

HUMANITIES

From expressionless to impressionist: Exploring the link between neurological disease and artistic style in painters

Ricarda M. Konder, BSc

Class of 2020, Faculty of Medicine, Dalhousie Medicine New Brunswick, Canada.

Abstract

This paper discusses the relationship between various types of neurological disease and stylistic changes in painters. By first outlining the hypothesized neuroanatomical bases of creativity, the discussion then relates localized brain damage to various stylistic changes in painters and previously non-artists. It also explores artistic style in the context of more global neurological damage, such as dementias and neurotransmitter imbalances. The literature suggests that focal neurological insults (such as strokes or head injuries) may more often lead to focal deficits in painters, such as the loss of visuospatial ability or partial hemineglect. More widespread neurological damage may be associated with more global stylistic changes; for example, dopamine replacement therapy for Parkinson's disease has been shown to produce a more impressionist painting style in numerous recorded artists. In several case studies, brain damage actually led to the emergence of de novo artistic ability. While these changes in artistic style may not be rigidly predictable based on the limited literature available, this paper demonstrates that both artists and non-artists may experience significant changes in artistic style after neurological disease. Patient narratives also suggest that painting may serve as an empowering personal coping and communication strategy, aiding patients in navigating their complex illnesses.

Introduction

Despite the breadth of artistic variety in the humanities, few sub-forms are as widely studied as the visual arts. In fact, painting is an artform so tempting that even our Neanderthal ancestors produced animal drawings – at times complex and extensive – on their cave walls. It is now widely hypothesized that the artistic abilities of humans evolved as a mode of communication, allowing us to relate to one another and consequently create more tight-knit communities for a greater survival benefit.¹

In more recent centuries, our societies have focused thoroughly on the concept of style in individual artists. Because the increasing complexity of artistic style is temporally correlated with an increasing complexity of the human neural framework, it is of particular interest to study painters' styles in the context of neurological ailments. It may come as a surprise to some that numerous famous painters were known to have neurological diseases which greatly influenced their work. Among them are Vincent van Gogh (psychosis), Georgio de Chirico (migraine/epilepsy), Lovis Corinth (stroke), Georges Braque (head injury), and Guillaume Apollinaire (head injury).^{2,3} This paper explores the potentially causal link between neurological disease and subsequent changes in artistic style.

It should be mentioned that, while the link between neurological insult and style change has been studied, and in some instances may be considered causal, there may be other factors at play which influence this correlational relationship. One is the reality that many

artists' styles naturally evolve over time, sometimes slightly, but oftentimes substantially. Usually, however, this evolution in style is gradual and signifies the maturation of the artist over time.³ Therefore, for the sake of exploring the hypothesis that neurological disease profoundly influences artistic style, we will closely examine some recorded cases of artists who exhibited sudden and profound stylistic changes (or even de novo artistic talent) in direct correlation to an identifiable neurological event. This will be achieved by discussing artists who suffer both localized neurological damage (e.g. a head injury or a stroke) and more widespread neurological change (e.g. dementia subtypes and neurotransmitter imbalances).

Neural Structures Associated With Creativity

Before discussing individual cases, it may be of some benefit to first discuss the various neurological structures that have been studied in relation to artistic style and creativity. While traditional doctrines postulate that the right hemisphere is the seat of artistic ability, research in recent decades has largely debunked this rather simplified view of artistic ability being a lateralized trait.⁴ Many different areas of the brain have been identified as important contributors to the creative process. Lefebvre and colleagues noted that creativity in some birds was strongly associated with a more well-developed hyperstriatum and neostriatum (two regions found in avian brains).⁵ In non-human primates, they found that the striatum (normally associated

with motor and reward systems) and the neocortex (normally associated with spatial reasoning, cognition, and sensory perception) are implicated.⁵ These areas in particular have grown significantly throughout the evolutionary development of humans,^{1,6,7} thereby establishing a temporal relationship between an increase in brain size and an increase in complexity of artistic style. Van Essen and colleagues used MRI technology to compare human to non-human brains and deduced that a larger left Sylvian fissure (the sulcus separating frontal, parietal, and temporal lobes), a larger right dorsomedial prefrontal region (the area housing our “sense of self”), and a larger right angular gyrus (normally responsible for number processing, language function, and spatial reasoning) may be key players in creativity.⁶

