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Review Article

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The Medical Anatomy of a Tragedy

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Introduction

Over the weekend of July 25, 26, 27, 28, 2025 a 27-year-old man drove his car from Los Vegas, across the country, arriving in NYC on Monday as planned. He was armed and had a very carefully planned mission to shoot up the NFL (National Football League) offices located in an office building in Manhattan. There is video of him carrying his rifle into the building. When he reached the office building, he began spraying bullets into the lobby killing 3 people and wounding others. From there he took an elevator to what he thought was the floor where the NFL offices were located. He was wrong, but he shot and killed an unarmed security guard on the wrong floor, and then very carefully shot himself in the chest, not the head., and died. In the aftermath of this tragedy, investigators found a note in his pocket that explained his actions. He had diagnosed himself with CTE (chronic traumatic encephalopathy) from playing in the National Football League (which he did not, he played high school football as a running back) and he had come to repay the league for their wrong doings. 5 people died on that Monday for no reason! This article will focus on the cause of his brain trauma (which was self-identified and I suspect is true), his subsequent tragic actions, and how we can prevent this kind of tragedy from happening in the future.

Over the past 9 years I have been working with brain injured patients (TBI, strokes, seizures, infections in the brain, brain illnesses and diseases of which CTE is one, major mental illnesses, and PTSD). And from my work I developed the Complex Architecture Model (see "The Complex Architecture and Healing of Traumatic Brain Injuries," Cambridge Scholars Publishing 2023). This model (which I have found to be very accurate) describes 4 architectures the brain creates as a result of being traumatized both physically and psychologically.

The 4 architectures include:

- **Architecture One:** Shock Trauma to the Brain, Mind, Body from the Point of Injury.
- **Architecture Two:** Disruptions to the Brain's Ability to Function Normally (damage to the neurons).
- **Architecture Three:** A Breakdown in the Brain's Ability to Function Normally (damage to homeostatic balance).
- **Architecture Four:** The Perfect Storm in the Brain.

In my experience, the NYC shooter's actions were a direct result of the neurodegenerative disease progression in his brain, described in this model, that began for him from the concussions he suffered while playing high school football. This neurodegenerative disease progression in the brain was clearly described in Dr. Brent E Masel's 2010 article [1]. To the best of my understanding, the shooter's concussions and post-concussion syndrome injury were never recognized nor treated. Over the past 9 years I have worked with a number of patients suffering with head trauma including professional athletes, victims of car crashes, and those suffering from long-term mental illness and PTSD. The scenario is unfortunately almost always the same. Persons suffer head trauma, which is not recognized well enough (that long-term treatment is needed) and then the neurodegenerative disease progression I describe in my model takes hold, and it is downhill from there. Persons begin to suffer from physical symptoms, cognitive decline, social and emotional problems, and sleep disturbances. It is my hope that through this article we can all better recognize and understand this neurodegenerative disease process, and prevent further tragedies such as the this one in NYC from ever occurring again. Finally, it is my observation that high school, college and professional athletes are at a greater risk for concussions and post-concussion syndrome than the general population. And that this fact is something American Society needs to take much more seriously.

