

How Neurological Conditions Affect the Artistic Process with a Focus on Neurodegenerative Diseases and Brain Injury

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ABSTRACT

This dissertation examines the impacts of different neurological conditions on the artistic process as well as what we can learn from these creative endeavors. We are given further insight into dementias by examining the change in style of an artist with Alzheimer's. By using fractal density measurements to read the complexity of paintings we are able to see when the progression of dementia begins, potentially leading to an early diagnosing system. Strokes can rewire the brain's processing of stimuli resulting in painters who experience physical pain when using specific colors. Long-term effects of serious concussions can alter someone's reality- forcing an artist to rebuild his practice from the ground up. All of these culminate in an examination of how science influences art and, subsequently, art's impact on science.

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INTRODUCTION

A key part of modern neurology's foundation is built upon the concept that each action in the mental/cognitive/emotional realms is correlated with a corresponding brain activity pattern (Caprini, *et al*, 2019). This idea intrinsically links the worlds of art and science; as artists create, they are activating multiple neural pathways and higher brain functions as well as utilizing several different parts of the brain.

....beyond the parietal lobes and the visual streams, artists use a multitude of cortical and subcortical brain regions in the organization of a visually appealing painting, drawing, or piece of sculpture.

(Caprini, G., *et al*, 2019)

It would then make sense that artists, and more specifically their practice, would be greatly affected by the deterioration of brain functions brought on by neurological injuries and diseases such as different types of dementia, non-traumatic injury, and traumatic injury. Each of these have different effects on the artistic practice and the artworks subsequently produced, with some even rewiring the way the brain processes and responds to stimuli.

Not only does the science affect the art, the art also provides a visual window into the neurological mechanisms in play throughout the artistic process. As of right now, there is not a lot known about the functions behind creative expression (Weir, 2022). By observing a change in art style or habit resulting from a neurological disease or injury, scientists are able to isolate which regions of the brain are being affected and when, furthering their knowledge of life-altering injuries and diseases. The new theories and hypotheses resulting from this could potentially reveal new forms of treatment, preventative actions to take, and even early-diagnosing systems.

According to Alzheimer's Disease International (2021) people are living longer which means the number of those living with dementia is rising exponentially. In 2020 there were 55 million individuals with dementia worldwide- a number that is expected to almost double every 20 years (Alzheimer's Disease International, 2021). Even with this reality in place, there is still not much known about the neurodegenerative disease. Studying the careers of painters or the artworks generated by those in art therapy could provide insight into the function and lifespan of Alzheimer's disease and other dementias.

Although injuries such as strokes or concussions are a lot less mysterious from the scientific point of view, there are still some repercussions, specifically on creative behaviors and actions, that go without explanation. While these observations lay heavily in the realm of science, how the individuals respond to their new way of living can be extremely motivational from a purely emotional standpoint. When viewing the artistic output of individuals who have experienced brain injury it reveals a determined mindset of not being pushed down by a something out of your control- finding ways to continue to create despite a loss of ability or drive.

The artists discussed in this dissertation all provide a unique story and journey. Whether they are career artists or have only just begun to find an interest and security in the creative process, all of them provide a unique insight into their individual conditions as well as the art world itself.

CHAPTER 1 | The Effects on Lifelong Artists

CHAPTER 1A: Forsythe Study

Although dementia is not an uncommon occurrence (nearly 10 million new cases each year according to the World Health Organization in 2023), there is still a lot that is unknown about the disease (National Institute of Aging, 2019). It is particularly difficult to find patterns in patients' behavior due to their unpredictable reactions to symptoms. Art therapist Ellen Greene Stewart states: “....when a skill is lost, the whole being must readjust itself. It is the ways that a patient readjusts himself to the loss that is fascinating and unpredictable” (2002). This brings into question how scientists and doctors would study something so case specific- how do they find the patterns? How would they be able to isolate and identify which parts of the brain are being affected and when? In order to find more clarity on the subject, scientists turned to the art world.

