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# Because We Have To: Flamenco as Survival Strategy against Detrimental Effects of Post-Traumatic Stress Disorder

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**Because We Have To: Flamenco as Survival Strategy against Detrimental Effects of  
Post- Traumatic Stress Disorder**

**By**

**Dolores Aurora Garcia**

**BA in Dance with a Concentration in Flamenco from the University of New Mexico,  
2015**

Thesis

Submitted in Partial Fulfillment of the Requirements for the Degree of  
MASTER OF ARTS IN THEATRE AND DANCE  
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# **Because We Have To: Flamenco as Survival Strategy against Detrimental Effects of Post-Traumatic Stress Disorder**

By

Dolores Garcia

BA in Dance with a Concentration in Flamenco from the University of New Mexico,  
2015

M.A. in Theatre and Dance History from the University of New Mexico at Albuquerque,  
2017

## **Abstract**

Can daily practice in flamenco training help mediate the effects of Post-Traumatic Stress Disorder (PTSD) on the brain and body? This thesis focuses on the inner-workings of the brain and how it processes stress and trauma. This is discussed through the idea of the Fear Circuit, which is a habitual response to reminders of the original trauma; the review of a current therapy for PTSD patients-Eye Movement Desensitization and Reprocessing (EMDR); the theory that throwing (skill in speed and precision –based throwing activities), music, and dance can all work to increase strength in areas of the brain that atrophy under post-traumatic stress; and by approaching the creation of a traditional flamenco choreography through the lens of EMDR and a throwing and reward-based system, to investigate further the similarities between these activities. I identified aspects of flamenco within my own body and my own community that could be mediators of PTSD symptoms when practiced on a regular basis, while acknowledging that flamenco is not usually approached in this way, nor was it developed for this purpose. The purpose of this research is to propose that flamenco holds within it specific

neurological, biological, and communal functions that make it uniquely effective in helping to maintain functionality and improve the quality of life of individuals, families, and communities suffering from PTSD. This is argued through a discussion of brain functionality as it pertains to PTSD; through theories of the transmission of memory; through a review of EMDR and its comparison to flamenco; through a discussion on the effects of throwing and sequencing on the brain, especially when coupled with reward, and through my own bodily investigation of all of these components as they relate to daily flamenco practice and flamenco performance and its effect on the symptoms of PTSD.

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## **Introduction**

In this thesis, I propose that daily practice in flamenco training can help to mediate the effects of Post-Traumatic Stress Disorder (PTSD) on the brain and body. My personal experience with severe PTSD and almost eight years of immersion in flamenco training and in the flamenco community of Albuquerque, New Mexico guided my research on the inner-workings of the brain and how it processes stress and trauma, as well as how the brain and body can survive trauma and remain functional, or not, depending upon the individual.

The first chapter focuses on the effects of trauma on the brain, both in a medical sense and through theories of post-memory, witnessing, and the inability to know one's own trauma laid forth by Marianne Hirsch, Dori Laub, Cathy Caruth, and Sigmund Freud. I will lay out the symptoms and hardships faced by PTSD patients, and introduce the recognized concept of the Fear Circuit, which is a habitual response to anything that reminds a person of the original trauma. I will discuss the role of habit, how it is set up in the brain, and how trauma affects our habits. I will also reflect on the effects of trauma on large groups of people and how individual and collective trauma can affect generations of children who did not experience the original trauma.

The second chapter will review one of the several current therapies for PTSD patients, which has been proven to be efficacious among groups and individuals who have suffered extreme trauma; Eye Movement Desensitization and Reprocessing (EMDR). EMDR deals specifically with helping PTSD patients process traumatic memories, a process which is interrupted in the case of extreme trauma. This chapter will outline the functioning of memory processing, and clarify exactly what breaks down in

the memory processing of PTSD patients that causes so many difficulties in daily life. By reviewing research on ritualized movement and the brain, I will then argue that daily flamenco practice holds within its characteristics that may affect the brain, body, memory processing, and PTSD symptoms in ways that are similar to EMDR.

Chapter 3 will propose another layer of flamenco characteristics that position it as a potential tool for strengthening parts of the brain greatly deteriorated by PTSD. Using the ideas of neurophysiologist William Calvin on the effects of being able to throw with precision and speed, and the ability to sequence quickly and well, coupled with the presence of reward, on the brain and on the evolution of human beings, I will argue that throwing, music, and dance can all work to increase strength in areas of the brain that atrophy under post-traumatic stress.

In chapter 4, I will present my own research conducted through the creation of a traditional solo flamenco choreography. I approached the creation of this solo piece by choosing to put myself in distress while engaging in movements and activities that I identified as either having similarities with EMDR or with throwing and sequencing skills, all within the context of creating the flamenco choreography within the flamenco song form of *soleá* (The *soleá* is one of the slower, more somber flamenco song forms, done in a 12-count rhythm). Outlining a process for creating a traditional flamenco dance, which includes training in movement and music as well as watching dance, I lay out the experience of fear and mediation of fear that took place within the creation and performance of the dance. I will then discuss the attributes of flamenco that connect to these ideas, proposing that flamenco holds a number of movement qualities that require

the same sharp focus and precision as skilled throwing, making flamenco a site for combatting traumatic stress on the brain.

Approaching the creation of the dance through the lens of EMDR and a throwing and reward-based system, I was able to identify aspects of flamenco within my own body and my own community that could be mediators of PTSD symptoms when practiced on a regular basis, while acknowledging that flamenco is not usually approached in this way, nor was it developed for this purpose.

I argue that flamenco holds within it specific neurological, biological, and communal functions that make it uniquely effective in helping to maintain functionality and improve the quality of life of individuals, families, and communities suffering from PTSD. I argue this through a discussion of brain functionality as it pertains to PTSD; through theories on the transmission of memory; through a review of EMDR and its comparison to flamenco; through a discussion on the effects of throwing and sequencing on the brain, especially when coupled with reward, and through my own bodily investigation of all of these components as they relate to daily flamenco practice and flamenco performance and its effect on the symptoms of PTSD.

## Chapter 1: The Establishment and Transmission of the Fear Circuit

When our lives are threatened, our bodies have a system that removes us from ourselves and our consciousness as death approaches us. It causes a mental break that makes us consciously not-present. It is as if we are being removed from the very fact of our imminent death, in order to be able to bear the unbearable: “It is because the mind cannot confront the possibility of its death directly that survival becomes for the human being...an endless testimony to the impossibility of living” (Caruth 62). However, if we survive the unbearable, the mental break that occurred makes it virtually impossible for us to understand the event and our survival of it in any logical way that brings relief from the fright that it caused. That mental break - the function that allows us to bear an unbearable event by disassociating us from the moment of trauma - is the same function that causes the moment of trauma to intrude upon our waking consciousness and disrupt our dream cycles. Sigmund Freud called this “traumatic neurosis” (Freud 6-29). “The survival of trauma is not the fortunate passage beyond a violent event, a passage that is accidentally interrupted by reminders of it, but rather the endless *inherent necessity* of repetition, which ultimately may lead to destruction” (Caruth 63). Cathy Caruth, author of *Unclaimed Experience: Trauma, Narrative, and History* stresses that traumatic stress causes deterioration of the brain because of its intrusive nature and this intrusive nature accounts for the high suicide rate among survivors, among other debilitating effects (Caruth 63).

The very way in which our brains and bodies react to life-threatening situations cause the memories to become stuck in a place where they repeat themselves over and over in the survivor’s brain, causing the same sensations of terror that were present

during the actual event. Freud describes this as “unknowing” and of the mind’s constant struggle to attain a knowing of the event (12), so it re-plays over and over in order to achieve some sort of knowing (Caruth 60). Freud attributes this unknowing to the cortical layer of the brain being overwhelmed by sensory input, causing dissociation (Freud 28). This “knowing” is likely the proper processing of a traumatic memory, which can be stalled in people who have survived a trauma. This type of re-experiencing of memories and sensations of trauma is often referred to as Post Traumatic Stress Disorder.

Although this disorder affects people on a very personal and individual level, collective trauma is a reality for many groups of people who have all undergone the same trauma, as in the case of survivors of genocide, for example, or wide-spread persecution such as slavery. It has been reported that there is an element of transmission of symptoms involved in regards to the children of traumatized individuals as well as subsequent generations of groups affected by collective trauma. Many children of severely traumatized individuals have been observed as having symptoms of Post-Traumatic Stress Disorder, even though they did not witness or live through the actual event (Marianne Hirsch 110-112, Fraiburg 388). A traumatic experience can include, but is not limited to

[E]xposure to war as a combatant or civilian, threatened or actual physical assault (e.g., physical attack, robbery, mugging, childhood physical abuse), threatened or actual sexual violence...being kidnapped, being taken hostage, terrorist attack, torture, incarceration as a prisoner of war, natural or human-made disasters (American Psychiatric Association 2013).

PTSD is connected to a host of associated disorders, and includes the creation and perpetuation of what Shin, Kolassa, and Elbert call the Fear Circuit. The Fear Circuit is what causes PTSD, and is what is activated during PTSD. It is a habit set up by, usually prolonged, exposure to life-threatening situations. It is a negative variation of a normal survival instinct that has been grossly over-activated. In most cases of PTSD, the sufferer has lived through several traumatic events. PTSD is actually most common among those with more than one traumatic experience (Kolassa and Elbert 321-322). This disorder is diagnosed upon symptoms that include but are not limited to: hypervigilance, exaggerated startle reflex, anxiety, depression, psychogenic seizures, tremors, insomnia, flashbacks, chronic pain, addiction, and psychogenic movement disorder. It is also characterized by the specific and harmful ways in which it is thought to re-structure the brain (American Psychiatric Association 2013).