There are also interesting examples of brain structures which, if injured, may lead to the amplification of artistic ability. Shamay-Tsoory et al. determined (with a respectable sample size of 40 subjects) that anatomical lesions to the left posterior parietal cortex (responsible for spatial reasoning and motor movement planning) and posterior temporal cortex (associated with the ability to imagine another person’s spatial perception) were associated with an increase in creativity.⁸ In fact, the larger the lesion, the greater the effect. Meanwhile, lesions to the right medial prefrontal cortex (responsible for decision making) were associated with a decrease in creativity.⁸ With these, and many other structures, implicated as “hotspots” for the creative process, creativity likely is not housed in a single hemisphere but relies on a complex interplay of various neural structures.⁹

These findings may beg the question of whether artistic ability is something that can be “created” as a result of damage to the brain. Many case studies and reviews have addressed this particular question. In an extensive review paper published in 2014, Zaidel presents a list of case studies that discuss the emergence of *de novo* creativity in people who began producing art only after brain injury.^{1,10-16} However, instead of deducing that tissue injury leads to artistic “enlightenment,” Zaidel came to a much more temperate conclusion: “there is a deep survival motivation to communicate through art when the communicative channel of language fails following brain damage.” In other words, art is a way for patients to adapt to their new disability by creating a new mode of communication.¹

Artistic Style and Localized Brain Insult

Patient cases that discuss artistic style in the context of a very localized brain injury (such as stroke or trauma) may give us insight into how the disruption of a discrete subset of neurons may affect a person’s artistic ability. In

a letter published in *The Lancet*, Miller and colleagues described three cases of enhanced artistic ability in patients suffering from a subtype of frontotemporal dementia, a type of neurocognitive disorder in which the anterior temporal area degenerates while the frontal lobes are mostly unaffected. This letter outlined that damage to neuronal systems in the anterior temporal lobe (responsible for inhibiting the posterior visual cortex) produced a profound sensory experience in patients. This consisted of intense visual memories and unfiltered visual perceptions of their surroundings, leading them to paint uninhibitedly.¹⁷ This is one of several studies that propose a “disinhibition hypothesis,” or the idea that, with certain inhibitory neural networks disrupted, the lack of available “brakes” now allows for the enhanced functioning of otherwise suppressed pathways (some of these studies will be discussed later). Bogousslavsky, another researcher in the field, supported this hypothesis with his own observations, writing that “[t]he capacity to ‘disinhibit’ [...] repressed, controlled, mental processes is illustrated by the attempt of numerous artists to achieve a ‘low arousal’ state, which may allow the emergence of more ‘spontaneous’ expressions.”³

Another fascinating case couples these observations with an instance of hemispatial neglect. A patient published as “The Painter From Sinaloa” underwent the removal of a central neurocytoma that resulted in the severing of right thalamo-parietal connections. The painter – previously producing full works of well-balanced canvases – now began to involuntarily neglect shapes in the left side of his paintings.¹⁸ Astonishingly, instead of neglecting the entire left canvas as one might expect, he continued to paint contours and colours in the left half, but began to neglect elements like perspective and shapes. This resulted in works such as a green, hilly landscape throughout, but texturing elements like grass, flowers, and trees were restricted to the right half.¹⁸

There are two cases of famous artists who experienced a profound change in their artistic style after brain injury. Both Guillaume Apollinaire and Georges Braque sustained head injuries during WWI. Apollinaire, previously a poet, began to produce paintings in vivid watercolour while Braque, previously known for his cubist painting style, began to soften his sharp cubist abstractions and used more vivid colours.³

Another interesting question is whether artistic style changes may conform to laterality, i.e. whether brain injury in a certain hemisphere may translate into predictable changes to the artist’s canvas. This question can be best answered by Italian neurologist Anna Mazzucchi whose research group studied various famous artists’ pre- and post-stroke works and drew

conclusions based on the laterality of the insult.¹⁹ This paper will outline four of her famous case studies.

Initially, let us discuss left-hemisphere strokes. The first example is that of Zlatyu Boyadjiev, a Bulgarian painter. Before his stroke, his works depicted semi-realist Bulgarian village scenes, often large crowds gathered around a fire. After the insult, his work became much more simplistic and impressionist with a strong decrease in perspective mastery.¹⁹ Afro Basaldella, an Italian artist, is another example of a painter whose art became remarkably simplified after not just one, but two left-hemisphere strokes. His use of colour, previously realistic, became “opaque and simplified.”¹⁹

Artists suffering from right-sided lesions exhibited different style changes. One example is that of Lovis Corinth, a German artist. His premorbid style reflected a robust adherence to realism: the subjects of his paintings, usually portraits, were conventional and realistic. After two right-hemisphere strokes, Mazzuchi et al. described his style as exhibiting “quick painting strokes, [...], flat and rather elementary with hardly any tridimensionality.”¹⁹ His hemineglect became especially obvious in later years, with his paintings showing strong imbalances between the right and left sides.¹⁹ The second example in this category is Otto Dix, another German painter. Originally also adherent to the naturalistic and academic painting style, he experienced profound challenges in coordinating volumes and space after his right-hemisphere stroke. His art also became entirely bidimensional with very basic colour schemes.¹⁹