Salvador Dali, Norval Morrisseau, Willem de Kooning, and James Brooks not only have a shared commonality as influential painters, but also as career artists who were afflicted by neurological disorders in their later years. Dali and Morrisseau suffered from Parkinson's while de Kooning and Brooks were both diagnosed with Alzheimer's. These four monumental painters are the focus of a study conducted by Alex Forsythe in which paintings are subject to fractal analysis to detect signs of neurological disorders. Around 2,000 paintings from Dali, Morrisseau, de Kooning, and Brooks as well as three additional artists, Monet, Picasso, and Chagal, who notably did not suffer from any severe mental decline, were subject to fractal density analysis.

Fractals are classified in the Oxford Dictionary as “a curve or geometrical figure, each part of which has the same statistical character as the whole” (2023). In terms of painting, this is

seen when patterns created by the smallest paint strokes are replicated on a larger scale. Forsythe and her team were looking at the fluctuation of the fractal density of paint strokes throughout the artists' careers. For Monet, Picasso, and Chagal the density was seen to increase as they aged, indicating a steady and consistent progression in complexity. For Dali and Morrisseau the results of the fractal measurements created a line following the path of an upside down u. The most startling results were those of de Kooning and Brooks. The fractal density of their work began high but had a steep drop off in their 40s. This was a significant discovery considering that, as of right now, the most statistically common age to develop Alzheimer's is after 65 (National Institute of Aging, 2019). Brooks was diagnosed in his late 70s and de Kooning in his late 80s.



Figure 1. Boon



Figure 2. Untitled

Above are two works created by James Brooks; on the left, *Boon* (1957), which was created early on in his career. When compared to the 1985 piece on the right, the differences are extreme. *Untitled* (1985) was created the year of his diagnosis, and although it could be argued as a stylistic change, the simplified lines and colors of Brooks' later work reflect the same

change in de Kooning's work post diagnosis. While *Boon* (1957) is littered with expressive strokes and applications of paint, *Untitled* (1985) appears contained. Without prior knowledge of Brooks' condition, the later piece can almost ironically be seen as a practice in self-control.

Due to its results, it is not unreasonable to see this type of test being used as an early-diagnosing system for dementia and Alzheimer's. If this were the case patients could start receiving treatment and therapy years before they normally would- learn how to live with it, what to expect, and potentially even slowing the progression of the disease. Unfortunately, because of the small sample pool as well as disputes against the validity of fractal density measurement from physicist Katherine Jones-Smith (2006) and others, this cannot be seen as a viable option for early-diagnosing. There is still a silver-lining, as Forsythe states: "I don't believe this will be a tool for diagnosis, but I do think it will trigger people to consider new directions for research into dementia" (2016).

CHAPTER 1B: Willem de Kooning

Willem de Kooning is not an uncommon example for artists with neurological disorders. His journey with Alzheimer's is heavily documented; either through the work he created or through the video recordings he took of his process towards the end of his career. Prior to his diagnosis, de Kooning would famously produce around one painting a year, his process heavily relying on adding on to and reworking technically finished canvases- in some cases even working on a painting as it was going out the door to a gallery. The time spent on these earlier works contrasts heavily with his rate of production in his later years. During the last ten years of his career, de Kooning made around 341 finished artworks. While Alzheimer's often has symptoms of a shortening attention span, potentially leading to a disinterest in past hobbies, it seemed as though de Kooning was generating more work than ever.

Not everyone saw de Kooning's late artworks as a triumph over his disease; many critics were outspoken in their belief that this work lacked the style and integrity of his previous creative outings (Stewart, 2002). These criticisms were not unfounded, as it is not difficult to realize the discrepancies in de Kooning's paintings as time and his condition progressed.



Figure 3. *Woman I*



Figure 4. *Untitled*

To further illustrate this point, the two paintings above represent two extremely different time periods of de Kooning's life; on the left, *Woman I*, selected from one of his most famous series and created at the height of his career. This work demonstrates de Kooning's rapid and expressive brush movements, building thick layers of colorful paints on top of each other to create a composition of vibrancy, movement, and frantic energy. While the near-overloaded complexity of the painting may pull the viewer into a meditative trance as they fall into the details, the energetic actions and attitude of the artists are never lost.