### **The Fear Circuit: PTSD as Habit**

The brain has a procedure for dealing with safety and danger. Different brain regions work together to decipher whether or not there is danger in any given moment. If the brain senses danger, it sends the body into various stages of survivalist behavior, depending on the severity of the danger. This is normal human survival functioning.

Some of the brain regions associated with the fear circuit are the amygdala, the hippocampus, the prefrontal cortex, the basal ganglia, and the anterior cingulate cortex. The amygdala sets off a chain of survival-based reactions when a traumatic event occurs, causing the hippocampus to shut down the prefrontal cortex. The prefrontal cortex is what lets us know that we exist, and manages our will-power. The anterior cingulate cortex, which helps to extinguish fear and is part of the prefrontal cortex, is also shut

down. If this happens on a regular basis, as in the case of long-term exposure to trauma, the basal ganglia turn this information into a habit, which can be set off by things that are not dangerous but do have things in common with the traumatic event such as specific odors, songs, the time of year, or the feel of a certain type of fabric (Shin 68-73; Hormigo, Vega-Flores, and Castro-Alamancos 10274-10284). The effects of PTSD start with the brain. PTSD can be seen as a feedback loop that activates the trauma state on a regular basis. The trauma state is activated by the fear circuit. The fear circuit is a specific neuro-circuit of brain functions that are established by prolonged exposure to life-threatening events (Shin 68; Kolassa 321).

### **The Doorway to Fear: The Amygdala**

The amygdala, which takes in all initial incoming sensory input, is the part of the brain that first decides if there is danger by analyzing that input. If the sensory data points to safety, it sends the data along to the prefrontal cortex, where meaning is assigned and decisions are made about what type of action, if any, needs to be taken. For example, it decides whether a certain food is good to eat based on the sights and smells sent in by the amygdala. It decides whether you can rest or keep going, or if this is the right time to bring up a certain topic. The whole time, the hippocampus is taking snap-shots of everything that is happening. These snapshots are usually processed into long-term memory later on. The hippocampus is also regulating the brain and making sure no one part of the brain is becoming overstimulated by the information being sent in by the amygdala.

If the sensory data points to danger, the amygdala does not send the information to the prefrontal cortex. Instead, it sends it straight to the hippocampus without it having



any meaning assigned to it. The hippocampus receives this input and alerts the survival centers of the brain, releasing stress, adrenal, and pain relieving hormones and chemicals to help the body to escape, to defend itself, or to become catatonic, depending on the situation and the individual's past experiences with life-threatening or dangerous situations (Shin 69).

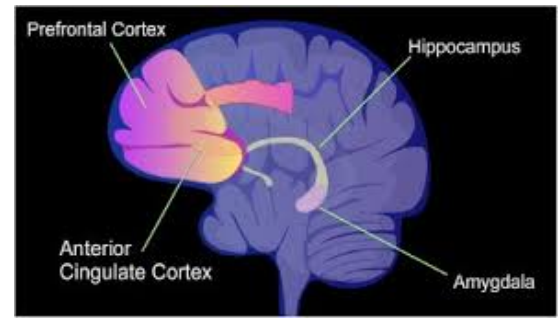


Figure 1. Some brain regions affected by PTSD; "Brain Basics." National Institute of Mental Health, U.S. Department of Health and Human Services, [www.nimh.nih.gov/health/educational-resources/brain-basics/brain-basics.shtml](http://www.nimh.nih.gov/health/educational-resources/brain-basics/brain-basics.shtml).

### **The Loss of Reason: The Prefrontal Cortex and the Hippocampus**

If the amygdala gets too inundated with sensory information, which is the case when experiencing a life-threatening situation, the hippocampus shuts down sensory input to the prefrontal cortex, because there is too much information for the prefrontal cortex to make any sense of (see fig. 1). If survival is at stake, it will take too long to wait for the prefrontal cortex to make a decision. If the prefrontal cortex is not involved in decision making, the brain can save energy and time by relying solely on instinct and habit, which takes much less energy (Matsuzaka et al 1819-1832). However, if this shutting down of the prefrontal cortex happens too often, as in the case of daily combat, torture, childhood abuse, and displacement, the part of the brain responsible for habit becomes very used to being in a trauma state. This trauma state, the release of stress hormones, and the shutting down of the prefrontal cortex, become a habit. This habit induces all of the symptoms of PTSD listed above and is activated on a very regular, habitual basis. As soon as the amygdala senses a real or imagined threat in daily life, it

automatically sets off the habitual trauma state and its subsequent reactions (Liberzon et al 817-825).

### **Habit: The Basal Ganglia**

The part of the brain responsible for habit is the basal ganglia. The prefrontal cortex, which houses our will power, uses a tremendous amount of energy. When it has run out, the basal ganglia take over (Schneider and Shiffren 269-276). The basal ganglia are a bundle of subcortical nuclei and are connected to: the limbic system, which contains the amygdala and the hippocampus; and the prefrontal cortex, which contains the anterior cingulate cortex (ACC). The ACC extinguishes fear and assigns meaning to sensations (Ashbey, Turner, and Horbitz 209). The amount of energy required for the basal ganglia to work is much less than the amount of energy needed for the prefrontal cortex (Matsuzaka, et al 1819-1832). The basal ganglia use information from the prefrontal cortex to form habits. The prefrontal cortex only has to make decisions based on new information. Information that has been experienced many times is organized into different habits which are activated with very little energy by the basal ganglia. This is why training is important. Training creates habits through repetition, ingraining certain activities into neuro-muscular memory. When the prefrontal cortex wears out, or is shut down (through overstimulation, fear, or exhaustion), the habits, brought about through training and repetition, are what are left. If our habits include the activation of the fear circuit, this can create a difficult way of life for PTSD sufferers, as the trauma state is activated in daily life, without the presence of real threat.

## **The Anterior Cingulate Cortex (ACC): Extinguishing Fear**

The Anterior Cingulate Cortex helps us to not be afraid. It reminds us that every loud sound is not a threat. It tells us that the smoke we smell is not a dangerous fire (unless there is a fire, in which case, the ACC is not involved at all). The ACC is located in the medial prefrontal cortex and is involved in extinguishing fear and putting sensory input and memories into context (Kollassa and Elbert 323). If this is damaged, it is more difficult to distinguish between real and perceived threats. Trivial and unrelated stimuli, such as the smell of the food that happened to be cooking near-by, or the song that happened to be playing become interconnected with feelings of terror and helplessness and cannot be separated, causing symptoms such as flashbacks to occur with minimal encouragement, such as hearing that song or smelling that same food (Kollassa and Elbert 323-324). PTSD sufferers have been shown to have smaller ACC volumes than those without PTSD, suggesting that trauma causes damage to the ACC, accounting for the high prevalence of intrusive thoughts and flashbacks, since the ACC is less able to extinguish fear and assign meaning to sensation (Kollassa and Elbert 323-325; Liberzon 824; Shin 69). We can no longer distinguish between real and perceived danger, or even safety and danger, which sometimes share the same stimuli. This inability to distinguish between real danger, perceived danger, and safety, sometimes causes sufferers to shake and startle. It causes them to freeze and convulse and twitch and seize. This is often referred to as Psychogenic Movement Disorder, which is a subset of symptoms associated with PTSD.

## **Psychogenic Movement Disorder (PMD)**

PMD has its own place in the fear circuit, making it a part of the habituation process of PTSD. PMD can manifest itself in several ways. Hinson and Haren state that PMD covers:

[T]he full range of organic abnormal involuntary movements, affect[ing] gait and speech, or present[ing] as unusual undifferentiated movements that do not fit into a known category. The disorders most commonly fulfill psychiatric criteria for a conversion disorder, a form of somatoform disorder, along with somatization disorder... body dysmorphic disorder, and pain disorder (695).

Hinson, Andreski, and Fizman have all, in their own studies, found sufferers of PTSD to have a high prevalence of other neurological effects such as psychogenic movement disorders and somatization. Psychogenic movement disorders take on the form of uncontrollable and sporadic movements such as twitches, spasms, hand flapping, finger tapping, hand clenching, rocking, dystonia, affected gait, affected speech, trembling, and seizures (Hinson, 695). Somatization in trauma survivors includes complaints and prevalence of higher rates of cardiovascular, respiratory, musculoskeletal and neurological symptoms, higher rates of gastrointestinal and pseudo-neurological symptoms, increased rates of cardiopulmonary symptoms, audiologic symptoms, headache, and back pain (Andreski, 132).

Fizman, et al found that, in people who suffered non-epileptic seizures, “The rates of reported general trauma were extremely high (76%, 84%, 86%, 88%, and 100%). The rates of lifetime physical and/or sexual abuse were also quite high, varying between 50 and 77%” (820). The movements generated by PMD, activated by the fear circuit, are

also eventually happening without the help of the prefrontal cortex, if they appear as symptoms of PTSD. This psychogenic movement activation happens on a very regular basis, and therefore becomes part of the habituation of PTSD.

### **The Transmission Traumatic Memories**

Life-threatening experiences, Post-Traumatic Stress Disorder, and Psychogenic Movement Disorder affect individuals in psychological and physical ways. If traumatized individuals raise children, the children often become witnesses to the after-effects of trauma. Psychoanalyst, Holocaust survivor, author, and archivist Dori Laub writes that another person needs to witness the traumatic event in order to make it real and avoid muddling of memory. This muddling of memory causes doubt in an individual about what is real and what is not. The absence of a witness can cause destruction psychically, bodily, and within families and communities (Laub 61-74).

