# ABSTRACT

My oil paintings are an exploration of the inner-workings of the human brain. The brain is the most vital, and often times the most perplexing tool we as humans possess. More than anything else, this organ governs how we think, how we act, how we live. Utilizing contemporary literature, I investigate the electrochemical reactions that occur inside the brain. My art then becomes the symbolization of neurological functions. Through a combination of compositional planning and process-driven spontaneity, I produce imagery that is based in science yet exists in a place beyond this reality.

#### DEDICATION

There has been one major person who has supported and encouraged me, not only in my artistic endeavors, but throughout the course of my life. One person whom above all others, deserves special recognition. That person is my mother, Theresa Bernard. Whenever I needed anything, she was always there for me – whether it was someone to talk to, or a roof over my head. My mother never questioned my professional or educational decisions. She has devoted her life to the health, happiness, and well-being of her children. Her sacrifices were great, just as her love is for me. Everything that I am, everything I have accomplished, is all because of her. I would not be where I am today were it not for my mother. Words cannot express how grateful I am for everything you have done for me. I will continue to try and make you proud, until I no longer carry breath in my body. This thesis is dedicated to you. I love you mom.

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# Dr. Halide Salam

Dr. Salam has been my painting advisor for my entire graduate education. More than that, she has been an invaluable guide in my growth as an artist. She helped to open my mind to new ways of thinking, both practically and conceptually. Was it not for her critique and support, this thesis would not be possible.

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I have known Dr. Bradbury ever since I entered graduate school. She has been an educator, a critic, and a friend. My voice as a writer is indebted to her patience and encouragement. I have a brighter future because of her.

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Professor Philpot and Dr. Bay are educators at Radford University. They have expanded my mind and changed the way I look at my art. Their efforts with my art and thesis have benefitted me greatly and I am extremely grateful for their insights.

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I came to Radford without knowing anyone or anything about the area. I became part of a talented, dedicated community. My peers here at the university have given me inspiration, support, and most importantly, friendship. I am a better artist today for having shared this experience – for that I thank you.

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## **INTRODUCTION**

No matter how much external stimulus is present, artists must invariably look inwards for inspiration. It is only through this internal exploration that they can hope to identify the *why* behind their art. In the search for such answers, I stumbled upon what I consider to be my primary source of inspiration: the human brain. More than any other organ, the brain governs our thoughts and actions. It is to this effect that I pursue my current means of artistic expression: visual representations of neurological functions.

My undergraduate work was exceedingly different than my present endeavors. I was a figurative painter and focused almost exclusively on portraiture. I explored various concepts with these paintings, such as the artist-sitter relationship, or a person's label/role in society. By the time I graduated with my Bachelor of Fine Arts degree, I hit a wall. I felt I said all I could through that specific genre. Grasp as I may for ideas, they would not come. It was at that point I decided to explore alternative modes of representation.

Under the tutelage of my painting professor, David Olivant, I began to practice a nonrepresentational style of painting. Olivant teaches a class entitled "Painting from the Unconscious" which is based on a methodology he has developed for years: students let the process inform the content. Paint or medium is applied to a surface, and eventually, some kind of image appears. It is then up to the student how they wish to treat said imagery – whether they choose to coax it out, or completely obliterate it altogether. I lean towards the latter, leaving no recognizable objects visible.

While practicing this new style, I realized that I wanted more out of my paintings, specifically from the medium. Out of sheer curiosity, I began to incorporate various chemicals

into my paint. I wanted to test the limits of oil paint and find out how I could make it behave. Preliminary experimentation included such materials as liquin, linseed oil, mineral spirits, and oil painting medium.

Once I reached graduate school, I found out that the majority of my peers were treating their paints with various additives as well. This helped to encourage my process and led to further investigation with emulsions. Through consultations with my advisor and other graduate students, I integrated damar varnish, turpentine, refined linseed oils, and various plant-based oils into my paints. These chemicals gave me much more control over the viscosity, transparency, and color intensity of the medium.

My non-representational style of painting necessitated further investigation into other abstract artists – specifically those with similar working methods. I always admired the art of the Abstract Expressionists, but the more I learned about the paintings of Helen Frankenthaler, the more I saw a link between her work and my own. Another major artist who influenced me was Leon Golub. Having used palette knives for the majority of my artistic career, Golub's unique "scrape" technique completely enamored me. The work of these two masters, in conjunction with the teachings of Olivant, profoundly affected the way I saw and created art.

I struggled for months trying to come up with some sort of concept behind my art. The only consistent phrase that kept repeating itself inside my head was: "unconscious mind." I was aware that artists such as Jackson Pollock and Olivant utilized their unconscious mind in order to create art, but I was not interested in simply continuing this exploration. I wanted to bring something relatively new to the genre of abstraction, not only stylistically but contextually. Rather than duplicate other artist's methods, I wanted to create my own interpretations with these processes. More importantly, I wanted the content of my art to be unique – only existing within

the confines of my own imagination. After a year of trivial pursuits, countless frustrations, and endless theorizing, it finally came to me. The resulting idea was always just beyond my grasp, yet somehow, ever present. I was up in my studio one afternoon and something just clicked. It was an epiphany, in the purest sense of the word.

