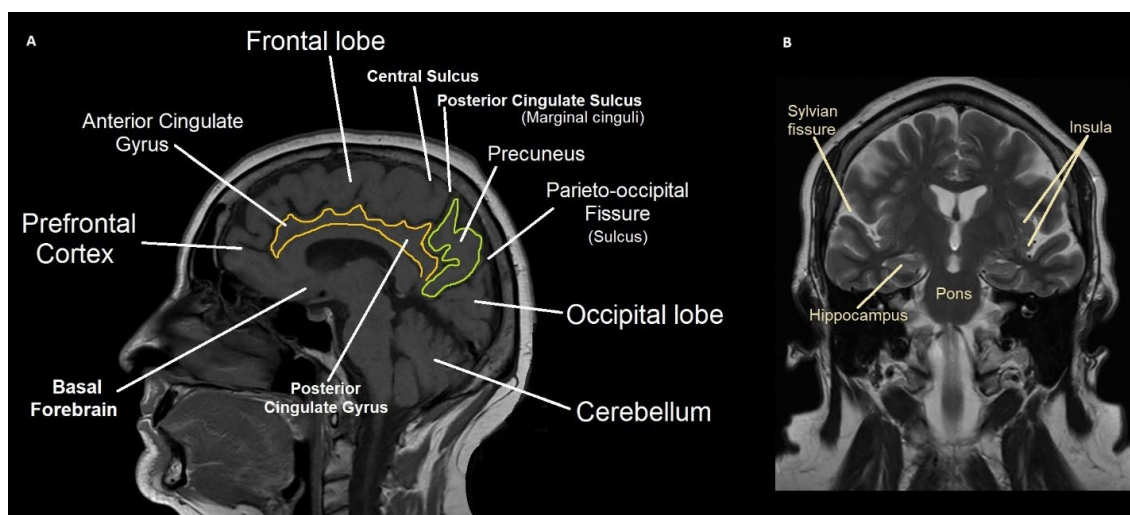


Figure 1. Anatomical Structures of the Brain in Sagittal and Coronal MRI Views. (A) Mid-sagittal view of the brain depicting the prefrontal cortex—the precuneus, cingulate gyrus and the basal forebrain are most involved in Alzheimer’s disease. It is conceivable to hypothesize that the hippocampus, in lateral proximity to the amygdala, the basal forebrain and the fusiform gyrus, has a cholinergic relay system via the anterior cingulate gyrus and into the precuneus. Amyloid plaques and NFT target particularly the cholinergic circuitry [28]. (B) Coronal MRI views of the brain through the pons. The hippocampus and the insular cortex are shown. The hippocampus is the primary target of Alzheimer’s disease, whereas FTD and LBD affect the insular cortex.

Table 1. Brain areas stimulated by art therapy.

	Drawing from Memory	Tracing
Frontal cortex		++ (P)
Prefrontal	+++ (B)	
Inferior frontal	+++ (B)	
Parietal lobe	+++ (L)	
Occipital lobe		+++ (B)
Temporal lobe	+++ (B)	

Differences in activation of neurocircuitry between eliciting drawing from memory and simply tracing objects and geometric figures. B = bilateral hemispheres; L = left hemisphere; P = posterior.

Han *et al.* (2024) using functional near-infrared spectroscopy (fNIRS), where structured paper-based drawing tasks elicited activation within the frontal, parietal and occipital lobes responsible for executive function and visuospatial orientation [29]. These findings support the neurobiological distinction among ETC levels and offer promising directions for tailoring interventions based on neural correlates of artistic processing.

The Expressive Therapies Continuum Assessment (ETCA) can be applied as an art-based tool to evaluate cognitive and emotional functioning in adults with dementia. The ETCA systematically measures an individual’s interaction with various art media, identifying their ability to engage with kinesthetic, perceptual, and

symbolic processing. By assessing image composition, color use, and representational qualities, research has demonstrated a correlation between artistic expression and cognitive impairment [14].