Children are often witnesses to the tortured minds and twitching bodies of their traumatized relatives. Transgenerational trauma theory, developed in 1975 by psychoanalyst and social worker Selma Fraiburg applies to individuals who come from long lines of dysfunction, abuse, poverty and negligence. If there is no early intervention, children who did not experience the original trauma may develop symptoms of trauma (Fraiburg, 388). Atkinson describes transgenerational trauma as:

[T]he process of vicarious traumatization where children witness the on-going effect of the original trauma, which a parent or other family member has experienced. Even where children are protected from the traumatic stories of their ancestors, the effects of past traumas still impact on children in the form of ill

health, family dysfunction, community violence, psychological morbidity and early mortality (Atkinson 294).

This can happen within individual families, and can, in the case of collective trauma, affect entire generations of a traumatized group.

Groups of people who develop PTSD because of a shared circumstance, such as wide-spread persecution, can develop cultural trauma which can affect significant portions of the persecuted population. Large groups of people can suffer the effects of PTSD collectively (Alexander, 1-30). There is a large body of research studying the effects of war and genocide on large groups of people. In 2003, Athanase Hagengimana, one of only two psychiatrists in Rwanda, studied the prevalence of psychogenic trauma symptoms in Rwandan widows who had survived the 1994 Rwandan Holocaust. 40% of the widows studied suffered from psychogenic panic attacks, which is one manifestation of PMD (Hagengimana 6-9).

South African Psychology Professor, Ashraf Kagee, conducted a similar study in 2005, among former South African anti-apartheid activists who were abused and tortured in captivity (Kagee 2). Measuring the prevalence of PTSD among these survivors, Kagee found similar results, with numbers in the 40% range accounting for PTSD symptoms (7), including somatic complaints (9). Kagee also lists past studies in which political detainees from around the world have been studied, with similar results (3-4).

These studies are only two of all the available current examples of ways in which extreme hardship can affect an entire group of people physically and psychologically. Other groups studied include Somali and Oromo refugees (Jaranson 596), children

released from Cuban refugee camps (Rothe 974), Bhutanese refugees in Nepal (Shrestha 447), and South East Asian refugees (Kroll 1592).

Maria Root argues that cultural trauma can be passed down from one generation to the next with what she calls “insidious trauma,” which is a feeling of worthlessness or danger because of one’s social status; a feeling of being unsafe or less-deserving because of race, class, or sexual identity (240). This feeling of worthlessness or danger can also be transmitted from one person to another, for example, from parent to child. Root defines this as “transmission of unresolved trauma and attendant defensive behaviors and/or helplessness that is transmitted trans-generationally as the result of an ancestor’s direct trauma...” (240-241). Examples cited by Root are children of Holocaust survivors, Japanese Internment victims, displaced Native Americans and Hawaiians, and refugees (241).

### **Embodied Knowledge and the Transmission of Gesture**

Deidre Sklar posits that movement can become a communal knowledge that is habitual and unconscious. These habitual, unconscious movements come about through gesticulation and gesture and echo the cultural and social climate in which they are cultivated (Sklar, 85). “[In] body memory,” she states, “the past is enacted in the present” (89). This is exactly the claim that psychologists are making for PTSD. Trauma specialist Babbette Rothschild, in her book, *The Body Remembers: The Psychophysiology of Trauma and Trauma Treatment*, explains that individuals with PTSD, “re-live the life-threatening experiences...reacting in mind and body as though such events were still occurring” (6). Although Sklar is not talking about trauma, her theory can be used

together with Rothschild's to argue that embodied knowledge can contain trauma, if the population in question has experienced collective trauma.

The transmission of traumatic memory is discussed in the theory of Postmemory by Marianne Hirsch. In her article, *Generations of Postmemory*, Hirsch tackles the phenomenon of traumatic symptoms presenting in generations of children born to Holocaust survivors. She delineates memory into two categories: communicative memory and cultural memory. Communicative memory belongs to those who experienced the event. Cultural memory is how the memory of this event is preserved within the following generations through ritual, performance, archives, books, or museums (Hirsch 110). However, in the case of collective trauma, the ways in which the memories are stored are also disrupted (111). She states that, "nonverbal and non-cognitive acts of transfer occur most clearly within a familial space, often in the form of symptoms (Hirsch 112).

These habits and gestures can be understood on some level as early as infancy, before objects, people, and their symbols have been cohered in the brain. Sklar discusses how infants process the world around them. Infants pick up on feelings and emotions and can tie them together with gestures, even before they have an understanding of the people or objects around them. For example, Sklar states that infants can connect feelings of calm and affection when their mother smiles at them, or when she touches them with a soft caress; even if the infant does not know what a caress is, or even what a mother is (96). This suggests that these gestures of tenderness can be transmitted without logical understanding.



Cultural knowledge and cultural trauma, can also be transmitted through movement. It can be learned by others through daily use, and can vary according to environment. One way this happens is through gestures particular to a group of people. Gestures can be a window into a society's mode of thinking, and are passed down to other members of a given society's subsequent generations. Gesture can also be a window into the history of a particular family or individual. These gestures become societal habits. As habits, it can be argued that they also become part of a neuro-circuit set up as a reaction to prolonged exposure to stimuli, not unlike PTSD. Movements become habits when the movements are made so frequently that the basal ganglia's habit forming system solidifies these gestures into neuro-muscular physical responses to stimuli.

Gesture affects all aspects of life from a very early age and becomes ingrained in culture. Bodies, with or without the presence of trauma, embody cultural knowledge through gesticulation and gesture. A culture's gesticulations could be indicative of lived trauma, originally established generations before by PMD as part of the fear circuit.

The establishment and transmission of the fear circuit begins when trauma is experienced. Long-term or multiple instances of trauma can establish a neuro-circuit of fear which is the brain's manifestation of PTSD. This neuro-circuit turns PTSD and its symptoms into habit. PMD, as a symptom of PTSD also becomes habit, which is activated by the fear circuit on a very regular basis. This habitual activation of movements become part of the fear circuit and happen automatically.

PTSD and PMD habits can be suffered collectively and can be passed down so individuals who never experienced the trauma are engaging in the trauma habits,

suggesting that embodied knowledge can include the embodied knowledge of trauma. Physical habits can look like and function like gesture. Gesture is also passed down. This suggests that we can have trauma-induced, physical habits being created culturally and being passed down generationally.

Flamenco was developed among a widely-persecuted population, the Roma, who settled in Spain beginning in the 15<sup>th</sup> century (Leblon 1-17). In Spain, Roma are also known as *Gitanos*. The Roma people settled in other parts of Europe as well, but flamenco was not developed in any other areas. I argue that this population may suffer or have suffered from collective trauma, beginning with their forced settlement in un-livable areas in Spain when they first began to arrive, and continuing with a multitude of anti-Roma laws that encouraged the capture and killing of Roma people, separation of communities, forced military service, purposeful erasure of cultural identity, and slavery (Leblon 17-31). Certain characteristic movements in flamenco, both in the dance and within the movements of the musicians, are similar to movements found in PMD, although these movements are executed in relationship to a very specific musical structure. The clenching and un-clenching of the fist, for example, can be found within the performances of certain flamenco singers such as El Chocolate, Manuel Agujetas, and others. El Chocolate and El Canela also make use of a highly exaggerated movement of the jaw while they are singing. Often, the throwing of the arms and upper body at the end of a *remate*, or the punctuated end of a phrase, is reminiscent of the spasmodic bodies of PMD sufferers. If flamenco was developed within a population where collective trauma was at work, it is possible that habitual trauma-induced gestures were passed down through generations and found their way into flamenco.

In the next chapter, I will discuss how widely used movements within ritual can use the same neuro-circuitry as the fear circuit but for positive and productive reasons. These ideas, coupled with contemporary trauma theory, can illuminate the idea of flamenco, which engages in many of these types of movements even if not tied to ritual, as, not only a vehicle for transmitting trauma witnessing, but also as a societal, transmittable survival strategy for the prevalence of the fear circuit.

## **Chapter 2: Releasing Traumatic Memories: A Comparison of EMDR, Ritual Dance, and Flamenco**

Anytime we have an experience, good or bad, everything we see, smell, touch, and hear as well as how we felt in that moment gets stored for a short while as a vivid snapshot of the event. This snapshot only exists for a short while in our brain. When we go to sleep, the snapshot is usually deconstructed and the memory is given meaning within the larger scope of your life. The snapshot is no longer a snapshot, and the memories are no longer so strongly tied to all of the sensory input recorded during the event, and the emotional response around the memory is not as strong. The event has now been processed into our long-term memory.

These snapshots are also known as episodic memories. Episodic memories are the first phase of memory processing. When we experience something, the hippocampus stores a memory of it immediately, but it doesn't always store a conscious awareness of what happened. It usually only stores all of the sensory input and the neurological and bodily reactions to that sensory input. This means that, while in the episodic stage, any recall of that memory includes all the sounds, smells, muscular tensions, and responses of joy, fear, or anger associated with that memory (Stickgold 62-63).

Episodic memories are meant to be temporary. They are meant to move from the hippocampus to the neo-cortex, where they are stored in complex systems that connect to other related memories and build experiences to call on in the future, and are not connected to immediate sensory reactions. They change from being episodic memories, to being semantic memories, which have meaning and cognitive awareness attached to them (64-65). Most of this processing occurs during Rapid Eye Movement (REM) sleep.

During REM sleep, episodic memories are processed into semantic, long-term memory (66-67). This is what normal memory processing looks like.