After continuously repeating "unconscious mind" over and over in my head, I simply replaced the word 'mind' for 'brain.' In addition to governing all of our conscious and unconscious thoughts and actions, it is also the most vital tool we as artists possess. More than anything else, the brain dictates the how and the why of our art. Because of how important the brain truly is, it seems only fitting to use the organ's inner-workings as my source material.

In my current work, I research the basic electrochemical reactions that take place inside the brain, and create oil paintings in reaction to them. More specifically, I am symbolizing neurological activity through my art. The chapters of my thesis therefore investigate the various steps of my working methodology. First a section devoted to the neurological texts that serve as the foundation of my paintings. These books give me the information about the microscopic occurrences that take place inside the human brain. Next, a chapter where I draw links between my own art, and the writings and teachings of the artists who have influenced me: David Olivant, Helen Frankenthaler, and Leon Golub. Then I will present quotations from the neurological books in order to bridge the gap between written observations and visual representations. The final chapter will analyze my paintings, and detail their progression throughout my time in graduate school.

#### THE BRAIN AS REFERENCE

The decision to employ the human brain and its occurrences as my subject material was by no means an easy one. The brain is such a multifaceted organ, no one knows its full use or potential. How could I, an artist with no previous experience on the subject, educate myself on the most complex area of the human body, let alone select one specific portion to draw inspiration from? This chapter contains the answers to these and other questions regarding my utilization of the brain. How I go about finding information; the specific actions I focus my research on; my reasoning behind choosing them; the clinical tools used to gather this information in the first place; examples of phrases gathered from these texts; and finally, how written descriptions transition into painted imagery.

Due to constantly evolving technological advances, scientists and medical professionals currently know more about the brain and how it works than any other point in history.<sup>1</sup> Almost all of this research is being documented in medical journals and texts. These guides are the starting point of my own artistic endeavors.

At university libraries, I obtain clinical guides devoted to: neurology, neuroscience, and neurobiology. Although a plethora of information has been written about the brain, the scope of my research is very rigid. I am only interested in books that have been published within the last ten years. This rationale is two-fold. I wish to keep my work current and a product of its time. In order to be a product of my time, I first must be privy to the most up-to-date neurological findings. Secondly, these neurological findings must be different than the neurological information other artists may have potentially used in the creation of their art. As such, I cannot use the same material made available to my predecessors, i.e. books published before 1980. Of these contemporary texts, a portion of them must be devoted to the rudimentary functions of the

brain. Because my scope is so narrow, I am not interested in the complex aspects of speaking or reasoning or emotions. The basic electrochemical reactions of the brain are my only concern – nothing else.

An abundance of these books have portions devoted to complex neurological actions and/or illnesses of the brain. While the complexities and damage(s) of the organ may be interesting to some, they invariably lead down pathways that take the focus away from the brain itself. What I am most fascinated by are the common, elemental incidents that take place every second of every minute of every day. These thousands of millions of microscopic actions are what operate our brains, help us function, and keep us alive – all of which happen without any effort or knowledge from ourselves.<sup>2</sup> Although these actions can be detected, via the flow of oxygen and blood throughout areas of the brain, the working parts and how they operate still remain relatively unknown. The components can only be viewed when surgically excised and immobile, not while moving. This unseen motion is terribly intriguing to me, and because of its ambiguity, I am free to imagine how these actions might transpire.

In the late 19<sup>th</sup> and early 20<sup>th</sup> centuries, when neuroscience was still in its infancy, the only way physicians could gain access to the inner recesses of the human brain was to cut it open. By the 1970s, doctors, scientists, and engineers had developed the technology to improve upon previous techniques without the need of surgical equipment.<sup>3</sup> In the course of my research, there are four neuroimaging techniques that prove most vital to the study of contemporary neurology:

- Magnetic Resonance Imagery (MRI): uses a powerful magnetic field to align excited water molecules with or against the direction of the force. The water molecules absorb or transmit radio waves, producing a pattern detected and analyzed by a computer.
- Functional Magnetic Resonance Imagery (fMRI): measures blood flow changes by recording the shifts in blood-oxygen levels.

- Positron Emission Tomography (PET) scan: takes a biologically active chemical like glucose, tags it with a detectable radioisotope, and records its uptake by active brain cells.
- Electroencephalography (EEG): a diagnostic test to record electrical impulses (brain waves) associated with mental activity.<sup>4</sup>

A byproduct of all this technology is the ability of doctors to take extremely detailed photographs of the brain's inner-workings – the results of which are littered throughout clinical books. But regardless of how visually appealing these illustrations might be, they are merely the visual recordings of medical instruments. I avoid such images in my research so they do not influence my paintings. I do not wish to transfer a visual image from one material (paper) to another (canvas). Instead, I limit my studies to what the author has written, which is much more abstract and open to interpretation.

In the course of researching the basic neurological functions of the brain, there are certain words or phrases that I take note of because they are the most relevant to my art. Sometimes the author will say something entirely metaphoric: "there are islands of activity in a sea of silence."<sup>5</sup> Other times it will be a scientific description: "a sheath of white substance which acts as insulation, allowing electricity to flow swiftly and directly."<sup>6</sup> Or perhaps it could be two seemingly innocuous words that when placed together, produce something unique: "sensory palette."<sup>7</sup> These words spark my imagination. I take all of these quotes and organize everything into a catalog of sorts – including book title, author, and other pertinent bibliographic information. This inventory allows me the advantage of returning the texts once I am done reading them.