A decline in ETC functioning, thus, may represent pathological variations in interneuronal synapses between multiple lobes of the brain, as observed through regression of form, contrast, and color, or devolving abilities in the continuum from creative to perceptual or kinesthetic engagement [1] [19]. A structured method for assessing these cognitive regressions has been established by examining an individual's ability to organize visual elements, correlating changes in artistic output with specific dementia-related deficits [14]. As an example, William Utermohlen (1933-2007) was diagnosed with Alzheimer's disease in 1995 at the age of 62 years. His symptoms started approximately 4 years earlier. Comparing his self-portraits from his mid-thirties into his late sixties, we can observe the facial features becoming less recognizable (see **Figure 2**).

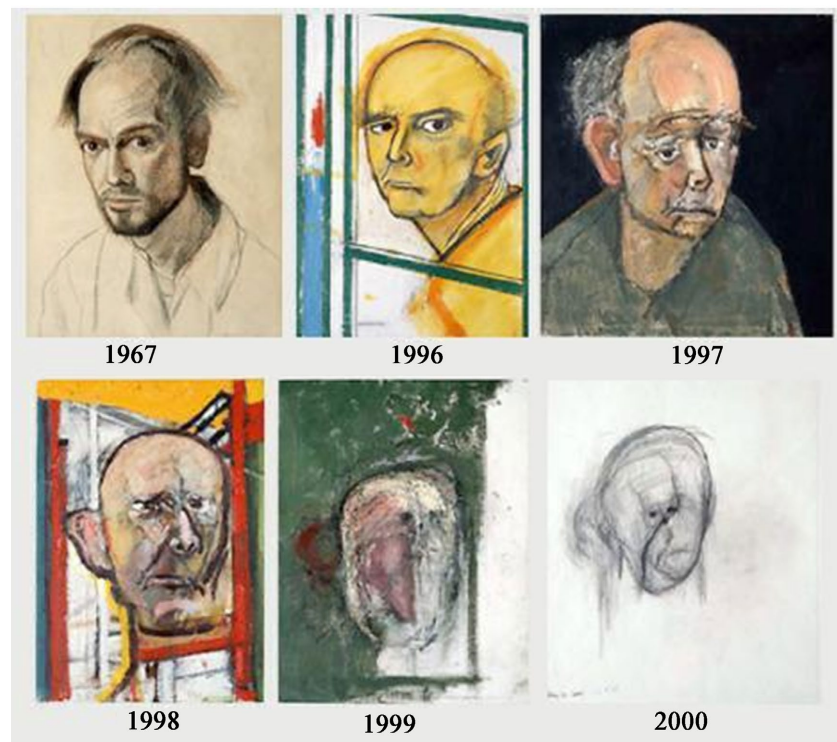
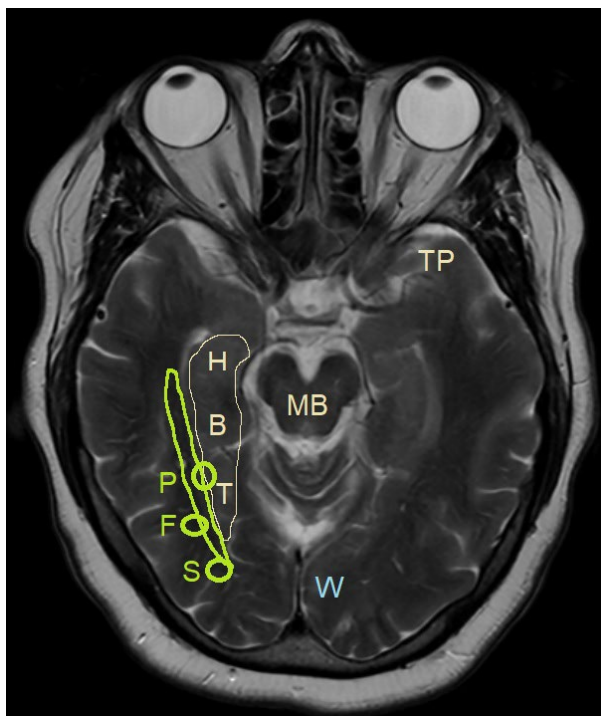


Figure 2. Self-portraits of William Utermohlen over the course of his career, the latter years being afflicted with Alzheimer's disease. The gradual waning of contrast, contour and shape becomes evident when the portraits are juxtaposed with one another. In Alzheimer's disease, neurofibrillary tangles and amyloid plaques affect the fusiform gyrus in the temporal lobe and its interconnections to the frontoparietal association cortex (https://www.reddit.com/r/ArtHistory/comments/iv63gi/william_utmohlens_self_portraits_drawn_after/#lightbox, accessed 11/8/2024).