While these are only four cases of the study’s original six, Mazzucchi et al. were able to draw substantial conclusions. They found that painters with left-hemisphere lesions began to struggle with properly depicting perspective and often resorted to using repetitive geometric elements. Right-hemisphere lesions led to deficiencies in distance and depth, and the resulting visuospatial neglect often yielded imbalances in the left half of the canvas. Both groups regressed to the use of simpler, less realistic colours. Interestingly, the authors also found that the works of painters with left-sided strokes tended to improve over time, while those with right-sided strokes tended to improve very little, if at all.¹⁹

In summary, artists who suffered a discrete neurological insult generally experienced discrete artistic changes, such as neglect, visuospatial deficiencies, or regression to simpler colours. These changes may even be partially predictable based on which hemisphere is affected. Next, let us examine artists who suffered more widespread neurological damage.

Artistic Style and Widespread Brain Insult

In cases where brain damage is not neatly encased by penumbra and instead extends to large areas of the brain, we may observe different stylistic changes. Consider, for example, cases of neurocognitive disorders (dementias). It has been shown that persons with frontotemporal dementia and Alzheimer’s disease remain active, creative artists through the course of their disease.²⁰⁻²² One particularly interesting case describes a woman with frontotemporal dementia whose style evolved with the progression of her disease. Originally trained in watercolour and Chinese brush painting, the progression of her condition was associated with an increasing tendency to paint large figures in bright colours, especially red, purple, and turquoise.²³ The author describes her last couple of pieces as intensely impressionistic with less detail, but more colour and more poignant emotional overtones.²³ There are also instances of *de novo* creativity in these patients.^{20,24-27} Most of these cases are explained by authors’ deference to the disinhibition hypothesis, relating the atrophy of inhibitory cortical pathways (a common feature of frontotemporal dementia) to a less restrained brain. However, this tends to be the exception rather than the norm, with most of the evidence showing that non-artists who become demented actually have lower creativity and artistic behaviour.²⁸ One possible explanation that marries these two observations is that of the “latent artist,” meaning that the atrophy of inhibitory cortical pathways acts as a “release” of pre-existing artistic potential, rather than the *de novo* creation of it.¹

Another way to look at more widespread neurological change is through neurotransmitters. The most predictable relation between neurotransmitters and artistic style is seen in dopamine. Parkinson’s disease (PD), a movement disorder featuring tremors and postural instability due to insufficient striatal dopamine activity, is usually medicated with dopamine replacement therapy (DRT) via agents like levodopa. Multiple documented cases (discussed in subsequent paragraphs) have shown an increase in artistic output upon starting dopamine replacement. It has been argued that increased artistic productivity is not necessarily a unique side effect, as it is in line with other common side effects of DRT (such as an increase in impulsivity and gambling behaviours).²⁹ However, a study conducted by Canesi and colleagues suggested that *de novo* artistic ability after dopaminergic therapy in PD patients was not necessarily associated with impulsivity or impulse control disorders.³⁰ Therefore, increased artistic ability or productivity need not be seen as a reliable warning sign for impending impulsive behaviour.

While increased artistic productivity post-DRT initiation has been a relatively common observation by researchers,^{31,32} style changes are starting to emerge as a Parkinsonian phenomenon.³³ More specifically, PD patients change their painting style post-DRT to one that is more impressionist (hence the title of this paper, “From Expressionless to Impressionist”). The emergence of this “Parkinson’s Personality” has been the focus of many research groups. In a keynote address titled “Tremor: A biography of Parkinson’s disease from the shaking palsy to the neurobiology of compulsion,” prominent medical historian Dorothy Porter detailed a collection of paintings that became increasingly more impressionist in style after the artists began DRT.³⁴ This same trend was reported by Johanne Vermette, a former family physician and now painter living with PD. In a 2001 exhibition at the McGill Centre for Studies in Aging, she featured her art among that of seven other painters with PD. She has observed definite changes in her painting style since her diagnosis: “The new style is less precise but more vibrant. I have a need to express myself more. I let myself go, sometimes painting with enraged fingers.”³⁵ Vermette also describes increased artistic productivity as a side effect of her DRT, often allowing her to paint late into the night.³⁵