When I am ready to begin a new painting, I will scroll through the list of phrases until one seems to stand out more than the others. The internalization process begins once I have chosen the phrase. The selected phrase gets filtered through my own mind – maybe for a day, maybe for a week – until I decide how I believe this action should be expressed through paint. In

my studio, I use palette knives to drip, pour, and scrape layers of pigment onto the flat canvas. I build these vibrant strokes and gestures into my own interpretation of the electrochemical reaction.

## PLUGGING IN TO THE PAST

No artist can create art in a vacuum. No matter what genre you practice, you are bound to be influenced by artists that came before you. And while I admire and respond to many different artists, there are three individuals that have helped to facilitate the progression of my art: David Olivant, Helen Frankenthaler, and Leon Golub. I will explain how each of these masters has impacted my art, and describe the characteristics that are of most use to me. There is little formal resemblance between my work and the work of these artists however. There may be similar concerns with regard to application or concept, but my solutions are consistently disparate.

The first artist worthy of analysis is my former professor: David Olivant. I cite Olivant as a source because of how tremendously significant his teachings were/are to me, and because our relationship eventually became one of master and apprentice. I was initially drawn to Olivant's work because of its powerful color theory and its deeply psychological intent. By the time I had completed my undergraduate degree, Olivant was the chief inspiration for my art.



Figure 1. David Olivant. *Untitled*. Pastel on paper. 2004. [Permission granted by artist/Licensed by David Olivant, Turlock, CA]

Present in Olivant's art was a working method completely unfamiliar to me at that time. Beginning each piece without any preconceived notion as to the final outcome, Olivant utilizes automatism in the creation of his art – allowing his unconscious mind to not only guide his hand, but also spill over onto the surface. *Untitled* (fig. 1) is a work of complete imagination. At first glance the 'painting' appears to be a cacophony of scribbles, scrapings, and smears. But upon closer inspection, the viewer recognizes Olivant's dominating command over his medium. The predominantly cool image is filled with organic, rock-like structures whose colors ebb and flow purposefully throughout the composition. A sense of depth is achieved through the laborious 'construction' of the piece. Olivant builds up the surface with medium. He then smears, scratches, and erases the pastel, building and reworking areas over and over until some kind of cohesion begins to take shape, at which points he works towards such an end.

*Untitled* is a work in which Olivant purposefully left the content unrecognizable. The majority of his oeuvre however consists of representational, and often times narrative, imagery – the process is the same, the results are what changes.



Figure 2. David Olivant. *Cadenza*. Pastel on paper. 2004. [Permission granted by artist/Licensed by David Olivant, Turlock, CA]

*Cadenza* (fig. 2), created the same year as *Untitled*, is typical of the work Olivant is most well-known for. During the production of these fantastical compositions, Olivant subconsciously

begins to draw recognizable objects or forms.<sup>8</sup> These random items eventually lead to an overall concept or narrative of some kind. What makes a piece like *Cadenza* so intriguing is the interaction, or lack thereof, between the cast of characters. The individuals in the top register are so tightly compacted together they are obviously aware of each other's presence. But then there are figures that are completely isolated – most notably, the sullen man seated on the horse in the lower-right corner, and the sickly-green, elderly woman, vehemently clutching her infant child in her right arm, and an exceedingly large phone receiver in her left. The piano-playing, fox-man hybrid serenades his disheartened counterparts with an undoubtedly melancholy tune. More than the previous example, *Cadenza* demonstrates Olivant's masterful technical capabilities.

I am indebted to Olivant for numerous reasons. Olivant's use of spontaneity and the unconscious mind facilitated my shift away from portraiture into abstraction. His teachings and guidance continued to give me the courage to embark upon non-representational imagery, which at the time was entirely unknown to me. And while our mediums and content are completely different, one parallel characteristic is our color choices, which tend to be vibrant and electrically charged.

As I began to develop my own language and style of painting, I started to research other abstract artists whose work corresponds with mine. It was important to identify artists who treated the paint itself in a similar manner. Eventually, I became aware of Helen Frankenthaler. I immediately felt a kinship with her: from our mutual admiration of Jackson Pollock, to our desire to increase the fluidity of our paints. The more I learned about this woman and her art, the more I realized how much of an influence she was to me.

Frankenthaler's paintings do not look the same as my own. Nor is our subject matter related. Where we find common ground is our application and approach to painting. The

methodology Frankenthaler employs helped to instill a confidence in my own artistic endeavors. In an interview conducted by Barbara Rose, the artist says about her process:

A really good picture looks as if it's happened at once. It's an immediate image. For my own work, when a picture looks labored and overworked, and you can read in it – well, she did this and then she did that, and then she did that – there is something in it that has not got to do with beautiful art to me. And I usually throw these out, though I think very often it takes ten of those over-labored efforts to produce one really beautiful wrist motion that is synchronized with your head and heart, and you have it, and therefore it looks as if it were born in a minute.<sup>9</sup>

Having gone through trepidations of my own involving "over-labored efforts," this statement resonates to the very core of my working method. Some of my greatest artistic accomplishments occurred when decadence gave way to intuition.