Although it can be argued that Utermohlen was exercising his artistic expression, and no magnetic imaging studies are available of Utermohlen's brain, one can conjecture that atrophy in the posterior fusiform gyrus within the tempo-

parietal junction in connection with frontal and occipital lobes (see **Figure 3**) contributed to the progressive abstraction and facial distortions seen in his later self-portraits [23] [30].



Axial (transverse) T2-weighted MRI sequence of the brain slicing through the midbrain and medial temporal lobe, where it hosts the hippocampus, a crucial structure for registering and processing new information. Adjacent to the hippocampus lies the fusiform gyrus, which has distinct sections to assist the hippocampus in deciphering places, faces and shapes of items. Legend: Head (H), body (B) and tail (T) of the right hippocampus; MB = midbrain; TP = temporal pole; FG = fusiform gyrus (green), showing the location and deciphering of place (P), facial recognition (F) and shape (S) of items. Word forms (W) utilize the network between the corpus callosum and the primary visual cortex (occiput).

Figure 3. MRI of the brain demonstrating the hippocampus and fusiform gyrus.

This conjecture stems from the fact that patients with Alzheimer disease perform poorly on the Clock-drawing test, a crucial neurocognitive assessment tool widely used by practitioners to assess visuospatial orientation. The Clock-drawing test activates the bilateral frontal, occipital and parietal lobes as well as the supplementary motor area and precentral gyri, the areas that are most affected in patients with Alzheimer disease [27].

It is important, however, to note that these neuroanatomical inferences remain speculative, as they are based solely on visual analysis of his artwork rather than clinical imaging data. Similar patterns of stylistic deterioration have been observed in other artists with dementia, as reviewed by Pelowski *et al.* (2022), who examined case reports and published artworks for evidence of neurological changes. Such studies offer contextual support, but the absence of longitudinal imaging in Utermohlen's case limits definitive conclusions [16].

Art Therapy Media

Art therapy has traditionally relied heavily on theories and concepts rooted in psychotherapy and psychology, and as such has been guided by more subjective and intuitive approaches to neuroplasticity and sensory experiences due to the complex function of creative expression [29]. Imaging studies are increasingly being incorporated into the study of the field to both validate and localize different interventions. Several studies have been trialed using Mobile Brain/Body Imaging (MoBI), electroencephalography (EEG), quantitative electroencephalography (qEEG), functional infrared spectroscopy (fNIRS), positron emission tomography (PET), and functional magnetic resonance imaging (fMRI), each having their biases and limitations in study design. In spite of the limitations, a cursory causation can be drawn. In one qEEG comparison study, for example, working with clay and drawing with pencils showed activation in regions of memory processes, meditative states, and spatiotemporal processing [29]. In another fNIRS study, findings suggested unique neural activation based on the art media used by the individual, including the ventro- and dorso-lateral prefrontal cortex, the orbitofrontal cortex, and the parietal cortex during paper drawing compared to tablet drawing [31].