Compare this energy to the 1983 untitled piece; this time it feels as though de Kooning himself is the one in a meditative state. The spectrum of color in *Woman I* completely overwhelms his untitled work. On the surface, *Untitled* can seem more thoughtful, as the scarcity of marks could allow each one to hold its own purpose, not relying on the eccentricity and clutter of the rest of the composition to give it meaning. In reality, the repeating hypnotic marks de

Kooning would lay across canvas are symptomatic of a neurological disorder (Storr, 1995). The repetition of these soothing movements along with the loss of his ability to make wide gestures across canvases are what led to his controversial change in style.

With this stark change in style as well as the increasing number of paintings being generated, many had turned their backs on de Kooning and disregarded his late paintings as gibberish. What is bewildering about this assessment is the public's inherent belief that the art is being made for them to judge. This can be true for artists as some create in order to call attention to beliefs, movements, or personal struggles that are intended to be seen by many, this could even be true of de Kooning himself at the height of his influence, but it is believed that Willem de Kooning kept creating art purely because he had to. Ellen Greene Stewart states:

Although he was losing his memory and his ability to speak, perhaps painting, which was as automatic as breathing to him, was preserved by virtue of the depth with which it was ingrained in his being.

(E. G. Stewart, 2002)

Whether he was aware of it or not, de Kooning had begun to use painting as a therapy against Alzheimer's. The rapid expulsion of creativity was his way of coping with his loss and the symptoms of his condition; a combatant to the disorientation and inclination to retreat in on oneself that is stereotypical of the disease. From this point of view there is no way to see these paintings other than triumphant.

CHAPTER 1C: William Utermohlen

While both Brooks and de Kooning have demonstrated the stylistic changes an artist goes through while suffering from dementia, none are more shocking nor illustrative than the self-portraits of William Utermohlen. The transformation timeline of Utermohlen's work as he descends into Alzheimer's is thoroughly documented and has even been on display at shows and exhibitions. Not only do the portraits grab the viewer's attention by their dramatic display of loss of self, the works also provide insight into the development and stages of Alzheimer's- stoic faces revealing what is affected and what is lost.



Figure 5.

In attendance at one of Utermohlen's exhibitions is Bruce L. Miller, MD who is the current director of the Memory and Aging Center at the University of California, San Francisco and co-director of the Global Brain Health Institute. Miller gives reason as to why it is so common for an artist's style to change as they develop a neurodegenerative condition. According

to Miller, an effect or injury to the right parietal lobe does not have to be much larger than a fingerprint to cause devastating impacts on an individual. Spatial recognition and internal imagery can be heavily impaired to the point of non-function, leading to what is seen as an abstract or surrealistic shift in style (2006). Although Utermohlen's transformation of visual language was a result of his condition, there is no denying that this change in tone lends itself to being an excellent communicator for the experiences of an individual living with dementia.

Art is often seen and used as an exploration into the self. How is it then that an artist continues to persist despite losing that centrality? Who do the self portraits become? In Nicci Gerrard's article on Utermohlen's journey with the disease, she writes about the existence of the Alzheimer's gene in her family. In the article she mentions this being a unique kind of fear, a "special way of being afraid" (2015). The conditions of Alzheimer's and other dementias provide such an odd alternate reality- paintings that, along with the audience, the artists themselves are trying to derive meaning from. It adds a layer of reverence for the paintings that reveal the last pieces of an identity, of a life lost all while the body remains breathing.

Even the time he was beginning to be ill, he was always always drawing, every minute of the day. I say he died in 2000, because he died when he couldn't draw any more. He actually died in 2007, but it wasn't him by then.