This sort of episodic to semantic memory processing is inhibited in many PTSD patients. PTSD symptoms such as insomnia and hypervigilance during sleep can interrupt normal REM processing (68-69). If you can't sleep, or if you can't really ever get into a deep sleep for a significant period of time, when will episodic memories be removed from the hippocampus and turned into semantic memories in the neo-cortex? Many everyday memories do get processed, but if there is a back log of traumatic episodic memories in the hippocampus, it is unlikely the brain will ever get to them without help. The brain gets overwhelmed every time the traumatic memory is recalled and REM or any kind of processing is shut down, and the hippocampus becomes overwhelmed with memories that are tied heavily to all of their original sensory input and have not had meaning assigned to them in the larger context of life (Stickgold 62-67).

This is one of the reasons why PTSD is so painful. You experience something painful, abhorrent, or life-threatening. The memory is attached to feelings of terror and hopelessness. However, it is also connected to the feel of the fabric on your skin, the song that was playing, the smell of a certain soap, a certain flower blooming, a certain bite to the air. The terror memory, attached to all those sensory cues, stays trapped in the hippocampus and is never processed. The body remembers exactly what it was like that day you experienced terror, it remembers every time it smells that soap, or hears that song, but it cannot make any sense of it.

If that memory had been processed properly, it would have separated itself substantially from all those cues. It would fit in to the context of your life. You would

understand its gravity, but also its place in time-as something that had passed. If you do not process it, your body cannot tell that it is not happening right now when you experience a related sensory cue, activating our terror response over and over. Every time a sensation occurs that is connected to any of the episodic memories trapped in the hippocampus, all of the associated sensory and somatic reactions are triggered. Usually, these reactions are traumatic, fear of death reactions, because the traumatic event is what caused the normal processing breakdown in the first place. Since these episodic memories that cause the break down are fear of death memories, fear of death responses are being triggered on a very regular basis, whether or not the patient's life is actually in danger. This habitual activation of the "fear of death" response caused by the abnormal storage of episodic memories is at the core of many of the symptoms of PTSD and PMD.

Eye Movement Desensitization and Reprocessing (EMDR), a trauma therapy developed by psychologist, Francine Shapiro, in the late 1980's, can work to neutralize the symptoms and effects of PTSD and PMD by encouraging the processing of traumatic memories into long-term memory. Shapiro hypothesized EMDR in 1989 (Shapiro and Maxfield 934) and it has since been developed into a widely-used therapy for many sufferers of PTSD and PMD.

One aspect of this therapy targets the abnormal storage of memories that occurs in the hippocampus during PTSD. We already know from the previous chapter that the hippocampus is involved in the immediate reaction to traumatic events because it shuts down the prefrontal cortex, which leaves the brain to rely solely on habit and hormonal responses. When it comes to the development of PTSD, after the event has occurred, the

hippocampus is involved in another way-through the abnormal storage of episodic memories.

EMDR works to slowly and safely move episodic memories from the hippocampus to the neo-cortex by creating an environment where an REM-like state can be achieved, and a specific memory can be processed into semantic memory status, reducing the daily fear of death response previously associated with that memory. It does this, mainly, through the use of bilateral stimulation and traumatic memory recall, which causes the brain to go into an REM-like state while focusing on a particular traumatic memory (Stickgold 70). Bilateral stimulation can take many forms. Currently, EMDR practitioners use tones alternating in each ear through head phones, or buzzers held in each hand and sending pulses in alternating patterns during traumatic memory recall, as well as Eye Movement practices, which make use of alternating focal points followed with the eyes (Zarghi et al 98). This bilateral stimulation causes a constant re-focusing of attention, which helps the patient enter into an REM-like state of consciousness (Schubert 71; Stickgold 71). The patient then focuses on the chosen traumatic memory and verbalizes it for him or herself and the EMDR practitioner. This calls to mind the process of witnessing the self and witnessing another, as well as witnessing the witnessing of the self that was discussed by Dori Laub (“Truth and Testimony: The Process and the Struggle” 61-74). The mind is in a hyper-relaxed, REM-like state at the same time that the body is being urged into the terror response of a particular traumatic memory. This combination of contrasting psychophysiological states allows for the chosen traumatic episodic memories from the hippocampus to gradually move into the neo-cortex and establish them as semantic memories (72).

Schubert et al. conducted a study on the effectiveness of EMDR in post-conflict Timor-Leste in Southeast Asia after they gained their independence from Indonesia in 2002. It was found that EMDR significantly reduced symptoms of PTSD (Schubert et al. 70-72, 77). Bennett et al. also studied the effectiveness of EMDR, however their population were athletes who were experiencing performance blocks that affected their skill and ability to execute a specific function. These performance blocks are identified by “intense cognitive anxiety, loss of control, fear, intrusive thoughts” (Bennett et al. 1), all symptoms that appear within PTSD. Performance blocks have also been reported with symptoms that mirror PMD such as “anxiety-related disorders, dystonia...sudden and uncontrolled movement disruption...and panic” (2). Bennett et al. also make the comparison with dissociation, which is often present in PTSD. The authors assert that EMDR is effective in removing performance blocks because the blocks often stem from outside emotional problems. This study found that, through EMDR treatment, performance blocks in golfers were removed. Putting scores increased while anxiety and distress levels decreased. The authors also state that performance blocks and anxiety-related disorders have much in common and may therefore be treatable by similar methods (9-13).

Arguments against the efficacy of EMDR state that EMDR is no more effective than other types of exposure or cognitive therapy, and that bilateral stimulation is a superfluous component to the therapy. Other arguments suggest that EMDR may be effective for adult victims of single-instance trauma, but may be less effective for combat veterans or children survivors of multiple instance trauma (Farrell et al 32-52, McNally 225-236, Davidson 305-316, Rubin 4-30). These arguments are backed by clinical



studies, much like the studies that back the positive efficaciousness of EMDR. However, mores studies were found stating the positive effectiveness of EMDR than otherwise, including the efficaciousness of bilateral stimulation.

### **Flamenco and Ritual Dance as Bilateral Stimulation**

The hyper-relaxed, REM-like state happening in tandem with a hyper-aroused state of traumatic memory recall can occur in ways other than EMDR such as ritual dance and, I will argue, flamenco practice. In the previous chapter, we discussed how cultural knowledge can be passed down on a generational, cultural basis. I then made the argument that embodied traumatic knowledge can also be passed down. I would now like to go one step further and suggest that not only can traumatic knowledge be passed down, so can bodily survival knowledge-knowledge about how to survive the debilitating effects and symptoms of PTSD.

Paul Connerton argues that social memory is preserved through ceremony and ritual (Connerton 6-15). As discussed in the previous chapter, cultural memory is the archive of cultural experiences and can manifest as books, performances, and ritual (Hirsch). Ceremony and ritual bring communities together, mark time, and make meaning out of life events. It is possible, however, that ritual can serve another societal function-a neurological function that may have effects on our bodies in ways that mirror EMDR.

Embedded within many ritual ceremonies world-wide are transcendent spiritual states, spiritual bodily possessions, and painful physical rites that are enacted within the transcendent ritual state (Newberg and D'Aquili 85-101). These transcendent states, and the physical acts that produce them, are, following Connerton's argument, a part of social

memory. These physical acts can be a part of social memory, much like the physical symptoms of PMD.

Andrew Newberg and Eugene D'Aquili discuss these transcendent ritual states in their book *Why God Won't go Away*. One of the main factors of transcendent behavior, they argue, is the shutting down of the prefrontal cortex through overstimulation of the amygdala, often achieved through repetitive and rhythmic ritual dance (34-39). By conducting brain imaging studies on monks and nuns during meditation and prayer, they found that activity in the prefrontal cortex decreased significantly during moments when the subjects reported having reached a transcendent state (9-18). The transcendent state can be achieved in a variety of ways. It can be reached through breathing practices, meditation, drug use, and, as suggested by Newberg and D'Aquili, through the physical act of ritual dance (87-91).

Ritual dance, under the right circumstances, activates what Newberg and D'Aquili call our "quiescent and arousal systems" (45-47). These systems do not usually operate at the same time (45). The arousal system, for example, is activated "whether [a] situation is a threat or an opportunity...the response will be...a surge of intense readiness or arousal. Physiologically, this is expressed as faster heart rate, higher blood pressure, quicker breathing, and increased muscle tone. In this aroused state, the body is expending energy to allow for decisive physical action" (46). In such a situation, the quiescent system would be less active. The quiescent system, alternately, is responsible for relaxation, sleep, digestion, and nutrient distribution. This system only takes over if there is no excitement or threat (46-47). REM sleep is an example of the quiescent system. These

systems are also commonly known as the Sympathetic and Parasympathetic nervous systems.

These two systems are the same two systems utilized during EMDR therapy. The limbic system, activated by fear or excitement, contains the amygdala and hippocampus, and is what Newberg and D'Aquili call the "Arousal System", which can be initiated by repetitive, rhythmic movement. This system, activated by ritual dance, is also activated by trauma and, in EMDR, is purposely activated by recall of a traumatic memory. The "Quiescent System" is what causes the REM like state activated by EMDR. It can also be activated by repetitive, rhythmic movement, such as that found in many forms of ritual dance.

### **EMDR and Flamenco Practice**

Bilateral stimulation is only one phase in the 8-phase process of EMDR, and although EMDR may share certain components with ritual dance, we may be able to find even stronger parallels within the daily practice flamenco. Flamenco does not meet the criteria for ritual for a few reasons. It is not used to mark calendar time, to praise deities, to celebrate life events, or to prepare for initiation or battle. It is not used for healing. It is not used to achieve an altered state, or communicate with a higher power. In fact, when flamenco began, it was used as a way for working-class people to make money (Roldán 20-24). There are arguments about the development of the art form, but we do know that it first began to appear as a solidified art form in the mid 19<sup>th</sup> century, and that it was offered as a more "authentic" version of the Escuela Bolera, or Spanish Classical Dance, that was touring Europe at the time (Berlanga 4-6). Foreigners came to Spain to see Escuela Bolera, and after the shows, went looking for "real" Spanish dance. Working-

class people, many of the them Roma, also known as Gypsies or Gitanos, held “private” parties where colloquial and Spanish dances were individualized and improvised, and this eventually turned into flamenco as we know it today (6-7). These “private” parties were advertised to foreigners, who were charged an entry fee. If we look at it this way, flamenco is very far removed from the societal function of ritual.