3. Dementia

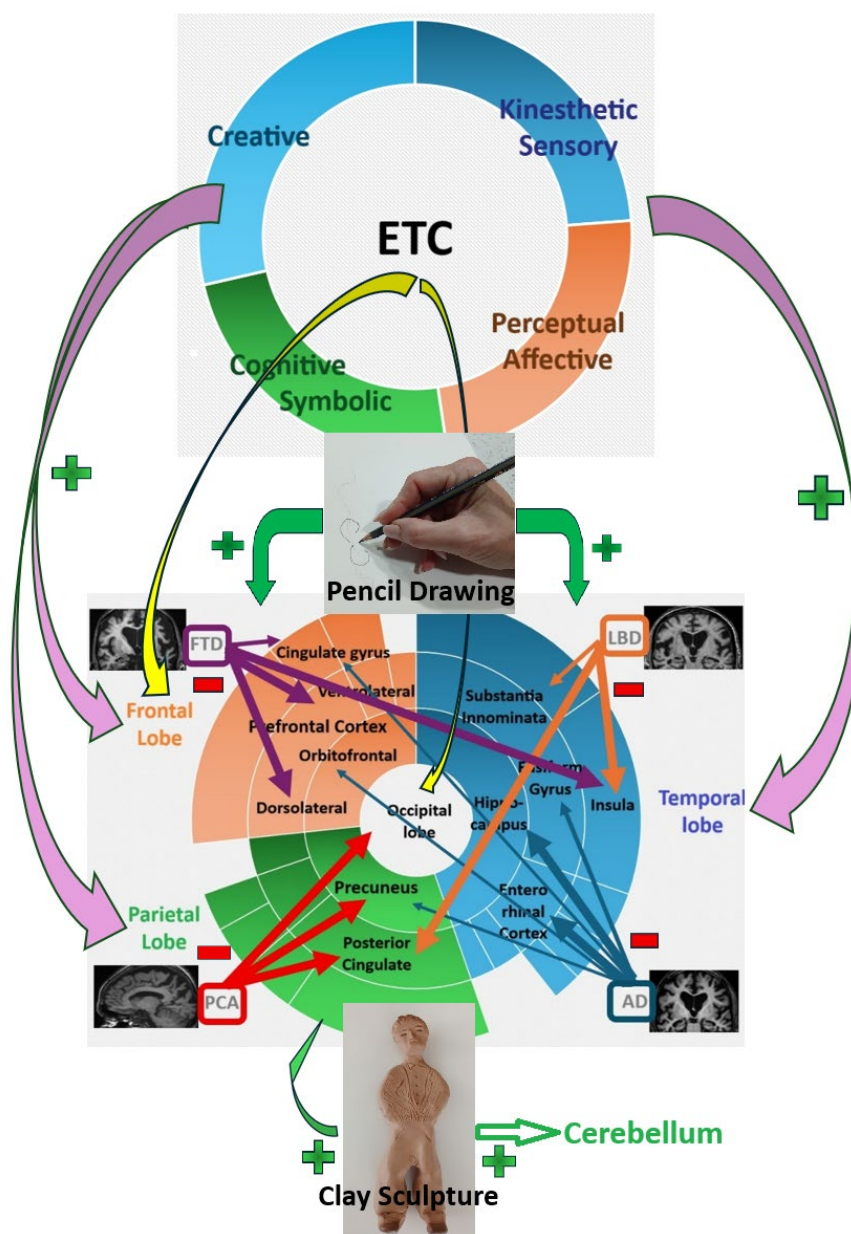
The Diagnostic and Statistical Manual of Mental Disorders (DSM-V) categorizes the six domains of cognitive function into attention and multitasking, planning and executing, learning and memorizing, speaking and articulating, perceptual-motor control, and adopting social behavioral norms. Dementia involves not only the inability to learn new information but also the diminished cognitive function within one of the six domains that interferes with activities of daily life.

The nonvascular and degenerative Alzheimer's disease (AD), Lewy body dementia (LBD), Frontotemporal dementia (FTD) and Posterior Cortical Atrophy (PCA or Benson's syndrome) constitute the four common types of dementia. They typically afflict the elderly population, but each possesses distinguishable cognitive dysfunction and radiographic characteristics secondary to the pattern of abnormal protein deposition and brain atrophy (see [Figure 4](#)).

Memory impairment for recent events is the seminal feature of AD, whereas it tends to be preserved in LBD. Visual hallucinations predominate in LBD but not in the early stages of AD. Disinhibition and social inappropriateness affect the behavioral variant of FTD. Like art therapy, distinct pathologies influence different intra- and inter-hemispheric networks, resulting in an array of clinical manifestations.

3.1. Alzheimer's Disease (AD)

Alzheimer's disease (AD) is the most common form of dementia. The neurofibrillary tangles and amyloid plaques accumulate in the prefrontal cortex, within which lies the subgenual and posterior cingulate gyrus, as well as midline and lateral parietal cortex (precuneus), medial temporal cortex where the hippocampus



This illustration combines [Table 1](#) & [Table 2](#). For a more precise neuroanatomy, refer to [Figures 1-3](#). Unlike the four types of dementias, viewed to be constricting (negative (-) effect), art therapy and ETC provide positive (+) feedback to all the hemispheres, depending on the medium selected. Atrophy in each of the 4 disease states involves a particular region of the brain, depicted by weighted arrows representing the degree of damage. Although there is some overlap, each type of dementia has a proclivity towards a specific area. Similarly, certain parts become more activated depending on the art medium selected, such as clay sculpture, provoking the parietal lobe and the cerebellum, whereas drawing from memory elicits a synchronous input from the temporal, frontal and parietal lobes.