(P. Utermohlen, 2006)

CHAPTER 2 | Artists Emerge Post-Diagnosis

CHAPTER 2A: The FTD Phenomenon

The link between brain degradation and creative output, practices, and activities runs deeper than consequential results:

People who engaged in artistic activities, such as painting, drawing, and sculpting, in both middle and old age were 73% less likely to have memory and thinking problems, such as mild cognitive impairment, that lead to dementia.

(American Academy of Neurology, 2015)

This statistic demonstrates some of the positive and preventative measures established in art therapy. Art therapy is a common treatment growing in popularity with patients of dementia and Alzheimer's. Not only do creative practices promote positive brain health, they also allow for patients to express themselves in ways they potentially had not considered before. This impulse can be so ingrained that some, like Willem de Kooning, arrive at it naturally. What is interesting is this result occurring in those without any artistic or creative background.

For de Kooning it is not surprising that his creative output provided sanctuary for him in his more difficult years- this had been what his life and career had been centered around, almost becoming a muscle memory for him. Why is it then that some dementia patients with no prior interest in the arts develop this instinct almost overnight? This phenomenon can occur in an individual who has survived a brain injury or stroke, but has also been observed in a number of those living with a specific type of dementia: FTD, otherwise known as Frontotemporal dementia.

Since FTD is one of the rarer forms of dementia (Alzheimer's Research UK, 2023) there is not as much information or research available on its effects, specifically on artists. The

existence of the spike in creativity has been known, but the reason why it happens has remained a mystery. That is until a recent 2023 study conducted by Adit Friedberg, MD, a research fellow at the UCSF Memory and Aging Center.

According to Friedberg, injury or damage to brain tissue resulting from dementia can actually activate parts of the brain associated with the visual, leading patients to have a higher inclination towards visual creative output (2023). This occurs early on in the development of dementia. Similar to Forsythe's fractal density study, Friedberg's FTD theory would need future studies to confirm her hypothesis, but as of right now it has shed some light on enhanced capacities resulting from neurodegenerative conditions.

While Friedberg's study still requires further confirmation and tests, her hypothesis, as well as Bruce L. Miller's theory that as the frontal parts of the brain decay the regions further back (visual comprehension regions) compensate for the loss, have provided some potential answers for patients experiencing FTD's artistic surge (2006). The first published report of someone experiencing visual artistic creativity, written by Bruce L. Miller in 1996, references a FTD patient who had no experience in the arts suddenly "become obsessed with painting."

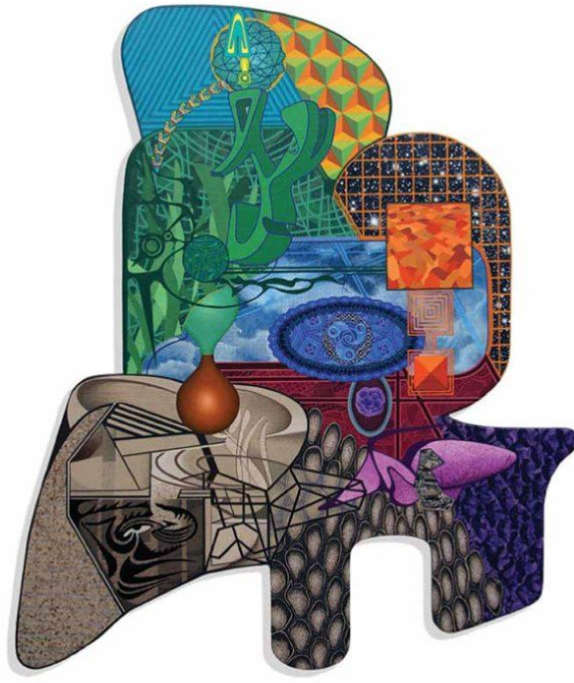


Figure 6.

The artwork featured above is by an individual with semantic variant primary progressive aphasia, a common condition of those living with Frontotemporal dementia. Since FTD targets the regions of the brain associated with language, loss of speech is not an uncommon symptom. This creative spike not only provides patients with a creative outlet, but a new form of communication as well. The abstract imagery and bold use of color are tells of the neurodegenerative disease, but the development of a unique visual language provides aid to the one afflicted by it. For a disease that so often deals in deficits to actually produce something positive is remarkable, as well as the art that is created as a result.