However, if we look at the bodily practices of flamenco, we can find many similarities with ritual dance and movement, as discussed by Newberg and D’Aquili. Whether through use of the arms and legs in alternating marking patterns; rhythmic footwork patterns; the execution of *palmas*, or hand percussion, the rapid and complex playing of the guitar; or the ever-present bodily gestures of flamenco singers, flamenco is full of bilateral stimulation, often presented as repetitive rhythmic movement. If we use Newberg and D’Aquili’s arguments about repetitive rhythmic movement and how it induces aroused and quiescent states, we can argue that flamenco can affect the brain in a way similar to ritual dance and EMDR.

### **The 8 Phases of EMDR**

Once a patient and practitioner have decided on EMDR as a therapeutic tool, the practitioner guides the patient through an 8-phase process that can take weeks, months, or years, depending on the severity of the physical, emotional, and sensory distress surrounding the stuck episodic memory of a traumatic event. Below, the 8 phases are outlined as described by Francine Shapiro (Zarghi et al 99-100).

#### **Phase 1: History and Planning**

During this phase, the patient and practitioner identify target memories to focus on during processing. This is done through collecting the patient’s dysfunctional history.

This phase also builds trust between the patient and the practitioner. This phase may take weeks, months, or years.

#### Phase 2: Preparation

During Phase 2, the patient is educated in the EMDR process. She or he is taught self-control and soothing techniques to employ during the arduous and terror response-filled memory processing. A lot of emphasis is placed on the duality that will be experienced- the duality of the reality of present physical safety and the recollection of dysfunctional material that will cause distressing body memories.

#### Phase 3: Assessment

Assessment means looking at different parts of a chosen memory, and identifying a specific image that is especially distressing. The patient is then asked to rate the distress around that image from 0-10, 10 being the most distressing, and 0 being the absence of distress. The patient is then asked to identify negative self-thoughts and images surrounding the distressing image and event. She or he is asked to rate the severity of these negative cognitions from 1-7, 7 being the most severe. Finally, the patient is instructed to notice and identify any physical sensations associated with the image and its associated negative cognitions, for example a tense jaw, neck, or shoulder. Positive cognitions (thoughts, self-images) are identified as goals to be reached at the end of treatment, such as feelings of empowerment, safety, and hope.

#### Phase 4: Desensitization

This is the phase which makes use of bilateral stimulation. This is where the actual processing takes place. The three previous steps are preparations for the actual procedure of EMDR, which involves individual sessions of focusing on the traumatic

image, speaking about it and surrounding images and sensations to the EMDR practitioner, and engaging in bilateral stimulation all at the same time. This process is what mimics the REM-like dream state, and allows for the chosen memory to be moved from the hippocampus to the neo-cortex. How long a patient stays in this phase overall depends on how long it takes to fully process the chosen memory. Sessions are usually given weekly, and a patient undergoes actual EMDR processing for 30-45 minutes per weekly session.

#### Phase 5: Installation

The EMDR practitioner knows that a memory has been fully processed when the distress surrounding the memory and the severity of the identified negative cognitions are both reported to be at a 1 or a 0, and when the patient is able to identify the traumatic event as a memory that happened in the past and does not become overwhelmed with all of the emotional and sensory information associated with the memory. REM is usually responsible for this type of processing, but REM fails to do so in PTSD in regards to traumatic memories. The difference between REM and EMDR is that, in EMDR, there is a focus on one particular memory, and the process is being facilitated by a trained professional. Without this guidance and focus, the patient cannot process the memory alone, because he or she becomes overwhelmed. Even during EMDR, one of the practitioner's main focuses is not letting the patient become overwhelmed. The practitioner must constantly be reminding the patient that he or she is not, in fact, experiencing the trauma. The patient must constantly be reminded that this was in the past, that he or she is safe now, looking back at a memory. The inability to do this on one's own, in regards to traumatic memory, is the main reason why PTSD is developed.

A person cannot even access the memory momentarily without activating the fear circuit, which extinguishes any possibility of memory processing, which has to happen during times of rest and relative safety.

#### Phase 6: Body Scan

At the beginning and end of each session, the patient is asked to identify their distress levels surrounding the traumatic image. If, during a session, distress and negative cognition levels are reported at 1 or 0, the practitioner will usually deem the memory fully processed. If this is the case, the practitioner will ask the patient to do a “body scan,” while continuing on with bilateral stimulation. During a body scan, the patient holds the original image in mind and is asked to report any “residual tension” associated with the image. Those parts of the body are then “targeted for future processing” (Shapiro 937).

#### Phase 7: Closure

This phase happens at the end of every session, whether or not the memory has been fully processed. During this phase, the patient is brought back in to the present. Various grounding techniques are used to bring the patient back to “equilibrium” both in mind and body. These techniques include pressing the feet into the floor, holding in the abdomen, and stretching the arms.

#### Phase 8: Reevaluation

This phase is enacted at the beginning of the next EMDR session. It involves planning for future sessions and the evaluation of how the previous session went.

## **Why is Flamenco like EMDR?**

Before comparing EMDR's 8-phase process with flamenco, I must address the idea of sensation and cognition. EMDR targets the sensations and cognitions associated with trauma. These sensations and cognitions are different for every person. However, EMDR is designed to address these negative cognitions on an individual basis, and then sets up a plan to replace those negative cognitions with positive ones. For example, a goal of EMDR is to replace feelings of powerlessness around a traumatic memory with feelings of empowerment. This replacement is stated as a goal at the very beginning of the process, and as stated above, one factor that alerts the practitioner that a memory may be fully processed is a feeling of increased empowerment and sense of control around the memory. This signifies that the patient is able to see the traumatic event as an event in time that has a context with the rest of his or her life and is able to see it logically, which is not the case with unprocessed traumatic memories. I argue that flamenco also targets these sensations and cognitions, and contains within it the tools to replace the negative cognitions associated with PTSD with positive cognitions. Examples of negative cognitions and the positive cognitions that could replace them are outlined below. This list is not exhaustive and was created by the author, in regards to her experience with the negative cognitions of trauma and the positive cognitions of flamenco.

*See list on following page:*



NEGATIVE COGNITIONS within  
TRAUMATIC MEMORY

Fear  
Abandonment  
Forced containment  
Chaos  
No control  
Loud noises  
Restricted breath  
Realization of immanent death  
Severe consequences for error

POSITIVE COGNITIONS within  
FLAMENCO

Fear  
Support  
Expanding movements  
Structure  
Agency  
Loud noise  
Emphasis on breath  
Non-life threatening  
Relatively less severe  
consequences for error

Flamenco holds within it the tools to replace negative cognitions with positive cognitions. This is not ever an easy process, just as EMDR processing is never easy.

Flamenco is not structured as an 8-phase process, nor is it designed to process any kind of memories, or to replace any type of negative cognitions with positive cognitions.

However, flamenco practice does inherently hold within it processes that work to combat the negative cognitions imposed upon PTSD patients by their stuck episodic traumatic memories, even if that is not the conscious or intended purpose of flamenco.

In flamenco, what mirrors EMDR in the most concrete way, is its similarity to the phase in EMDR called Desensitization, or the actual memory processing using memory recall and bilateral stimulation. Flamenco's bilateral stimulation is present in its great use

of strong, pressurized footwork. Flamenco was not developed for this purpose, nor is practiced with this purpose in mind. However, I would like to draw your attention back to the daily experience of a PTSD patient.

One of the most problematic symptoms associated with PTSD is the regular occurrence of flashbacks, which occur when episodic memories are triggered. The person experiencing the flashback is transported, both in mind and body, back to the original occurrence of the traumatic event, and is unable to extinguish the fear that comes along with it. This is a daily occurrence for many people suffering from PTSD. For many, myself included, flashbacks happen all day long. If you happen to be practicing flamenco, this means flashbacks are probably happening while you are dancing flamenco. Speaking from personal experience as a PTSD patient, flashbacks occur often throughout the day, including during flamenco practice. The difference between flashbacks that happen out of flamenco practice and flashbacks that happen during flamenco practice is that during flamenco practice, one is more than likely engaging in repetitive rhythmic movement with a larger group. This sets up a situation not unlike the environment that is created during an EMDR Desensitization session. The environment I am referring to is an environment where a flashback is being experienced, either by purposely recalling a traumatic memory or as part of the daily symptoms of PTSD, at the same time that the patient is engaging in bilateral stimulation. I propose that experiencing flashbacks while practicing flamenco over many years may offer some of the same benefits of the Desensitization process of EMDR.

Flamenco probably does not help process traumatic memories in the same way EMDR does. It may, however, replace the physiological and neurological negative

cognitions of entrapment, restricted breath, fear as imminent death, worthlessness, and powerlessness associated with trauma with its own inherent positive cognitions of expansive movements, a focus on breath, fear as non-life-threatening, agency, worthiness, and empowerment. It may be able to do this because of the brain state induced through its bilateral stimulation of vigorous footwork. In this way, flamenco may help manage symptoms of PTSD and PMD, even in people who are not practicing flamenco for this purpose.