Figure 4. Schematic drawing of the major regions of the brain being affected by the 4 different types of dementias, and the positive input from art therapy.

resides, the entorhinal cortex, and the cholinergic receptor-rich basal forebrain [32] [33].

3.2. Lewy Body Dementia (LBD)

Individuals with LBD demonstrate relative preservation of memory while experiencing inattention and visuospatial dysfunction. The vivid visual hallucinations appear to arise from poor regulation within the right insula [28]. In LBD, profound cholinergic deficits are visualized more in the posterior regions, with relative preservation of the medial temporal lobe (which houses the hippocampus) in subjects younger than 85 years. The midbrain appears to be more affected in LBD than in AD, with the substantia innominata as part of the basal forebrain showing greater atrophy, along with cortical thinning in the middle-posterior cingulate and bilateral insular cortices (see **Figure 1b**) [34]-[36].

3.3. Frontotemporal DEMENTIA (FTD)

Tau protein aggregation is the hallmark of FTD. It is the third leading cause of neurodegenerative dementia. Severe and often asymmetric “knife-edge atrophy” normally occurs within the prefrontal cortex, the anterior cingulate gyrus, the insula, and the anterior temporal poles (see **Figure 1** and **Figure 3** depict the areas of interest), sparing the posterior regions [37]-[40].

3.4. Posterior Cortical Atrophy (Benson’s Syndrome)

Posterior Cortical Atrophy (PCA) is a rare dementia characterized by visuospatial and visual perceptual deficits. The patients demonstrate visual restriction or simultanagnosia (see **Figure 5**) whereby only one aspect of an image is observed.



When two different concepts are presented, such as Giuseppe Arcimboldo’s depiction of Rudolf II of Habsburg as Vertumnus (left) or bubbles inside a heart, people with Benson’s syndrome will only select either the man or the heart and fail to see the flowers or bubbles. They cannot simultaneously discern both images. This is also termed “visual restriction”.

Figure 5. Examples of simultanagnosia.

It can coexist with Bálint’s syndrome (comprised of simultanagnosia, oculomotor apraxia, and optic ataxia) or Gerstmann’s syndrome (having the constellation of dysgraphia, dyscalculia, finger agnosia and left-right apraxia) when the atrophy extends into the temporo-parieto-occipital association cortex. Inherent to its

name, the pathology settles in bilateral primary visual cortices of the occipital lobes (Brodmann Area (BA) 18, 19), and the bilateral primary sensory and motor cortices (BA 1–3, 4).

4. Discussion

One can argue that the purpose of art is to conjure life experiences that otherwise cannot be expressed. Art incorporates the complex duality between the painter's attempt to emanate an illusion and the viewer's ability to process the visual inputs, and project meaning to it.

The artist's thick application of oil paint with short brushstrokes, for example, could induce agitation in the observer. The production of art by one person and its identification and recognition by another person involve an array of neurons in distinct parts of the brain such as the striate and extrastriate cortices that reciprocally connect with the emotional center of the amygdala. The viewer uses experience to rapidly deduce the perceived images. If the images are familiar, it enlists the aid of the bottom dorsal portion of the brain to identify familiar objects, such as animals, faces, shapes and forms; but abstract unrecognizable images activate the top portion of the brain to utilize greater cognitive processes [41]-[43]. There also exist two distinct but interdependent ventral-dorsal systems of "what" and "where" pathways, respectively. Reading elicits the ventral stream, whereas movement in space elicits the dorsal stream. Abnormal streaming process of information could explain simultanagnosia

This dorsal-ventral phenomenon can also be appreciated in listening to music. The auditory dorsal pathway interprets rhythm processing and is activated by vocals alone, whereas the right ventral premotor cortex and the left dorsolateral prefrontal cortex are governed by bass or drum. The latter areas are involved in planning and anticipating via the brain's mirror neuron system, which helps people anticipate and synchronize their movements with rhythmic patterns [44].

To illustrate this in the visual arts, a 30 × 40-inch oil painting by one of the authors is shown in **Figure 6**.