Unfortunately, the occurrence of the increased artistic creativity is typical of the beginning/early stages of FTD- as time goes on and as the disease progresses, these abilities will eventually be taken as well.

CHAPTER 2B: *What's Life Like* and Art Therapy

As mentioned before, there is a natural link between creative artistic output and neurological disorders. Performing creative acts can lower the risk of developing dementia and dementia-like symptoms, acting as a preventative treatment. The reverse of this would be art therapy, creative actions taken after diagnosis in order to combat and cope with a developing/existing condition. This form of treatment has become especially popular in those living with dementia.

What's Life Like is a poetry book published by the Alzheimer's Society in 2019. Visual pieces accompany the writing of multiple different poets, all of which are contributed by patients living with dementia. While the book features diverse writing styles of multiple poets, color is brought up many times in order to describe a feeling or sensation. In When it's red, things are becoming more clear: “Grey, is not knowing my children’s names; When it’s red, things are becoming more clear; Yellow is a good day.” (Joyce, 2017, *What's Life Like*).



Figure 7. And Then...

The piece above works in tandem with the poem companion piece And Then..., both of which were created by the same patient. In both the artwork and the writing the creator uses

color to communicate his experience. “The yellow bit is the brain; The black bit is the bit that is all the trouble; The black bit grows,; and then...”(Derek, 2017, *What’s Life Like*).

In both of the above mentioned poems, non-literal imagery and language is used as a vital way to get the poets’ points across. In addition to this, all of the artwork featured in the book is abstract as well. Where one would expect perhaps bleak or drained paintings, there are bold bursts of color and confident marks. This fascination with color both in writing and paint could be explained by the timeline that dementias usually take. In most circumstances patients retain their color processing abilities much longer than other skills. This, in addition to the theory of intact regions of the brain compensating for deteriorating ones, may provide explanation for this prominent color motif.

The stylized production could be a result of no artistic background or formal training as well as limited supplies, but as seen in the work William Utermohlen, a predisposition or natural inclination towards abstract expression is often seen in those afflicted with dementia or Alzheimer’s. It is also possible for symptomatic behavior as well as the lack of a creative background to coexist: culminating in a truly unique act of creation and expression. The development of a new type of visual language.

CHAPTER 3 | Brain Injury

CHAPTER 3A: Non-traumatic Injury

As demonstrated by the previous two chapters, neurological conditions have a severe and profound impact on creative output. Prior examples have focused on the effects of dementia and Alzheimer's: altering artistic style, greatly increasing the rate of production for artwork, surges of creativity, and loss of abilities such as facial recognition and visuospatial cognition. While all of these are symptomatic of dementia conditions, they also align with other neurological disorders or injuries.

Strokes can have some of the most intense and unpredictable repercussions on artists and the artistic process. As with Frontotemporal dementia, stroke survivors have also been known to experience a sudden outpouring of creativity (Bruce L. Miller, 2018). One of the more extreme examples of this is seen in a stroke survivor who initially had no previous interest in the arts. Six months after her stroke she began, almost out of nowhere, to paint daily. Additionally she began to experience a lack of emotional response resulting from her stroke. As time passed, she lost her emotional range and capabilities.

While dealing with this loss, she continued to paint; this led to a major development of her symptoms. Despite the lack of emotional response in her daily life, she began to have powerful reactions when she used certain colors while painting. Using the warmer tones of reds, yellows and oranges would elicit feelings of happiness while cooler shades like blue and green would evoke palpable painful reactions. Even stranger still were the conditions for this to occur; in order for her to experience this feedback, she had to be physically applying the colors herself.

Looking at the work of other artists who had used similar colors would not have these results- even looking at her own work did nothing to conjure up these responses.

This specific case study highlights the intense responses that can occur from a non-traumatic neurological change, but scientists and doctors are unable to pinpoint the exact mechanisms in motion that result in these extreme reactions. As of now, it is believed that her stroke may have rewired the way she perceives/reacts to stimuli, subsequently leading to the bizarre emotional and physical reactions.