### **Chapter 3: Going Ballistic**

The term ballistic, as it will be used in this thesis, refers to a type of physical activity that involves throwing or kicking something with the objective of hitting a target. Being skilled in ballistic activities may bolster the brain against traumatic stress, and flamenco may be very ballistic in nature, adding to its trauma-fighting qualities. The ability to throw an object and hit a target with accuracy and speed is a trait specific to humans. Another trait specific to humans is the tendency to reward one another by cheering each other on for well executed ballistic activities, as is the case in sports and hunting.

In this chapter, I will argue that flamenco is in itself a ballistic activity with its own built-in reward system that can then bolster the brain against traumatic stress. Ballistic activity has been shown to strengthen the left language cortex and to strengthen white matter integrity in the brain. The left language cortex and white matter integrity are two areas that are negatively affected by PTSD. I propose that flamenco qualifies as a ballistic activity and therefore strengthens the left language cortex and increases white matter integrity with daily practice.

#### **Throwing and Rhythmic Command**

Theoretical neurophysiologist William Calvin has written extensively on the development of throwing and aiming abilities in humans. Throwing, he claims, is an activity specific to primates (*The Throwing Madonna*, 40-55). More specifically, precision and speed throwing are activities particular to humans (41). With the ability to throw at great speed across large distances, human's food selection and survival while

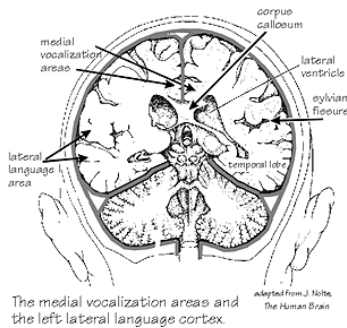
hunting may have increased. A hunter could now hide behind a tree and throw a spear at an animal instead of having to track it, wait for it to die, or attack it head on (49).

Calvin's questions around throwing have to do with how such a skill came about in human evolution. Mainly, he is concerned with the ability of highly trained practitioners to aim for and hit a target from a great distance. We already know, he claims, that the further away we are from a target, the faster we have to throw, and the more planning ahead our brains and muscles have to do. It is harder to do something faster than slower; "just try dancing twice as fast as you usually dance, and you'll get the idea that adjustments aren't always easy" (Calvin 240). Calvin's question is, why is speeding up movements you are planning so difficult? The answer he found is that motor neurons are very jittery and have limited precision planning capabilities (242). To be more specific, motor neurons cannot operate any faster than in tens of milliseconds, because individual motor neurons are too jittery to focus long enough on such precise planning (242). Calvin explains that you can successfully hit a regularly sized target at about 4 meters away at speeds in tens of milliseconds (242). If you double that distance, you need precision timing of 1 millisecond or faster, which is too fast for individual motor neurons to accomplish on their own.

Of course, people are able to hit targets of all sizes from distances far greater than 4 meters all the time. The reason they are able to do this, even with motor neuron jitter, is that, with practice, we are able to train more and more motor neurons in the sequencing skill of a particular ballistic activity, like throwing, even motor neurons that are usually being used for other things like talking, walking, and thinking about tomorrow (243-247). The more neurons focused on a specific activity at a certain time, the more regularly

rhythmed their individual jitters become, and precision timing can now be accessed at greater speeds and distances (243-247). This focused training of large numbers of neurons in precision, aim, timing, and sequencing, according to Calvin, opened the gateway for other important speed, aim, and sequencing skills which are defining features of humanity.

In another book of Calvin's, *The Throwing Madonna*; chapter 4, "Did Throwing Stones Lead to Bigger Brains?", Calvin takes his throwing argument one step further by isolating it within the functioning and makeup of the human brain. He addresses throwing as a highly-specialized sequencing skill, and claims that other complex sequencing skills came out of this early throwing development. These other sequencing skills, says Calvin,



The medial vocalization areas and the left lateral language cortex.

Figure 2. The medial vocalization areas and the left language cortex. William H. Calvin and Derek Bickerton, *Lingua ex Machina: Reconciling Darwin and Chomsky with the human brain* (MIT Press, 2000), chapter 5.

are things like language, music, and dance.

This ability for complex sequence planning and execution is lateralized in the left side of the brain (see fig 2). Calvin outlines the trajectory of these findings as follows:

Doreen Kimura, a Canadian neuropsychologist, found that people with left brain strokes, where sequencing skills are lateralized, had trouble both with language sequencing, as well as movement sequencing (44-45). Her

colleague, Catherine Mater, then found that left brain strokes resulted in oral muscular difficulty. Language, states Calvin, is really the sequencing of oral facial muscles (44-45). Calvin's colleague, neurophysiologist George Ojemann, worked with Mater on experiments on the language cortex and the left side of the brain, finding that movement

sequencing and language (and, according to Calvin, music and dance) are all operated by the same area of the left brain (*Cerebral Symphony*, 277-300).

### **PTSD and the Language Cortex**

Once I understood that ballistic activity is related to sequencing and is controlled in a specific area of the brain, I had a question about whether or not this part of the brain is affected by PTSD. Clinical neurologist Oliver Sacks writes about the effect of music on people with Parkinson's disease. His patient, composer Lukas Foss could not control his movements. They were either too fast, too slow, or frozen (2528-2529). However, when he sat at the piano, he was able to play music without any difficulty and the ticks and freezes stopped, although they started again as soon as he stopped playing (2529). Perhaps this is because, after a lifetime of training, when focused on playing, a large number of Foss's motor neurons remembered that they can all stop what they are doing in order to focus on playing music, which is a sequencing skill that requires aim by way of hitting the fingers just right on the keys to produce certain sound qualities.

This hypothesis has been studied by neurobiologists Dana Straight and Nina Kraus. They published a study in 2011 on the selective auditory capacities of musicians and non-musicians. They found that musicians were able to concentrate more fully on spoken words when auditory distractions were present as compared to non-musicians. They conclude that this information could mean that musical training "may aid in the prevention, habilitation, and remediation of individuals with a wide range of attention-based language, listening and learning impairments" (7). If PTSD comes with attention-based language, listening, and learning impairments, then perhaps musical training can

help here as well, and perhaps it partly has to do with the lateralized sequencing associated with music. But first, I had to find out if PTSD affects these areas.

Australian neuroscientists Erin Falconer, et al conducted a study on inhibitory control in PTSD. What they found was that subjects with PTSD showed less activation in areas of inhibitory control and executive function control subjects. They also showed higher activation of sensory and attention areas, which, the authors posit, is what makes inhibitory control and executive function difficult (Falconer et al 416-418).

Bruce D. Perry, an American psychiatrist who specializes in childhood trauma diagnosis and treatment, states that when someone experiences a traumatic event, the body goes into a different type of homeostasis, or state of normalcy, that involves extreme arousal and planning for survival and escape from danger (Perry 2), and that with repeated trauma, this new, highly alert state becomes the new normal. Although it is possible, states Perry, for this state to be the norm and go on for long periods, it is extremely taxing on the resources of the body and inhibits other parts of the brain (4).

This means that PTSD hypervigilance is taxing on other cerebral resources. The core of most problems in PTSD, according to Perry, is hypervigilance, the highly alert state. Contrasting the way aim borrows resources from other parts of the brain and body for a reward-based system, a consistent hyper-aroused state seems to regularly rob resources from the rest of the body without replenishing them. This causes problems with attention, focus, learning, information processing, and memory in PTSD (Perry 1-15), whereas ballistic aim and sequencing is proposed to strengthen all of these.

Finally, Bessel van der Kolk references studies he has conducted and assessed, stating that, “the left hemisphere, which mediates verbal communication and organizes



problem-solving tasks into a well-ordered set of operations and processes information in a sequential fashion, has been shown to be less active in PTSD” (van der Kolk 18).

After reviewing this information, it is appropriate to say that PTSD causes problems with focus, attention, learning, inhibitory control, and executive function. This means music may help PTSD, just as it has been shown to help people with other illnesses whose symptoms cross with PTSD in these ways. PTSD also affects the side of the brain responsible for sequencing skills and, therefore, ballistic activity. The question remains, why does this matter in regards to PTSD and flamenco? I hypothesize that there are two concrete, traceable reasons.

First, if ballistic activities strengthen the brain regions weakened by PTSD, then the highly ballistic art form of flamenco can also combat the area of the brain severely taxed by PTSD. Secondly, it is very possible that flamenco can help build white matter in the brain. White matter is responsible for connecting various brain regions. It contains myelinated axons, which help relay information efficiently and plays large role in memory and learning. Numerous studies have been done finding that PTSD patients suffer from atrophy of and decrease in white matter, especially around the left language cortex.

### **Review of studies done on white matter integrity in PTSD patients**

Li Lei et al. used Diffusion Tensor Imaging to view the white matter integrity of PTSD patients and analyzed microstructural alterations in the white matter (177). They found microstructural alterations in the prefrontal cortex and the left forceps major, which projects white matter fibers across the corpus colosseum (181).

Judith K. Daniels et al. conducted a review and meta-analysis of all empirical

research on white matter integrity in PTSD patients (208). After reviewing 25 empirical investigations, they found “Overall, reductions in white matter volume were reported more often than increases in these populations” (214). Further, Daniels et al. report that “Two of these six studies reported left-lateralized reductions in the posterior section of the cingulum, three in the left-lateralized anterior section, and one in the right-lateralized anterior section” (215).

Negar Fani et al. proposed the hypothesis that “individuals with PTSD would demonstrate significant differences in FA [Fractional Anisotropy, which measures abnormalities in brain structures] in white matter tracts connecting the hippocampus and cingulate cortex, compared with traumatized individuals without PTSD” (Fani et al. 2741, Alba-Ferrara). They also found that “participants with PTSD demonstrated significantly lower white matter integrity...relative to traumatized participants without PTSD” (Fani et al. 2743). G. Villareal et al. measured hippocampal volumes and whole-brain white matter volumes and found that PTSD patients has lower hippocampal volumes and higher instances of white matter atrophy (119).