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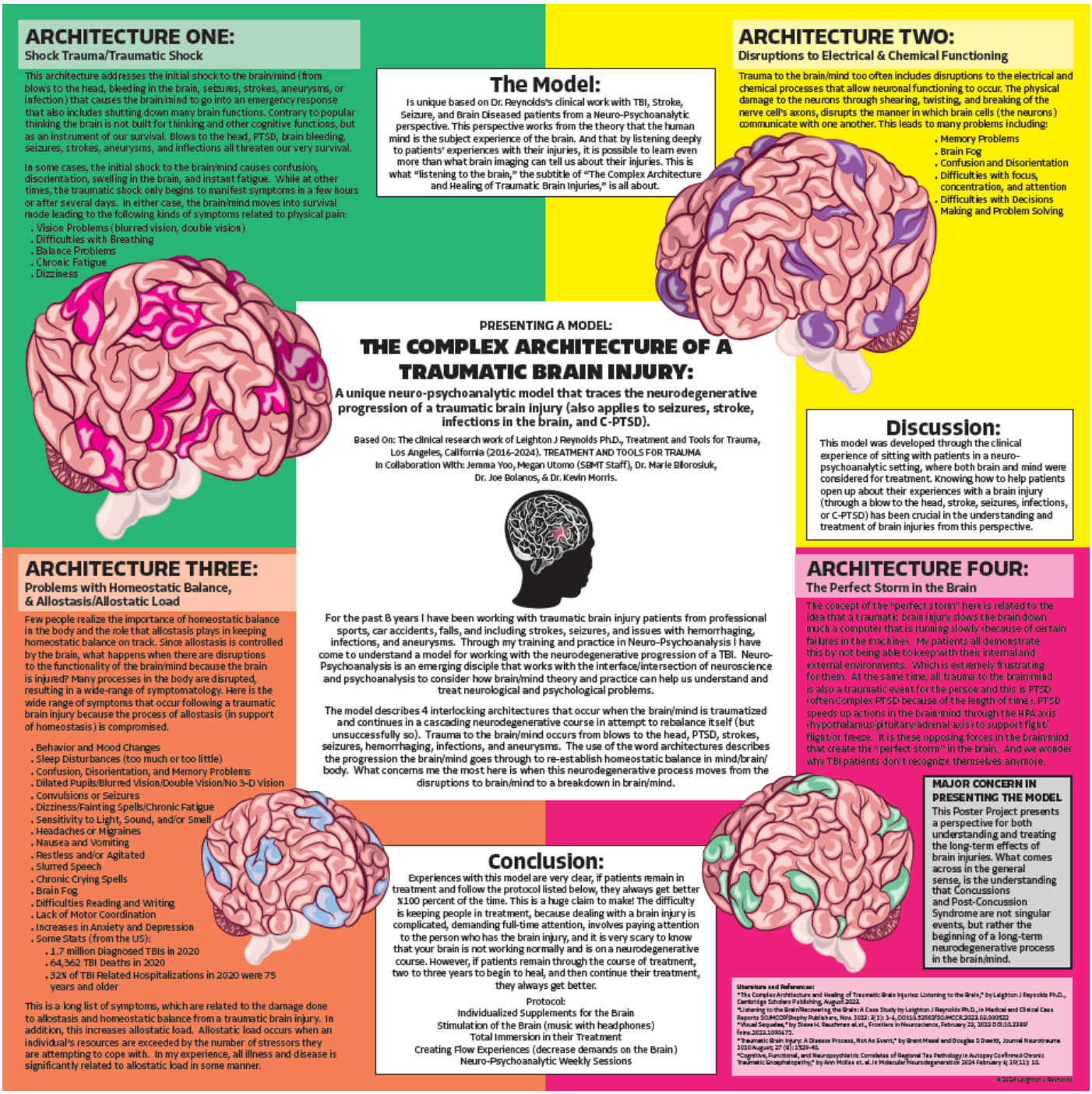
The 4 Architectures Modlel



At this point, I do not know the details of the shooter's head injuries (other than that his high school teammates confirmed he suffer several concussions while playing high school football). But I am aware from persons who went to high school with him that he was a good kid. The question is what changed for him that he had the sufficient ability to plan a mission and carry it out, while he irrationally killed 4 innocent people, and then himself? One of the progressive symptoms I have seen with head injuries is psychosis, when a person has lost touch with reality, and that may have been the case with this shooter, because he described having played in the NFL (which he did not). And how rational is it to bring a rifle into a high-rise office building and begin shooting innocent people on your way to the offices of the NFL.

One thing I am clear about is that trauma to the brain/mind (in this case probably several concussions) creates a different operating system in the brain. I also believe that this is true for persons suffering with psychosis, ADHD, autism, major mental illness, brain illnesses and diseases, and PTSD (especially Complex-PTSD). Their brain/minds are literally "running" on a different operating system. To the best of my understanding the shooter's actions were the result of his damaged brain/mind running on a different operating system, which can be described and understood through the 4 Architectures.