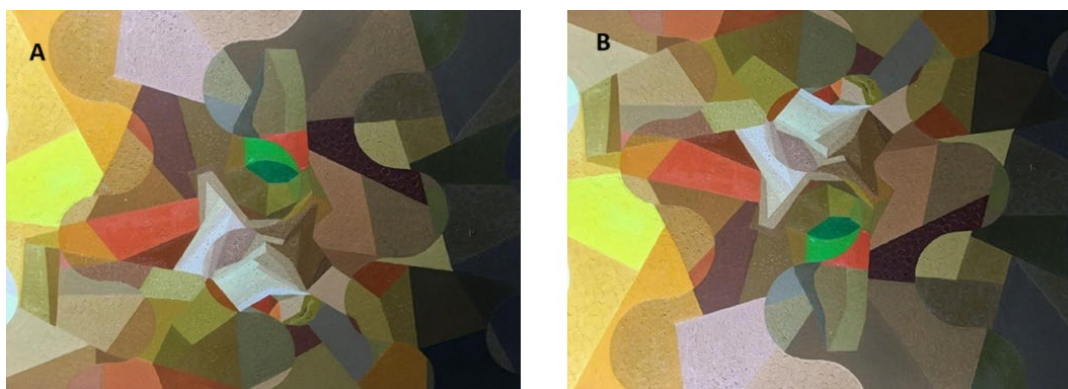


Figure 6. Salvador Dali *Falling Between Good and Evil* by R. Benjamin, 1996, oil on canvas, 30 × 40 inches. In its original orientation (A), and after being rotated vertically. In (A), the face plunging downward is not easily recognizable, whereas in (B) the figurehead appears to be floating in the air.

A quick glance yields no clear objective identification. It is titled “*Salvador Dalí Falling Between Good and Evil*”. Knowing the title, it remains difficult to perceive the man-figure Dalí in the painting, particularly in **Figure 6A**, chiefly because of the orientation of the painting itself. Once the painting is flipped (see **Figure 6B**), the figure becomes more noticeable, where the left arm is stretched out and the head is turned looking at it.

Normal cognitive function maintains distinct patterns and regions in the brain based on the task performed. The two fields of art therapy and neurodegenerative science involve complex neuronal circuitry, the former complementary, whereas the latter constricting. By merging these two disciplines, neuroanatomy can provide a structured framework to support nonpharmacological interventions for dementia care. **Table 2** illustrates in red overlapping neural structures between art therapy and neurodegeneration, emphasizing how targeted interventions can optimize remaining cognitive capacities.

Table 2. Neural intersection between dementia and art therapy.

	Alzheimer's disease	Lewy body dementia	Frontotemporal dementia	Benson's syndrome
Temporal lobe atrophy	+++	-	+++	+
□ hippocampus	+++	-	++	-
□ Entorhinal cortex	-	-	-	-
□ Fusiform gyrus	+++	-	-	-
□ Insula	-	++	+++	-
□ Substantia innominata	-	+++	-	-
Frontal lobe	-	-	+++	-
□ Prefrontal cortex	++	-	-	-
□ Anterior cingulate	-	-	++	-
Parietal lobe	-	-	-	+++
□ Precuneus	++	-	-	-
□ Posterior cingulate	-	+++	-	-
Occipital lobe	-	-	-	+++
Cerebellum	-	-	-	-

Summary of MRI findings in the four common neurodegenerative dementias. Pluses indicate the highest degree of atrophy in particular regions of the brain. Red indicates the areas most stimulated by art therapy depending on the scale of the Expressive Therapies Continuum.

Cognitive drawing interventions, as proposed by Dr. Lisa Hinz [26], such as genograms, lifelines or the more modern neurographica introduced by Dr. Pavel Piskarev (see **Figure 7**), confer new abilities to reflect and bypass the injured regions of the brain.



Author's (SSB) rendition of neurographic art using a black marker and pastel pencils to draw random moving lines and shapes in a meditative process, a technique developed by Dr. Pavel Piskarev to blend art therapy, neurobiology, and mindfulness.

Figure 7. An example of neurographica.

For example, persons with Alzheimer's disease who have lost the ability to verbalize their needs, or have difficulty recognizing familiar faces, could be trained to tap into the cerebellar "memory genes" and their role in kinesthetic sensory pathways by embossing, making collages or prints, and clay modelling.