Frankenthaler's paintings of the 1950s and early 60s inspire me due to their powerful energy and seemingly spontaneous application. In addition, her use of 'negative' space (the untreated canvas itself) is an integral part of the composition, one that encourages me to utilize the 'inactive' areas of my canvas. On this subject the artist is quoted as saying, "I think this is involved with my feeling that a 'successful' abstract painting plays with space on all different levels, at different speeds, with different perspectives, and at the same time remains flat."<sup>10</sup> This is an incredibly bold proposition. She is arguing both for the limitless space and depth within a painting, while still preserving its two-dimensionality. A complex objective, but one that maintains her status as "the bridge between Pollock and what was possible."<sup>11</sup>

The discovery of the stain method was a revelation for Frankenthaler. But technical consistency was not an easy feat. Although the paintings from this period are not seen as her

'best' works,<sup>12</sup> the passion and enthusiasm emanating from them is undeniable. Like Pollock, de Kooning, and Lewis before her, Frankenthaler does not let any amount of preparation or planning stifle the artistic process. "For certain, [Frankenthaler] chooses to act with colour in a fluid state...and in doing so encourages the extended duration of the active life of the material. She accepts the consequences for her intentions of its prolonged instability, allows it to guide her next move."<sup>13</sup> This idea has always had a profound impact on the way I paint. The dialogue between the painter and their art should never stop. There must be a give-and-take, back-andforth, action-reaction – for without it the painting cannot survive.

Due to the liquidity of our paints, we both had reason to paint on a flat, horizontal surface. But whereas the horizontality is bore out of necessity, how our paints react with the surface is one of choice – a dissimilar one at that. Frankenthaler stated that prior to her famous image *Mountains and Sea* (1952), she had always painted on primed canvas – but as her paints became thinner and thinner, they "cried out to be soaked, not resting."<sup>14</sup> This is the exact opposite of my process. While my paints are thin and extremely fluid, it is vital that they rest on the surface of a primed, and built up, surface. The reasoning for this has to do with: the various chemicals I add to my paints, how these chemically-altered paints react with one another, and the numerous, overlapping layers of treated paint. If I apply the same paints to an unprimed canvas, not only would the pigments lose their vibrancy, but the composition invariably becomes a muddy mess. If I paint using an easel, the chemicals would not interact in the same way, nor would I achieve the same level of transparency. Most importantly, the fluid paints would run right off the surface. I will go into more detail about my painting process in a later chapter.

The third individual, Leon Golub, is an artist of profound skill and uniqueness. His art is exceedingly dissimilar from my own, even more so than Frankenthaler's. But the commonalities

we do share warrant investigation. Again like Frankenthaler, the paintings I cite from Golub's oeuvre come from the 1950s and early 60s. The paintings during this period are the most relevant to my own.

Aside from his content, Golub is most well-known for how he handles his paints. During this early period, he used various methods to layer paint onto the surface of his canvas, and then scrape, scratch, or remove portions. He would repeat this process over and over, sometimes for months on end, until he finally achieved the 'look' he was after.<sup>15</sup> An example of this procedure can be viewed in *Fallen Man* (fig. 3) from 1960.



Figure 3. Leon Golub. *Fallen Man*. Oil and lacquer on canvas. 1960. [Art C Estate of Leon Golub/Licensed by VAGA, New York, NY]

The painting depicts a kneeling man, whose head and lower left leg are cropped, so the emphasis lies on his chest, abdomen, and right thigh. Just as dramatically as Golub builds up the surface with pigments, he eviscerates the same area with equal fervor. What remains is a figure that appears to be sculpted instead of painted.

An equal amount of layering is necessary for the paintings I create – but the process is rather different. In *Fallen Man*, there are sections of transparency and those where colors merge into one another. As Serge Guilbaut explains in his book on the artist, Golub's "creation comes more from subtraction than from accumulation."<sup>16</sup> The surfaces of my canvases are incredibly textured. This is because I am constantly building up layers of paint. Golub's texture results from building up, and equal if not greater removal of layers of paint from the surface.



Figure 4. Leon Goub, *Birth III*, oil and lacquer on canvas, 1956. [Art C Estate of Leon Golub/Licensed by VAGA, New York, NY]

There are times when the surface texture is less severe, and Golub has opted for a much more fluid appearance to his paintings, such as with *Birth III* (fig. 4). Instead of omitting certain parts of the body, here the artist has chosen to apply a 'cut-and-paste' style to the figure. The rigidity of the appendages in *Birth III* is counterbalanced by the amorphous design of the torso and womb. Donald Kuspit, discussing the works from this "first phase," describes them to be

"incomplete, fragmented."<sup>17</sup> We are not given an entire human to analyze – just specific areas designated by the artist. When depicting various neurological functions, I too give the audience an "incomplete" scene. The goal is to provide enough information in these fragments so they are not only stimulating, but feel 'complete.'