CHAPTER 3B: Traumatic Injury

Strokes are classified as non-traumatic brain injuries due to the causes of the injury being of internal origin. Although it is not an ‘injury,’ this is the same for Alzheimer’s as its causes are thought to be from an abnormal build-up of proteins in/around brain cells (NHS, 2021). While it is interesting to look into the human body’s capability to harshly alter, and potentially even annihilate, itself the effects of traumatic injury on the artistic process can be just as fascinating and poignant.

Concussions are one of the most common forms of traumatic brain injury (TBI) (National Institutes of Health, 2020). Most of the time concussions are seen as mild TBIs as the symptoms are, more often than not, temporary. However, it is not impossible for a concussion to lead to long lasting or even permanent damage. Cerebral achromatopsia, or a specific type of color blindness resulting from damage to the cerebral cortex, has been documented in those who have suffered from a serious concussion. This can be observed in the case of an artist who was in a car accident leading to his loss of color perception.

As a painter, this sent him into a deep depression. Not only was his day-to-day life affected, but he could no longer enjoy his passion to its fullest degree. He continued to paint but no longer found the same joy in it- he had lost a dimension of his world and began to find it more and more difficult to even picture a color in his mind’s eye. As time went on even his dreams were drained of their vibrancy. He began to adapt to this change of reality in strange ways: seeing as it was too painful to experience the once richly colored daytime he began to exist at night, going on long walks in a now unsaturated *mise-en-scène*. Eventually, as artists do, he found inspiration from these walks leading him to create paintings from those nights, unbothered by the apparent necessity of color.

As opposed to the symptoms of the previously mentioned artist who survived a stroke, it is very much known and documented why color-blindness can develop from a concussion. After damage to the color center of the brain, also known as the occipital lobe's ventral medial region, patients begin to lose color perception abilities (Cowey, Heywood, 1997). Cerebral achromatopsia is a common symptom of TBI, sometimes temporary and other times, like the case mentioned above, permanent.

This situation not only forced an artist to re-evaluate his entire practice, but it also provided greater insight into the color-processing regions of the brain. This case revealed that the visual cortex is involved in color perception as well as color imagination and memory. What is truly fascinating about this specific case of the color-blind artist is his persistence to create despite the setback. As stated before by Ellen Greene Stewart, when a loss occurs an individual is forced to readjust. How those adjustments are made is the interesting part.

CONCLUSION

The examples above demonstrate the degree that the neurological condition of an artist and the operation of their practice are interwoven and connected. Not only does a neurological disorder impact the artwork that is produced, but the process in which they were created.

The devastating effects of dementia and Alzheimer's on life-long practicing artists is seen in the shifts and changes of the work they produce- styles switching from energetic, intricate, and complex to simplistic, abstract, and calm. These are the results of the degradation and decay of cognitive abilities typical of dementia. Despite this, they developed their own ways to fight against it; from Willem de Kooning's repetitive and hypnotic works beginning to function as his own form of art therapy to William Utermohlen's documentation of his own fleeting memory and identity through self-portraits. All of them, whether consciously or not, lending a hand to future studies and theories made to benefit the lives of those living with similar afflictions.

Just as important are the artists who are born as a result of their disease- something that is so heavily associated with loss rearing a positive development. Whether it is surges of newfound creativity creating a new way of communicating for those who have lost their speech, or inspiring new works created as a product of coping and therapy- these artists are able to carve out a small sanctuary for themselves in the face of a destructive force.

Then there are those who have been severely impacted mentally and physically by a single moment in their lives and have had their reality altered because of it, but proceed to create despite it. All of these examples demonstrate just how serious and impactful the effects of neurological disorders can be on artists. It can reshape their practice, way of communication, or entire view of reality, forcing them to find new ways to adapt and create. Not allowing

themselves to be held back by the forces out of their control. Not allowing for their lives and legacy to be defined by a loss.

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