From here I will describe another case where I am familiar with the details of the individual's progressive symptomatology, to give readers an idea of how this model works, and how it applies to the NYC shooter. (See my article "Thinking Differently: The Case for Symptomatology, Impairments, and a Healing Ecology). Although everyone's brain is unique, my research demonstrates that all head trauma (physical and psychological) follows this progressive neurodegenerative pattern [2]. And this is the neurodegenerative course I believe the shooter, tragically, struggled with.

Exploring Another Case

On a particularly warm fall evening in Southern California, a young woman was traveling through an intersection with the green light in her favor at around 40 miles per hour. Suddenly she was broad sided by another vehicle making a left turn through the same intersection. He explained that he never saw her even though she had her headlights on. The impact knocked my patient's car out of the intersection and into a metal streetlight pole. So, it was a double impact on her brain, plus her brain was literally bouncing around inside her skull twice as the result of the double impact.

She was initially able to get out of her vehicle, but within approximately 10-15 minutes her shock trauma set in rapidly. She began to feel dizzy, disoriented, confused, physically weak, and felt a bad headache coming on rapidly. An ambulance arrived and she was taken to the emergency room, where an MRI revealed nothing and she was sent home. But look at the symptoms she was experiencing, where were they coming from? An MRI can reveal structural damage to the brain, skull fractures, hemorrhaging, and aneurysms, and this is important information to know. But it does not help us understand functional damage to the brain/mind. For this kind of damage, subtle but it can also be life altering, we need an fMRI (a functional MRI). As you will see below, in my patient's own words, there was a lot of functional damage that she was experiencing following the car accident that was not followed up on.

I will also point out, that will all the patients who come to my office over the past 9 years, no one has ever, to my knowledge, been checked for shock trauma thoroughly following any kind of trauma to the brain/mind. It is my strong recommendation here that medicine needs to pay more attention to the functional damage caused by a tbi, strokes, seizures, infections in the brain, illnesses and diseases of the brain, major mental illness, and PTSD, and begin treatment immediately.

Finally, I believe it is important to recognized that Architecture One: Shock Trauma, can last for many months following the original trauma, because, again, this is the beginning of a neruo-degenerative disease progression in the brain. Architecture Two represents what happens next in this neurodegenerative disease progression. The individual begins to lose functionality because there are disruptions to the communication pathways in the brain. The neurons are literally damaged, torn, twisted, or broken completely, and the result is disruptions to the electrical and chemical processes which allow the neurons to communicate with one another.

We now understand that the various forms of trauma to the brain/mind including tbi, stroke, seizures, infections, brain illnesses and diseases, major mental illness and PTSD can significantly damage electrical and chemical processes within the brain. Electric transmission in the brain is primarily mediated by the electrical synapses, which allow for the rapid passage of action potentials between nerve cells. Chemical transmission in the brain involves neurotransmittors such as dopamine, noradrenaline, and serotonin that play a crucial role in the communication process between nerve cells. And here is one of the crucial points in this article, damage to the electrical and chemical systems in the brain can (and in my experience always does) lead to various neurological consequences including physical problems, cognitive decline, social and emotional issues, and sleep disturbances. I believe this is a very important fact to keep in mind with all trauma to the brain/mind.

I also note that brain metabolism, the process that allows the brain/mind to work effectively, is an energy intensive phenomenon involving a wide range/spectrum of biochemical intermediaries. And that the brain/mind is one of the most energy intensive organs of the body utilizing approximately 60% of available energy for the fulfillment of electro-physiological functioning, while the remaining 40% is expended in the homeostatic functions supporting the internal mileu of the brain cells so these cells can function effectively.

In terms of how this directly effects an individual's behavior, note the following comments from the patient whose injury I have been describing.

"Since my accident in August, my life has changed as I feel that I am not the same person either mentally or physically anymore. I have been dreading driving now especially on the freeways since the accident. What used to be such an automatic task has now become a hassle and a source of extreme anxiety and fear for me."