Porter’s work also explores how these patients experience their change in artistic personality. In an extensive essay published in 2016, she tackles the question of how Parkinson’s patients navigate this often rather sudden paradigm shift.³⁶ One example is that of Gwendoline Spurll, a hematologist at McGill University. Diagnosed with PD in 2005, she published a personal reflection on not only the changes of the meaning of her art after her diagnosis, but also how she perceives her own illness. “I do know that there are only two times when I forget about the Parkinson disease: when I am solving a difficult clinical case, and when I am painting,” she writes. “It [painting] induces a flow state, and removes from my consciousness the constant knowledge of my physical limitation. It is like a meditation. It is my Zen.”³⁸

As a point of interest, there are various other artistic domains in which PD has been known to cause stylistic deviations. Schrag and Trimble reported on a PD patient who, upon starting DRT, began to write poetry de novo, eventually going on to win a prize for his work.³⁸ Another formidable example is that of Alan Babbitt, a photographer with PD who used a mechanical manifestation of his condition to his stylistic advantage. In order to compensate for the tremor he developed, he invented an entirely new style he termed “tremor-enhanced photography.”³⁹ “When you first learn photography, they tell you over and over about crispness, about keeping the camera steady with

a tripod,” Babbitt writes. “One evening in Las Vegas, where I was alone with a digital camera, I just started shooting. I was able to see right away what I got. Blurs. Streaks. And then people started reacting to it, liking it.”³⁹ His current artwork features brightly coloured cityscapes, lights, and abstract objects, often on black backgrounds to create sharp contrasts. He continued to name various of his portfolios after his condition, choosing names like “Shake me out to the Ball Game” or “Movement Disorder.”³⁹

Conclusion

Ultimately, neurological disease has the potential to produce significant changes in painting behaviour. Based on the studies available, it is possible that more localized brain injury (like strokes and head trauma) may lead to more focal changes in painting style. These include changes in visuospatial ability, colour choice, and the spatial distribution of objects. In more widespread neurological changes (like neurocognitive disorders or neurotransmitter imbalances), we see that changes more often reflect a global style change to one that is more daring and vibrant. The most predictable example of this phenomenon is reflected in the “Parkinson’s Personality,” an observation that the initiation of DRT often leads to a style that is more impressionist.

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References

1. Zaidel, DW. Creativity, brain, and art: Biological and neurological considerations. *Frontiers in Human Neuroscience*. 2014;8:1-9.
2. Piechowski-Jozwiak B and Bogousslavsky J. Neurological diseases in famous painters. *Progress in Brain Research*. 2013;203:255-75.
3. Bogousslavsky J. Artistic creativity, style and brain disorders. *European Neurology*. 2005;54: 103-11.
4. Gonen-Yaacovi G, de Souza LC, Levy R, Urbanski M, Josse G, and Volle E. Rostral and caudal prefrontal contribution to creativity: a meta-analysis of functional imaging data. *Frontiers of Human Neuroscience*. 2013;7:465.
5. Lefebvre L, Reader SM, and Sol D. Brains, innovations and evolution in birds and primates. *Brain, Behaviour, and Evolution*. 2004;63:233-46.
6. van Essen DC, Glasser ME, Dierker DL, Harwell J, and Coalson T. Parcellations and hemispheric asymmetries of human cerebral cortex analyzed on surface-based atlases. *Cerebral Cortex*. 2012;22:2241-62.
7. Buckner RL and Krienen FM. The evolution of distributed association networks in the human brain. *Trends in Cognitive Science*. 2013;17:648-65.