As my research continues, I am emotionally and artistically inspired by another comment by Kuspit: "Golub's libidinous figures exist ambiguously between abstraction and representation. To the extent that they are not strictly descriptive renderings of the body, they can be seen as representative forms abstractly constituted, or as libidinous, nonrepresentational structures given realistic sculptural expression."<sup>18</sup> When I create visual representations of neurological functions, there are no guides or models for me to follow. I take descriptions procured from texts, and concoct a "representative form" of my own design. While the action I depict is real, the final image comes from my interpretation of the action. Therefore, my paintings also exist in a realm between abstraction and representation.

Golub, like Frankenthaler, is another artist well-versed in the act of horizontal painting: "a constant movement between the horizontal and the vertical – a repetitive shifting of the painting from floor to wall – to allow the image to be read for its structural coherence and to correct unintended distortions."<sup>19</sup> Golub's problem was not that his paint was too thin, it's that he was too aggressive with the canvas. Were he to paint the same way using an easel, he'd tear right through the fabric. But the reasoning goes beyond mere practicality. Painting on a flat surface allows the artist to attack the image from all sides – altering his view perspectively as well as thematically. The artist can then penetrate into the very core of the painting, making the interaction between the two all the more symbiotic.

## **CHARTING THE MIND**

In the course of my research into the electrochemical operations of the brain, I have amassed over 300 quotations on the subject. What follows is a selection of the phrases organized into a relatively coherent sequence. The goal is to give the reader an insight into the organ's inner workings, as well as to put them in my position – so they can better understand the visual possibilities of these quotes. There are three sections to this chapter. The first one includes quotations discussing the general properties of the brain. The second one contains detailed descriptions about the organ and the various functions that occur within it. The final section consists of what I call 'action-quotes.' These are the most visually stimulating of all the quotes; the authors use a combination of abstract, visual, and poetic language in order to illustrate neurological actions.

## Section 1.

The history of neuroscience is the history of the techniques we employ to delve into the brain. Our entire edifice of knowledge, our very ability to pose questions about this organ and its relationship to the mind, depend on the tools and methods we have conceived to interact with them.<sup>20</sup> In science as in art we should delight not only in the physical manifestations of the data, but also in the ideas that produced them.<sup>21</sup> The fact remains that the cells that make up the nervous system can only be seen with magnification (one step removed) and only when stained with special chemicals (two steps removed) that illuminate the imperceptible. This means that our perspective on the world of the brain is entirely dependent upon the nature of unseen, biochemical reactions and is mediated only by the technologies we have invented to view it.<sup>22</sup> The history of much of experimental science is one of gaining access to the unseen and of representing it in a medium.<sup>23</sup> Only now, as we finally gain access to the brain's inner workings, have those brain maps from the past started to make real sense.<sup>24</sup> Indeed, much of what scientists now know about the human brain is the result of studies conducted over the last two decades.<sup>25</sup> The brain remains a work in progress even on so basic a parameter as its allotment of neurons... brain structure is also malleable, recording the footprints of our lives and thoughts.<sup>26</sup> The human brain is the most complex natural system in the known universe; its complexity rivals and probably exceeds the complexity of the most intricate social and economic structures. It is science's new frontier.<sup>27</sup> What makes the brain so special and fundamentally different from all other living tissue is its organized action in time.<sup>28</sup> The brain is perpetually active, even in the absence of environmental and body derived stimuli.<sup>29</sup>

Functional neuroimaging has its limitations. Most of its methods do not measure neural activity directly. Instead, they involve proxy measures, or "markers": blood flow, glucose metabolism, and so on.<sup>30</sup> We should no longer consider the brain as one organ among others. Instead, we are now to consider ourselves as beings who are separate from it and are driven by it.<sup>31</sup> The brain can produce an infinite array of different activation patterns.<sup>32</sup> When the organism is exposed to a new pattern of signals from the outside world, the strengths of synaptic contacts and local biochemical and electrical properties gradually change in complex distributed constellations.<sup>33</sup> The human brain has about 100 billion neurons with an estimated 200 trillion contacts between them.<sup>34</sup> Brain waves are the large-scale representations of the interactions among myriads of neurons, a collective-order parameter.<sup>35</sup>

#### Section 2.

Brain activity is controlled by currents and chemicals and mysterious oscillations.<sup>36</sup> On the perfectly translucent yellow background, sparse black filaments appeared that were smooth and thin or thorny and thick, as well as triangular, stellate, or fusiform bodies.<sup>37</sup> Dense internal meshwork of long, solid cables that form the growth cone's skeleton<sup>38</sup> Electricity is currency in the brain. A tightly choreographed ballet of electrical currents constantly – and fathomlessly – flickers throughout the vast expanses of the neural plains.<sup>39</sup> The electrical field generated by millions of discharging neurons in the cerebral cortex is 10,000 times smaller than that provided by an AA battery.<sup>40</sup> Plasticity is its capacity to modify its structure and cellular connections (synapses) in response to experience.<sup>41</sup> Neuroplasticity is the most important general discovery in all of neuroscience in the last decade.<sup>42</sup> Arachnoid membrane: a delicate, web-like membrane surrounding the brain and spinal cord.<sup>43</sup> Synapse: tiny gap where each axon