It is also important to acknowledge the heterogeneity of individuals and the diseases themselves. Within the FTD subtypes, as another example, particularly the behavioral-variant FTD (bvFTD), where clinical symptoms and regional brain atrophy patterns can vary significantly across individuals [39], some patients may exhibit prominent executive dysfunction with preserved emotional responsiveness, while others may display emotional blunting despite relatively intact memory and visuospatial abilities. This variability suggest that individuals may respond differently to art therapy modalities depending on the specific cortical and sub-cortical systems affected. While Whitwell *et al.* (2009) do not examine therapeutic outcomes, their identification of atrophy in regions such as the anterior insula and dorsolateral prefrontal cortex (DLPFC) provides a neuroanatomical basis for differential engagement [45]. Individuals with anterior insula involvement, associated with impaired interoceptive awareness, may benefit more from perceptual-affective art tasks that taps into emotional resonance and sensory immediacy. Conversely, those with DLPFC degeneration—a region implicated in cognitive flexibility, planning, and symbolic thinking—may find it more difficult to engage in structured, representational art tasks and instead respond more favorably to kinesthetic activities that rely on procedural memory and embodied action. This differentiation aligns with the ETC emphasis on matching media properties to processing capacities. Importantly, this individualized approach is reinforced by Han *et al.* (2024) and King and Kaimal (2019), whose neuroimaging studies provided empirical evidence for mapping distinct art-making processes to specific cortical regions [29] [31]. Together, these insights emphasize the need for a neurofunctionally informed and person-centered art therapy model that considers the diverse neural presentations of bvFTD.

4.1. Implications for Research

The authors propose a question to the popular beliefs about neuroplasticity. Can specific media and art therapy interventions be mapped to benefit specific areas of the brain, preserving or enhancing known pathways, or does the application of media and art therapy interventions teach the brain to function in new and adaptive ways when neurodegeneration is present?

Limited empirical data exist in studies conducted to date to substantiate the effects of media properties on specific regions of the brain, primarily due to functional challenges and not applying the standard International 10 - 20 system in electroencephalography [46]. Preliminary studies using 6 channels, however, indicate differences in frontal, mid-, and posterior brain activity during drawing versus clay sculpture [47].

Newer neuroimaging techniques such as Diffusion Tensor Imaging and tractography, a 3-dimensional modeling of nerve tracts based on diffusion of water molecules to analyze the complex white matter relays, and wide-field Ca^{2+} -imaging and/or Voltage imaging with fluorescent dyes [48]-[50] can provide a deeper understanding of how art therapy influences brain networks. By integrating art-based interventions with neuroanatomical evidence, advancements in therapeutic applications of art therapy may further enhance the quality of life for individuals with dementia. This review supports research on the importance of evidence-based art therapy interventions, guided by the Expressive Therapies Continuum, to bolster cognitive and emotional resilience in dementia care. As such, the field of art therapy can be further refined to address the unique neurological profiles of different types of dementia, leading to more targeted and effective therapeutic strategies.

4.2. Limitations

While this review proposes a correlation model linking the Expressive Therapies Continuum (ETC) to specific neuroanatomical structures, it is important to recognize that this framework remains largely theoretical. There is a paucity of direct longitudinal neuroimaging studies demonstrating causal or protective effects of art therapy interventions on structural or functional brain changes in individuals with dementia. Most evidence is extrapolated from single-session studies, case reports, or pilot data, which limits generalizability. Furthermore, the neurological mapping of ETC levels to brain regions, while conceptually compelling, requires further empirical validation through controlled trials employing multimodal imaging and standardized assessment protocols. As such, the findings and recommendations herein should be interpreted as a foundation for future investigation rather than conclusive evidence.

4.3. Conclusion

An improved mapping of the interneuronal pathways could aid in targeting beneficial art therapy interventions by either “exercising” the areas that are attacked

first by a particular type of dementia, or by bypassing the affected regions and utilizing different system networks such as mirror neurons to allow the individuals to preserve or enhance cognitive, emotional, and social functioning, which in turn can improve quality of life.

Acknowledgements

We would like to thank Dr. Lisa D Hinz for her assistance in bringing the team of authors together and for her enduring commitment to the field of Expressive Therapies Continuum.

Disclosure Statement

The authors declare that they have no conflict of interest and no competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Funding

No funding or grant-awarding agencies have been used.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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