8. Shamay-Tsoory SG, Adler N, Aharon-Peretz J, Perry D, and Mayseless N. The origins of originality: The neural bases of creative thinking and originality. *Neuropsychologica*. 2011;49:178-85.
9. Zaidel, DW. *Neuropsychology of art: Neurological, cognitive and evolutionary perspectives*. UK: Psychology Press. 2005.
10. Finkelstein Y, Vardi J, and Hod I. Impulsive artistic creativity as a presentation of transient cognitive alterations. *Behavioural Medicine*. 1991;17:91-4.
11. Lythgoe MF, Polak T, Kalmus M, de Haan M, and Khean CW. Obsessive, prolific artistic output following subarachnoid hemorrhage. *Neurology*. 2005;64:397-8.
12. Chatterjee A, Hamilton RH, and Amorapanth PX. Art produced by a patient with Parkinson's disease. *Behavioural Neurology*. 2006;17:105-8.
13. Pollak TA, Mulvenna CM, and Lythgoe MF. De novo artistic behaviour following brain injury. *Frontiers of Neurology and Neuroscience*. 2007;22:75-88.
14. Schott GD. Pictures as a neurological tool: lessons from enhanced and emergent artistry in brain disease. *Brain*. 2012;135:1947-63.
15. Simis M, Bravo GL, Boggio PS, Devido M, Gagliardi RJ, and Fregni F. Transcranial direct current stimulation in de novo artistic ability after stroke. *Neuromodulation*. 2014;17(5):497-501.
16. Midorikawa A and Kawamura M. The emergence of artistic ability following traumatic brain injury. *Neurocase*. 2015;21(1):90-4.
17. Miller BL, Ponton M, Benson DE, Cummings JL, and Mena I. Enhanced artistic creativity with temporal lobe degeneration. *The Lancet*. 1996;348:1744-5.
18. Orjuela-Rojaz JM, Sosa-Ortiz AL, Díaz-Victoriac AR, Marrufo Melendez OR, Townsend NL. The painter from Sinaloa: Artistic analysis of a case of spatial agnosia and neglect of visual shapes. *Neurocase*. 2017;23(5-6):304-13.
19. Mazzucchi A, Sinforiani E, and Boller F. Focal cerebral lesions and painting abilities. *Progress in Brain Research*. 2013;204:71-98.
20. Miller BL, Cummings J, Mishkin F, Boone K, Prince F, Ponton M, et al. Emergence of artistic talent in frontotemporal dementia. *Neurology*. 1998;51:978-81.
21. Fornazzari LR. Preserved painting creativity in an artist with Alzheimer's disease. *European Journal of Neurology*. 2005;12:419-24.
22. Crutch SJ and Rossor MN. Artistic changes in Alzheimer's disease. *International Review of Neurobiology*. 2006;74:147-61.
23. Mell CJ, Howard SM, and Miller BL. Art and the brain: the influence of frontotemporal dementia on an accomplished artist. *Neurology*. 2003;60:1707-10.
24. Miller BL and Hou CE. Portraits of artists: emergence of visual creativity in dementia. *Archives of Neurology*. 2004;61:842-4.
25. Chakravarty A. De novo development of artistic creativity in Alzheimer's disease. *Annals of Indian Academy of Neurology*. 2011;14:291-4.
26. Miller ZA and Miller BL. Artistic creativity and dementia. *Progress in Brain Research*. 2013;204:99-112.
27. Viskontas IV and Miller BL. Art and dementia: how degeneration of some brain regions can lead to new creative impulses. In: *Neuroscience of Creativity*, eds. AS Bristol, O Vartanian, and AB Kaufman. Cambridge, Mass: MIT Press, 2013:115-32.
28. de Souza LC, Volle E, Bertoux M, Czernecki V, Funkiewiez, A, Allali G. et al. Poor creativity in frontotemporal dementia: a window into the neural bases of the creative mind. *Neuropsychologia*. 2010;48:3733-42.
29. Inzelberg R. The awakening of artistic creativity and Parkinson's Disease. *Behavioural Neuroscience*. 2013;127:256-61.
30. Canesi M, Rusconi ML, Isaias IU, and Pezzoli G. Artistic productivity and creative thinking in Parkinson's disease. *European Journal of Neurology*. 2012;19:468-72.
31. Walker RH, Warwick R, and Cercy SP. Augmentation of artistic productivity in Parkinson's disease. *Movement Disorders*. 2006;21:285-6.
32. Schwingenschuh P, Katschnig P, Saurugg R, Ott E, and Bhatia, KP. Artistic profession: a potential risk factor for dopamine dysregulation syndrome in Parkinson's disease? *Movement Disorders*. 2010;25:493-6.
33. Kulisevsky J, Pagonabarraga J, and Martinez-Corral M. Changes in artistic style and behaviour in Parkinson's disease: dopamine and creativity. *Journal of Neurology*. 2009;256:816-19.
34. Porter, D. Tremor: A biography of Parkinson's disease from the shaking palsy to the neurobiology of compulsion. *Canadian Society for the History of Medicine Annual Meeting*. May 26th, 2018. Regina, SK.
35. Pinker S. Art Movements. *Canadian Medical Association Journal*. 2002;166(2):224.
36. Porter, D. Reconfiguring the Parkinson's Personality in the twentieth and twenty-first centuries. *Canadian Bulletin of Medical History*, 2016;33(2):465-92.
37. Spurrill GM. 'Zen and the Art of Painting. *Canadian Medical Association Journal*. 2009;181(8):175-9.
38. Schrag A and Trimble M. Poetic talent unmasked by treatment of Parkinson's disease. *Movement Disorders*. 2001;16:1175-6.
39. Weingarten W. "Disease Can't Shake Photographer's Tenacity," in *For ALLEvents Reviews and Views*, edited by Joseph Cilio (26 December 2013). <http://forallevents.info/reviews/disease-cant-shakephotographers-tenacity/>