meets a dendrite. In order for the current to cross the synapse each axon secretes chemicals, called neurotransmitters, that are released into the space when the cell it suitably fired up. These chemicals trigger the neighboring cell to fire, too, and the resultant chain effect produces simultaneous activity in millions of connected cells.<sup>44</sup> Ion channels (which are proteins) provide tunnels across the membrane, passing into and out of the cell. Each ion channel provides a discrete binary signal: either "all on" or "all off."45 Increasing the charge on a neuron's membrane is called activation, while decreasing the charge is called inhibition.<sup>46</sup> Hebb's Rule: every time a neuron fires after receiving an excitatory input from another neuron, the synapse linking the two neurons is strengthened.<sup>47</sup> Migration refers to the movement of newly generated neurons away from the proliferative zones.<sup>48</sup> Growth cones are both the site of axon extensions and the source of directional guidance as axons navigate through tissue. Axon guidance is achieved via signals received from the local environment by growth cones. This signaling pathway directs the forward extension of the axon through the developing brain tissues.<sup>49</sup> Neurotransmitters are fast acting, and are in charge of local interactions throughout the brain...neuromodulators are slower acting, controlled by nuclei located in the brain stem, and exert their influence over distant brain regions via long axons.<sup>50</sup> Myelin insulation not only speeds up spike transmission velocity but also protects axons from conduction failure, reduces the cross-talk from neighboring axons, and allows transmission of much higher frequency pulses per unit time than thinner, unmyelinated fibers.<sup>51</sup> Transmembrane current: a flow of ions across a membrane.<sup>52</sup>

Today, we consider the neuron to be a dynamic piece of machinery with enormous computational power. The conceptual change can be attributed largely to the discovery of dozens of channels in the cell membrane, which allow differential movement of ions between the inside and outside of the cell.<sup>53</sup> New neural connections are made with every incoming sensation.<sup>54</sup> The brain is too fluid for an identical pattern of activity to arise – what really happens is that similar but subtly mutated firing patterns occur. We never experience exactly the same thing twice.<sup>55</sup> All sensory stimuli enter the brain in more or less undifferentiated form as a stream of electrical pulses created by neurons firing, domino-fashion, along a certain route.<sup>56</sup> Action potentials: the digital means from communication between neurons.<sup>57</sup> At the peak of proliferation, it is estimated that in excess of 200,000 neurons are generated every minute.<sup>58</sup>

# Section 3.

Figure 5. Nick Milinazzo. In Distinction. Oil on canvas. 2011.

Neural firing can lead to changes in neural connections, and experience leads to changes in neural firing.<sup>59</sup> Triggered into existence by bursts of activity.<sup>60</sup> This constellation of neural activity shimmers with constant change as one thought dies and another comes forward.<sup>61</sup> An oily, nonbiological, fluorescent chemical that infiltrates the fatty membranes of axons and dendrites, and can inch its way down their long spans across the brain.<sup>62</sup> Each of these dendrites can conduct a weak electric charge along its membrane to the body of the cell. If enough of these weak charges arrive at the cell body within a small interval so that its membrane becomes charged to a critical point, it will discharge its electricity along the long filament leading out of the cell, which is known as the axon.<sup>63</sup> Pseudocolored.<sup>64</sup> Atomic collisions.<sup>65</sup> Little explosions and waves of new

activity are produced moment by moment as the brain reacts to outside stimuli.<sup>66</sup> A neuron 'fires' electrical action potentials.<sup>67</sup> Chemical electromagnetic movement.<sup>68</sup> Highly orchestrated electrochemical signals are relayed along complex interconnected neural pathways.<sup>69</sup> Continuous retrograde flow.<sup>70</sup> Elaboration of connecting fiber pathways in the developing brain.<sup>71</sup> The neurotransmitters are broken down in the synapse with the help of specialized enzymes. Meanwhile, the activation of postsynaptic receptors results in another electric event, a postsynaptic potential. A number of postsynaptic potentials occurring together result in another action potential, and the process is iterated thousands of thousands of times along both parallel and sequential pathways.<sup>72</sup> A collection of grooves clustered into separate mini-nets, each being quite very shallow grooves connecting the mini-nets.<sup>73</sup> deep within itself but with Communicating with distant neurons requires costly connections, and transporting electrical pulses over long distances is metabolically expensive.<sup>74</sup> Pyramidal neurons.<sup>75</sup> Unstructured population bursts.<sup>76</sup> Dramatic changes in firing properties.<sup>77</sup> Inhibitory loop currents.<sup>78</sup> Emitting about twice as many spikes during the light phase as in the dark phase.<sup>79</sup> Perturbations of slow frequencies cause a cascade of energy dissipation at all frequency scales.<sup>80</sup> Fractal structures are self-similar in that any piece of the fractal design contains a miniature of the entire design.<sup>81</sup> Without properly timed inhibition, cell assemblies can produce only avalanches.<sup>82</sup> Cascade of activation.<sup>83</sup> Epileptic discharges.<sup>84</sup> Absence of neural firing.<sup>85</sup>

#### FROM FUNCTION TO FORM: GIVING LIFE TO UNSEEN ACTIONS

The road to my current artistic endeavors was not an easy one. When I arrived in graduate school, I had only been producing non-representational imagery for approximately six months. From my first critique, I was informed that I eventually needed to have some type of concept behind my work. Because I didn't know where I wanted to take my art, I kept myself completely open to any and all possibilities – not limiting myself in any way, be it from style, application, or process.