"Each time I get flashbacks of the accident when passing that intersection, and I become super hypervigilant worried about cars just appearing in front of me. This constant fear, anxiety, and occasional panic attacks have all negatively affected my daily functioning, and have led to a lot of psychological distress including overwhelming anxiety, frustration, anger and depression."

"Besides the psychological challenges, I have noticed a cognitive decline as I feel not as sharp as before, and that there is a delay in my mental processing. It seems like my brain has been operating with very little energy and resources."

The key word for Architecture Two is disruptions in brain/mind functioning. And as you can see from the above statements, this patient has already lost significant functionality in her daily life, because of these electrical and chemical disruptions.

Architecture Three represents a breakdown in homeostatic processes in the mind/brain/body. Homeostasis is defined as the tendency within our mind/brain/body toward a relatively stable equilibrium between all the interdependent elements of the

mind/brain/body, especially as maintained and regulated by physiological processes. This is a two-fold process as the mind/brain/body works to maintain its own internal stability while constantly adjusting to external conditions at the same time. This is no easy feat, yet homeostatic processes accomplish this feat constantly and unconsciously in the background of our daily lives. Basic examples of homeostatic process include:

- Blood Pressure regulation.
- Body Temperature regulation.
- Fluid Balance in the body.
- Oxygen Levels in the blood stream.
- The Complicated Process of labor and delivery.
- Blood Clotting.
- Immune Responses and inflammation.
- Energy Levels.
- Acid Levels.
- Hormone Levels.
- Protein Production.
- Electrolyte Balance.

And when there is a malfunction of homeostatic balance, we can find allergic reactions, autoimmune diseases, and the occurrence of sepsis (CRS, cytokine release syndrome). But what about how trauma to the brain/mind might affect homeostatic balance? I often find that there is very little recognition of how trauma to the brain/mind effects homeostatic balance. The main regulator of homeostasis is the hypothalamus located in the midbrain region. Since I understand trauma to the brain to be pervasive in the brain/mind/body, then it is impossible for the hypothalamus not to be affected on some if not many levels. And hence the negative effect on homeostatic balance, which is why I believe there are so many symptoms and problems with brain injuries. Yet, again, in my experience this is seldom recognized and factored into the patient's treatment.

Within Architecture Three there are 2 additional issues to consider. One, the concept of allostasis. Allostasis is an extention of the concept of homeostasis that represents the adaptation process going on between the body's complex internal physiology (maintaining a balance here), and the physical, psycho-social, and environmental challenges that are constantly stressing this internal balancing system. The key word here is adaptation (constantly). The second issue concerns "allostatic load" which is the long-term result of the failure of allostasis, of adaptation to life's stressors. This failure can (sadly) easily lead to pathology and chronic illnesses and diseases. In summary, allostasis is the process by which, the body maintains stability through internal and external changes (allows homeostasis to work well). While allostatic load is the cummulative burden of chronic stress on the body leading to wear and tear on the individual's physical and mental health. In other words, when allostasis is not working. It is my strong experience that trauma to the brain derails homeostatic and allostatic processes leading to allostatic load and the resulting severe pathology, including death.

Finally, note that homeostasis, allostasis, and allostatic load are all automatic, unconscious, and need to be very finely tuned for survival. But as the motion of neurodegeneration continues its downward course through the brain, and as the process of allostatic load takes over the individual will be experiencing more and more symptoms and the loss of functionality on many levels. Here is what more my patient expressed regarding her loss of functionality, as a direct result of the above!

"In addition, I was even getting panic attacks in sessions and had to either cut the sessions short or take a break in the middle of my sessions. I even noticed getting slurred speech and blurry vision in the middle of the sessions at times. As a result of all this, I had missed many days of work especially during the first 6 months following the accident."

At this time, I don't see that there is enough attention is payed to the fact that primary structural damage to the brain is always followed by a long-lasting range/spectrum of secondary pathogenic events. One of the key issues in these cascading neurodegenerative events is that both primary and secondary damage drastically compromise mitochondrial functioning and promote energy depreciation in neuronal cells. New research is telling us that these are the most pivotal events determining the cascading course of brain injury/illness/disease. And this new research is suggesting that rather than paying attention to the primary insult, pay more attention to the secondary insults, which over the long-run are more damaging [3-5].