### **Flamenco and White Matter**

How can flamenco have an effect on this atrophy? I asked myself if training in ballistic activity could increase white matter integrity, namely in the left language cortex responsible for sequencing and damaged by PTSD, or in other areas of the brain. I consulted a study done by R.E. Roberts et al. They wanted to find out if a) karate masters did better on precision and speed-based ballistic tasks than non-masters and if b) karate masters had differences in their structural white matter integrity than non-masters (2283).

They hypothesized that something other than strength, such as “timing and coordination of arm movements” would be the predictor of high ballistic skill (2283).

Roberts et al. found that “When striking a target from close range, karate experts are able to consistently generate impact forces that novices find impossible to replicate...This may be due in part to a superior ability to coordinate the timing of limb movements” (2288). They also found, through MRI and DTI imaging, that the karate experts had more white matter integrity than the control group (2288). Using a comparison analysis between the experts and the controls it was found that “In the context of expertise, differences in the integrity of white matter microstructure may reflect a subtle fine-tuning of white matter connectivity to optimize performance on a specific task” (2287-2288). This would suggest that the more ballistic activity you practice and master, the more white matter integrity you have. If flamenco is the ballistic activity that I am proposing it is, then this is another concrete way flamenco can help battle the effects of PTSD.

## **Reward**

Calvin also credits the idea of reward with the development of throwing capabilities; opening the door to mastery and incredible precision in other ballistic and sequencing activities. Humans are the only animal, states Calvin, that cheer each other on when engaging in ballistic activities (*Throwing Madonna* 41). In chapter 1, I discussed the importance of habit when reacting under fear or pressure. The bundle of sub-cortical nuclei, the basal ganglia, play a large role in habit formation and execution. This same bundle is also responsible for reward and motivation (Schultz 11). This means that the basal ganglia form habits around reward, especially when tied to movement, according to

Schultz. The basal ganglia can predict reward and initiate the habits that are in place to receive that reward (11).

Flamenco has a very distinct and immediate reward system, different from many other performance art forms. Let us look once more at the structure of improvised flamenco performance. Other members of the group very often give a lot of approving *jaleo* to all members of the group throughout the performance. *Jaleo* are specifically timed shouts of encouragement that use very particular language to encourage the dancer, singer, or other musicians. These shouts can happen anywhere within the dance, but much of the *jaleo* comes at the end of phrases where precision in timing is of the utmost importance. This means that every time a dancer, for example, hits a mark at the end of a phrase with incredible precision, timing, and flair, their counterparts reward them with *jaleo*. This is the case with their counterparts, with the audience, and with their fellow dancers.

*Jaleo* and other forms of encouragement can also be found during training, especially when training children and newcomers. Constant encouragement, paralleled with corrections and critical feedback, is given as reward during flamenco training and performance, integrating this very tangible and abundant reward system within the, often ballistic, movements of flamenco, all connected and controlled within the basal ganglia, accounting for greater ballistic skill and therefore constant strengthening of the left language cortex and white matter integrity.

Ballistic activity, like throwing and kicking, requires planning, precision, speed, control, and aim. These same qualities are also important parts of flamenco practice, whether it's dance, singing, guitar, or percussion. This can be said of virtually all forms

of music and dance, however, flamenco's distinct relationship to rhythm, its obscure tonal structures, and unique reward system position the art form to have specific counter-effects to PTSD symptoms.

According to PTSD specialist Bessel van der Kolk, the part of the brain responsible for complex sequencing, the left language cortex and the areas surrounding it, have been shown to be specifically weakened by PTSD, resulting in, according to childhood trauma specialist Bruce Perry, language, attention, and learning problems in PTSD patients, especially children or people who have several instances of or chronic trauma. Studies suggest that music may help people who suffer from these types of problems. I argue that the reason for this is the strengthening of that left language cortex discussed by Calvin, all fueled by both sequencing and ballistic skill.

Going further, studies measuring the ballistic skill of karate masters - another arguably highly ballistic and sequence-based discipline - have shown that, not only do karate masters have much greater ballistic skill than non-masters, they also measured as having higher white matter integrity in the brain than non-masters. White matter helps connect parts of the brain to each other and sends messages between them. This is important for memory and learning.

Numerous studies have shown that people with PTSD consistently measure as having lower white matter integrity than non-PTSD patients, suggesting that ballistic activity strengthens the brain in areas thought to be affected negatively by PTSD. I argue that regular training in ballistic activity, like karate, flamenco, soccer, or any number of aim and precision based activities, may help work against PTSD brain degeneration.

Flamenco's communal tendencies and its unique reward system, considered alongside flamenco's many arguably ballistic movement qualities, may not only help strengthen the neurons in the part of the brain responsible for throwing, aim, and sequencing; it may also help build white matter integrity in that area of the brain, as well as others such as the hippocampus and the pre-frontal cortex, which we know have been shown to shut down and atrophy as a response to PTSD.

#### **Chapter 4: The Usefulness of Flamenco: Breaking out of Confinement**

Flamenco scholar and anthropologist Cristina Cruces Roldán has differentiated flamenco into two categories: *Flamenco de uso* and *flamenco de cambio* (Roldán 828). *Flamenco de uso* is flamenco that is practiced in every-day life and not performed for public consumption. *Flamenco de cambio* is flamenco that is done for the exchange of goods, services, or money (828). *Flamenco de cambio* is found in *tablaos*, festivals, and theaters. This type of flamenco is professionalized and commercialized, but is connected deeply with *flamenco de uso* because, as stated by Roldán, the art form was developed within the community. It was within this community that innovations were made and where artists were trained. The skills honed within this setting were then transferred onto the stage (831). This theory is closely linked with Roldán's ongoing discussion on flamenco's relationship to work. In Roldán's book *Flamenco y Trabajo*, she investigates the different flamenco forms and their origins. Some forms can be tied back to working-class populations, while others have roots in folkloric music and dance. Roldán's investigation deals with the separation of these two origins, as well as whether the songs among the working-class populations were created during actual work, or during leisure time. Either way, the Andalusian working-class population's relationship to work and how it relates to song is important. The songs are sung about work, hardship, and mistreatment (20), and were sung, if not developed, during work and leisure time.

Flamenco has a long anecdotal history with working-class populations. Many early flamenco songs focus on the harsh conditions of mining, blacksmithing, migrant farm work, and prison life. The word *uso* is a Spanish cognate for the word "use," as in something's use, or function. Roldán claims that *flamenco de uso*'s function in society is

to provide relief from difficult living conditions, to bring communities together, to provide training for would-be professional flamenco artists, and to temporarily break gender norms within the poor and working-class population of Andalucía (Roldán 828).

In this chapter I argue that *flamenco de uso* and its fluid interaction with *flamenco de cambio* holds another function within individuals and groups, beyond, or perhaps within the functions outlined by Roldán. That is to say, I argue that *flamenco de uso* and *flamenco de cambio* also serve a neurological and biological function, due to their unique combination of factors identified with the reversal of and protection against severe traumatic impact. The daily aspect of *flamenco de uso* has been employed increasingly to prepare for performance, or *flamenco de cambio*. This economic need to produce flamenco keeps the daily practice alive in many respects, unconsciously pushing the agenda of the trauma-combatting benefits of daily flamenco practice.

It is beyond the scope of this thesis to argue that the population in which flamenco developed, the poor and working-class communities of Andalucía, made up of many Gitanos and non-Gitanos, suffer from collective trauma, or that flamenco was developed with any kind of therapeutic purpose in mind. However, the Gitanos do have a history of severe persecution in Spain, as well as in other parts of Europe, and Spaniards in general lived through a harrowing civil war and decades of tyrannical dictatorship under Francisco Franco from 1939-1975 (Jerez-Farran 7-170, Leblon 14-31). Paralleling these traumatic experiences was the practice of flamenco in precisely many areas of life where trauma was being or had been experienced, such as prison, poverty-ridden neighborhoods, mines, and farms with harsh living conditions for workers.



Future research may include investigating the effects of flamenco on the brains and bodies of generations of communities that have experienced collective trauma and who also have studied flamenco their entire lives as part of daily practice. It is not my intention to argue that flamenco saved the lives of the Andalusian population. My intention is to propose that flamenco can save the lives of severely traumatized individuals through daily practice because of flamenco's unique make-up of trauma-combatting attributes. I use the term "save" intentionally as PTSD can be deadly if left untreated. PTSD increases the risk of depression, anxiety, and suicidal ideation and actual suicide (Ramsawh et al. 116-122, Rosellini et al. 732-739, Weisenhorn et al. 161-167, Ohto et al. 1727, Kang et al. 96-100, Davidson et al. 279-289). PTSD also has been shown to age its victims faster than non-PTSD sufferers, on a cellular level, which can result in early death (Wolf et al. 155-162), and can put sufferers at a greater risk for cardiovascular disease and death from cardiovascular disease (Gradus et al. 9334, Brouwers 979-990, Wentworth et al. 16-22, Levine 1-19, Vaccarino et al. 970-978, Chen et al. 302-307, Klingaman et al. 1-7). It is also not my intention to claim that these attributes were in any way consciously developed by flamenco innovators.

In order to explore this question further, and to construct a methodology for the therapeutic effects of flamenco, I decided to delve into my own traumatic history while undergoing EMDR and keeping daily practice in flamenco while constructing a dance for performance. In this way, I can compare the process of EMDR with the practice of *flamenco de uso* (my own daily practice), while preparing for performance, which will give *flamenco de cambio* the presence it often occupies in the lives of flamenco practitioners.