The other method I employed was simple: to paint as much as possible. The idea was, the more time I spent in the studio, the closer I would ultimately be to discovery. Without a solid concept though, I continued to utilize my unconscious mind as the metaphorical doorway to subject matter. One of the first pieces I created in this vein was *Collide* (fig. 6).



Figure 6. Nick Milinazzo. Collide. Oil on canvas. 2010.

What the viewer sees is actually an entirely different painting than what I initially planned on. The first composition was so ill-received that I painted over it completely. The only clue that another painting existed there at all is the underlying texture. After getting such harsh criticism on the first draft, I threw caution aside and poured, brushed, scraped, and smeared layers of paint onto the surface. The tool I kept coming back to was the palette knife. Having employed the knives for the majority of my artistic career, I felt much more comfortable with them in my hand rather than a brush.

*Collide* demonstrates my increasing concern with the physical consistency of my paints. Paint with more fluidity can be guided around the canvas with greater ease. The compound oil painting medium is critical for me in this task. It is the first and chief substance I combine with my paints to increase their fluidity. Oil painting medium accomplishes this by giving the paint more surface area, thereby increasing its plasticity. Even though the product is thinner, the hues do not lose their intensity. Oil painting medium also has the consistency of cheap or knock-off maple syrup, as opposed to linseed oil which is thicker and resembles honey.

Besides oil painting medium, I also added mineral spirits to thin down my paints. The amalgamation of the two gave me more control over the fluidity of the paints. With thinner paints, I could also experiment with transparency in my pieces. *Collide* is therefore a combination of many transparent layers (the light blue form on the left and electric green entity on the right) and washes of paint (dark blue area at bottom right).

Unlike oil painting medium, mineral spirits diminishes the vibrancy of colors. By using rectified turpentine, the colors of the paints retain their intensity, while resulting in a matte finish. The turpentine also mixes well with another new ingredient: damar varnish, which produces a satin/gloss finish. This triad of chemicals – oil painting medium, rectified turpentine, and damar varnish – are the foundation of the emulsions I use most in my work.

After over a year of experimentation and contemplation, I knew that my art would revolve around the inner workings of the human brain. There was however a transitional period for my art: a shift that occurred between the paintings created using a stream of consciousness,

and those strictly based on electrochemical occurrences. Of the handful of paintings I produced during this interval, one of the best is *Gap Jump* (fig. 7).



Figure 7. Nick Milinazzo. Gap Jump. Oil on panel. 2011.

With *Gap Jump* I had a very clear concept going into the painting. Neurons communicate with one another through a combination of secreted chemicals and electrical pulses. These chemicals are known as neurotransmitters, and are sent from neuron A to neuron B. The 'empty' space between neurons that neurotransmitters must transverse is known as the synapse.<sup>86</sup> *Gap Jump* is an illustration of this process. I chose to depict the most focused amount of energy in the neurons themselves – yellow and blue regions. The various overlapping marks in the center represent the trails of energy left behind by the neurotransmitters, much like tails of a comet.

The painting began with the large yellow area on the right and the bright red portion in the center – these sections were constructed first. Numerous hot yellows and electric greens combine with heavy doses of damar varnish in order to achieve the desired luminosity. Dozens of transparent films of alizarin crimson and ultramarine blue were layered on top of one another to 'push back' the middle area. The addition of the vibrant blue was one of the final stages. My painting process is predominantly an additive one. As such, there are certain sequential steps that must be taken to ensure a successful product. While I am satisfied with the colorization of *Gap Jump*, the overall composition is too divided. To make it more cohesive, the separate regions needed more integration.

My paintings symbolize the actions of the human brain. And while the events I research are very tangible, the images that emerge come from my own personal interpretation of said occurrences. There are thousands upon thousands of neurological actions that take place at any given moment, but almost all of them maintain two basic characteristics: electricity and fluidity.<sup>87</sup> The electrical components inform my color choices: Does a function warrant a warm or cool color? How do these colors interact with one another on the surface? Why? The fluidity involves taking the paint from a solid state, and mixing it with different additives and mediums in order to create an emulsion. Which products I use, and how much of them are added to the oil paint, depends entirely on the compositional requirements, as does the application of the paint itself. Sometimes thicker patches of paint are scraped on. Other times numerous thin washes need to be layered. Perhaps two varnish-heavy emulsions and one turpentine-heavy mixture should be allowed to chemically interact on the canvas. These decisions are worked out while the painting is underway. And because I have liquified the paint, I do not use brushes. First, the bristles would act like a sponge, soaking up some of the product I've just created. Speed is another benefit of these tools. I can apply thick layers of paint, make minor revisions, or scrape off entire sections extremely quickly with the knives. Finally, because I've used palette knives

for the majority of my painting career, I have a tremendous amount of control over them. I feel much more comfortable with a palette knife in my hand than I do with a brush.