We need to recognize (as a part of Architectures Three) that primary and secondary insults to the brain/mind are associated with the breakdown of tissue homeostasis due to:

- Impairments of the blood brain barrier.
- Osmotic imbalance in nerve cells.
- Neuro-inflammatory processes.
- Excitotoxicity.
- Apoptosis

Once again, all of the above processes result in the loss of tissue functionality and ultimately the person's ability to be functional in their day-to-day life. For example, the process of excitotoxicity is a damaging process that kills nerve cells. This occurs when the necessary and safe levels of the neurotransmittor, glutamate, become pathologically high resulting in excessive stimulation of nerve cell receptors, which then leads to damage and the death of nerve cells. Here is further evidence of the neurodegenerative damage occurring in the brain/mind as a result of trauma and its effects on homeostatic balance. A sister process here is apoptosis, which is programmed cell death. It is the mechanism by which cells intentionally die for the greater good of the organism. Apoptosis also occurs in response to damaged DNA and/or other cellular stressors. Again, this is all a part of the process of homeostasis getting out of balance, causing an increased symptomatology for the individual. Ultimately making their day-to-day lives one hardship after another.

Note the Following Experience My Patient Described

".....it felt like I had a brain fog and was unable to focus, comprehend, and later remember the conversations. This was unprecedented as I used to be very sharp and had a good memory, something I was very proud of and always got compliments about." Finally, there is Architecture Four: The Perfect Storm in the brain. The predominate feature of this architecture is the clash of physical trauma to the brain/mind and PTSD, because all brain injuries are traumatic to an individual. Physical trauma

to the brain (tbi, stroke, seizures, infections, illnesses, diseases, major mental illness, and PTSD) slows down brain functioning, such that the brain is running like a slow computer. I always know when my patients are struggling with a brain injury because they are slow to respond to everything. Their brains are "running" like a "slow computer." At the same time, PTSD speeds up processes in the brain/mind through the release of stress hormones. This clash is literally crazy making for many patients. At the same time, there is the patient's social context, their family, friends, work environment, and social interactions in their daily lives. Note my patient's experiences with her family below.

"My mental health symptoms have also been negatively affecting my relationship with my family and friends as I feel that I am running on a thin line, not having the mental energy and tolerance to interact with them."

Based on this model, the perfect storm in the brain is what I believe the shooter was struggling with when he entered the office building in Manhattan on that fateful Monday afternoon. Exactly what kind of "brain state" and "feeling state" does it take to shoot innocent people and then point a gun to your chest and pull the trigger. It has been my thought for a long time that at this point in a shooting incident the person's brain has been hijacked by rage. And that rage at this stage is blinding for the individual. In cases like the NYC shooter, however, where there is probable brain damage from concussions, we also have to factor in organic damage that can lead to severe difficulties with problem solving and decision making.

Finally, I believe this tragedy was preventable given the brain damage I believe the shooter suffered with. An autopsy on his brain (if done) could give us a final clue as to exactly where his brain/mind was and what he was struggling with. It is possible that he was delusional about all of this, and that the delusions came from psychosis (a symptom that the person has lost serious touch with reality). But then where did the psychosis come from? I believe that psychosis is a symptom of trauma to the brain that can come from both physical and/or psychological places. I am hoping we can learn a lot more about the shooter's life and medical history so that we can more accurately understand the origin of this heart-breaking tragedy Lastly, a final thought, I use the term brain/mind to indicate that the human mind is the subjective experience of the brain [6]. If the brain is damaged (as I suspect it was for the shooter) then his mind will also be damaged. And his brain/mind will be running on a different operating system. Which could explain and help us make sense of this terrible tragedy. And yes, much more research needs to be done around the issue of trauma to the brain/mind and the long-term consequences of not treating these injuries [7].

Dr. Reynolds is happy to receive comments and questions in response to this article.

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