Another important aspect of the knives involves how I paint. I have a rough concept or idea for each composition. But once the work begins, there are times I work from a stream of consciousness. Helen Frankenthaler has expressed similar situations in her process: "Trains of thought and feeling are set in motion which I have to complete, or at least explore, and the impulse to do so is such that I cannot distinguish between what is interior to me and what is out there on the canvas."<sup>88</sup> She is describing moments that are common to many artists: the point when the art leads its maker in new/variant directions. Successful artists communicate with their work. Some describe it as being 'in the zone,' others say that they're simply being spontaneous. Whatever one calls it, the outcome is the same: the artist relinquishes control and gives in to the needs of their art. The knives are an invaluable tool for me in this respect. They allow for immediate application or removal of medium from the surface before the moment of inspiration escapes.

Creating an adequate base is the first step for any new painting. This involves five to eight coats of gesso, depending on its viscosity, and three to four layers of tubed oil paint. I use a 6" plastic scraper for the paint application to ensure proper thickness and uniformity of layers. These layers also provide a necessary buffer between the weave of the canvas and the metal of the palette knives. Because all of my work is painted on the floor, I wrap the canvas around a framed piece of eucaboard. The board gives the painting support – so the canvas does not sag in the middle – as well as rigidity to the overall structure.

After a concept has taken shape, the next step is to decide on the color options. Color is a critical element because it affects the entire composition. The hues must relate not only to the

content, but also to each other. Instead of single colors, I select pairs, triads, or groups of colors, which taken together act as generators of what can be seen through the painting. These colors bring my paintings to life.



Figure 8. Nick Milinazzo. The Return. Oil on canvas. 2011.

An example of this life-giving quality can be seen in *The Return* (fig. 8). Here, color has been stretched to its absolute limit, with overlapping analogous and contrasting hues working in conjunction to achieve the final product. This piece can roughly be divided into three sections: the middle area, with the greens and light blues, the perimeter or boarder, comprised of dark blues and violets, and the deep red portion, sequestered mostly in the top left region. The central, amorphous design acts as the core of the composition – all other colors and forms revolve around this one. This entity was formed through numerous thin coats of paint being scraped across the surface, creating a 'streaked' appearance. I built up the layers in a sequence, beginning with the darkest colors first, and ending with the lightest shades on top. For the border region, viscous emulsions of light violets cover a pool of tranquil blue. The isolated red area in the top left is articulated with rivulets of dark blues, while the same shade of red infiltrates the lower right register of the painting.

There are so many subtle variations in the painting it is difficult to detect them all on film. In order for someone to truly appreciate my work, they have to be standing right in front of it. But the viewer's angle in relation to the surface of the painting – 90 degrees, 45 degrees – will determine exactly how or what they see. This has to do with my treatment of the painting's components. For example, there are over a dozen different colors that make up the primary form.



Figure 9. Nick Milinazzo. The Return - detail. Oil on canvas. 2011.

Their delicate transitions are only visible in person. Or depending on how matte or glossy a particular region is it will generate an entirely different effect on the overall work.

As much as *The Return* illustrates an actual neurological occurrence, the painting's design comes from inspiration and spontaneity. In the conceptual stages I was reacting to the colors, forms, and marks that I initially laid down. It was only after I took a step back to evaluate my actions that the composition began to coalesce. The same cannot be said of a work produced during the same time, *Frequency I* (fig. 10).



Figure 10. Nick Milinazzo. Frequency I. Oil on panel. 2011.

Aside from the conceptual aspect, there are two major differences between *The Return* and *Frequency I*: the treatment of the paint, and the surface material. With *The Return*, the paints were mixed with a large amount of turpentine. This accounts for the transparency and multiple layers. In addition, the piece was done on stretched canvas, with no backing. As a result, less of a base had to be applied. In *Frequency I*, not only do the emulsions contain a tremendous amount of varnish, but the image is painted directly on a panel. Because I work with palette knives, I need a surface with both resistance and flexibility. The only way to achieve this on regular panel is to build up a thick base of gesso and oil paint.

When composing *Frequency I*, I had a clearer image in my head as to what the final product should look like. Once the 'buffer region' had properly hardened (space between the wood and where I begin the painting), the initial hues consisted of deep blues and crimsons. After that, I applied a wide ban of red, followed by the greens, light blues, and finally the

yellows. As I mentioned above, these paints contain a lot of varnish. In addition to endowing the pigments with a sheen, it also has applicatory benefits. When I pour a color onto the surface, I allow it to mix and converge with other hues while they are still wet. The chemicals in these emulsions interact with one another, producing a gradation of colors as well as the unique designs of the composition. Damar varnish retards the drying time of oil paints even further; depending how much is added, paints can stay wet for up to a week, sometimes longer. This prolonged time allows me to make changes to individual colors or the entire piece.

All bodily actions require neurological actions – everything we do is based on these occurrences. These images are my interpretation and reaction to the neurological functions of the human brain. What I presented in this thesis is the development of both my painting as well as my thought process over the last two years. This is by no means the final product, but merely a portion of a body of work that continues to evolve and change with my own growth and maturity as an artist. The world of art is a complex and many-layered creature. My contribution in the realm of abstract art is allowing a written narrative of invisible biological processes to inform the subject of my work. Rather than work strictly from a stream of consciousness, or manipulate objective forms, I create expressive abstract forms from abstract narratives.

#### **NOTES**

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