My original question when beginning this research was whether daily flamenco practice could neutralize fear circuits set up by PTSD and set up positive habits. This research was initiated using two focuses. The first focus was on ballistic movements, meaning purposely practicing throwing-type movements in the construction of the choreography while trying to identify flamenco vocabulary that fit this description.

The second focus was on imitating EMDR processing by calling upon distressing bodily sensations and following them with bilateral stimulation in the form of rapid footwork. For the purposes of this project, I chose the act of turning quickly as a choreographic choice. Turning quickly on stage has historically triggered a fear of death response during performance for me and I chose to trigger this fear response through turning, followed by a rapid footwork variation which would account for bilateral stimulation. Could daily flamenco practice neutralize the fear circuit surrounding turning rapidly on stage if approached through ballistic movement and the coupling of sensation re-call and subsequent bilateral stimulation?

It was understood that these questions would change as research continued. It was also understood that this is not a conventional way to practice flamenco or undergo EMDR-like processing. The question of whether or not flamenco helps to process traumatic body memories cannot be accurately investigated if the investigation includes an awareness of trauma and therapeutic benefits that may not usually be present. This investigation also occurred while I was undergoing EMDR and under professional medical care. This offered a beneficial viewpoint as I experienced the 8 stages of EMDR at the same time that I was investigating the processing power of flamenco, however, this

would not be the way most flamenco practitioners would approach the creation of a dance.

## **Methodology**

Daily flamenco practice included: daily technique class, daily individual rehearsal, mentorship, watching flamenco performance and other dance performance, attending choreography classes focusing on the flamenco song form I had chosen to work with, a *soleá*; listening to *soleá* music, learning verse and rhythms associated with *soleá*, and preparing for performance. This specialized investigation was undertaken after 7 years of conventional school-based (as opposed to community or family based) flamenco training and immersion and 5 years of teaching flamenco to children and adults. EMDR treatment occurred once a week, in hour long sessions, under the care of a trained professional. The memory being processed in EMDR was not overtly connected to the distressing sensation of turning being undertaken in the dance construction.

I began by improvising in the studio with throwing my body into a landing position, instead of slowly placing my body into the desired shape. I wanted to find out what would happen if I approached flamenco movement from the standpoint of aim and throwing, calling upon the bodily resources needed for accuracy and speed outlined by theoretical neurophysiologist William Calvin. For example, I began my first variation by aiming to land in a lunge with my hand piercing outwards, all towards stage right. This action caused distress in my body as well as I felt I had less control. I also chose to get from stage left to stage right with a series of rapid *chainé* turns and immediately going into a rapid footwork variation out of the last turn. As expected, I struggled with performing these turns in front of even one person, so I choreographed an alternate

walking combination to get from stage left to stage right in case of the fear response taking over and shutting down the prefrontal cortex. I wanted there to be another habit in place besides freezing.

### **Mentorship and Expansion**

Initially, I struggled with the rhythm of my first variation. One of my mentors worked steadily with me until the problems were fixed, and there was a sense of accomplishment and reward in the form of congratulatory language and encouragement. Under mentorship, I was instructed to find expansion in my movement. I was instructed to find expansion outwards of my fingers, as well as outwards through my feet into the floor. I was instructed to find expansion in a complete sphere. This was distracting to me, because I was trying to focus on finding throwing movements in flamenco and on combatting the fear I had while turning on stage in front of an audience. However, I did try to find expansion. I tried to find expansion downwards into the floor in certain, wide-spread positions. I tried to find expansion outwards in many varying points by envisioning the Icosahedron used by Rudolph Laban (Hodgson 59-60). This included reaching upwards, outwards, and into the floor. I found these sensations to also be distressing. I felt the same loss of control and fuzziness around reality when reaching upwards and leaving the floor as I did when throwing myself into a landing position, or turning. It appeared that there was much fear around movements that required some sort of disorientation or deviation from security.

### **Watching Dance**

I went to watch a gallery performance of *the northern sky, a westward facing window*, choreographed by University of New Mexico Assistant Professor in the

Department of Theater and Dance, Amanda Hamp. This choreographic and dancer-led project was inspired by the story of Harriet Jacob, a woman who escaped slavery and whose experience included self-confinement in a small box (Hamp). The dancers were exploring movement done in confinement and then expanding that movement. The dancers explored this movement by actually being confined in small spaces.

The gallery show was a combination of video and live performance. When I arrived, there was a young woman standing in a cut out in the wall that may have been intended for a small sculpture or something similar. She was pressing against the sides of the cutout, the top, the bottom. She was pressing gently, pensively, she seemed to be exploring, softly, what it was like to move in a small way. I continued on into the space, and began to watch one of the several videos that was being projected on a wall or shown on small television screens. My attention was focused for a time on a small television where a video played of two girls, each curled up in a small box we could see into because of an open top. They, with similar gentleness and thoughtfulness, were pressing against all sides of the box with different parts of their bodies, making varying shapes and movements. I could see the different ways their skin, bones, and muscles reacted to the pressure. I was transfixed by this video at the same time that I had an overwhelming need to run screaming from the space. I suddenly became hyper-aware of my surroundings. My heart rate increased, I began to sweat, my breathing became more rapid as panic set in. Everything became very loud. I did not want anyone to touch me. I started trying to figure out how I could escape. This was the setting in of a fear response. I was able to recognize this as such before leaving the performance in a panic state. I looked around. I looked back at the television and felt a strong urge to vomit and a constricting of my

throat. I realized in that moment that this visceral reaction was to seeing the two girls in confined spaces and pressing as if trying to expand. My body completely overheated as the episodic memory of my own confinement surfaced. I had traumatic experience with being confined. With having my knees pressed up into my chest and my chin forced down into my chest also, constricting my breathing. But, I was not confined as a consenting adult as part of an experimental art project with the choice to become unconfined at any time given to me. I was a child and I was pressing against the sides of the box too; only I wasn't trying to explore movement. I was trying to escape. Those are two very different ways of pressing against the sides of a box. These are two very different ways of trying to expand. After some time of watching the videos, dancers came out into the space and performed the movements they had discovered in confinement. They performed these movements and expanded them. They ran across the space with their chests jutting forward and their arms trailing behind them and I wept for their freedom and mine. I realized that for the past 7 years I had been trying to find space and expansion with the tense and panic driven muscle tension of pressing against something with all your might because your life depends on your success. *northern sky, westward facing window* showed me in that moment of panic and recovery, that there was a different type of movement quality that could be associated with expansion that was not damaging, not life-threatening, but freeing.

I took these sensations into my next studio session. This type of expansion is present in flamenco practice as well. For example, to explore feelings of expansion, I recalled the body knowledge passed to me through Lucia Alvarez, who visited the dance program at the University of New Mexico in the Fall of 2016. While studying with her, I

wanted to investigate why her arms looked different- so much longer-doing *floreo* in high fifth than mine did, and how she seemed to move her fingers in a very distinct, gentle, and refined way that was very different from the tense pressure I always worked with. During her technique class, Alvarez did arm and hand exercises for an hour all while doing repetitive footwork. During my time with her, 2 hours a day, twice a week, for 5 weeks, I found that I could understand the expansion she used in her arms and hands and fingers on a body level because they had turned into habits through training. I used these habits, formed while training with Alvarez, to contrast the tense and fear-based habits of expansion that were living in my body.

## **Results**

In attempting to break down the fear circuit surrounding turning, the fear circuits involved in performance, expansion, and containment were exposed. This led to a distillation of the fear circuit into an understanding of the fear of death response that is both recalled and mediated by preparation for performance. A strong parallel between flamenco practice and EMDR was also found.

By observing similarities between flamenco practice and performance, and the process of Eye Movement Desensitization and Reprocessing, I was able to identify key elements of brain restructuring and memory processing within the construction of a flamenco dance. In EMDR, memory processing is considered complete when distress levels around the targeted memory are down to 0 or 1. The distress levels surrounding expansion and performance have decreased from high 10's to low 2's and 3's.

It should be noted that the turns were completely removed from the dance. The idea of turning rapidly onstage in front of an audience over took my mind with anxiety

and fear. It began to resemble self-torture and was interrupting my daily life. This particular fear circuit was not neutralized, nor was the distress lowered around it. It remains connected to episodic and sensations-based memories stored in the hippocampus. It is thought to be connected to the loss of control over the body. Under mentorship, it was brought to my attention that there does not have to be a loss of control over the body when turning. I have yet to investigate this further.

*Flamenco de uso* and *flamenco de cambio* work together neurologically and biologically to break down fear circuits. *Flamenco de uso* implies daily practice, while *flamenco de cambio* implies performance and preparation for performance. It was mentioned above that this study was undertaken with unconventional approaches to flamenco. Most people would not approach flamenco from the angle of trying to neutralize a fear circuit. However, trauma patients suffer from certain common sensations, which can be present in a person who is practicing flamenco and suffering from PTSD. For a PTSD patient, any kind of fear can and usually does set off the “fear of death response.” In preparing for performance by preparing a solo for a student choreography showcase, and by getting ready to go on stage, my “fear of death” response was activated. This means that instead of just stage fright, what I was experiencing was, an episodic memory of a threat to life.

Every night, I would scan the dance over and over in my head to find places where I felt the fear of death. I worked to eliminate or change them into something I felt I could control. But, I always found a new place in the dance that activated the fear of death response. And I kept telling myself, this fear is old. There is actually nothing that can happen that will threaten your life right now. The problem with such a realization is,



this kind of self-talk is all facilitated by the prefrontal cortex, and if the prefrontal cortex gets shut down, which it can by fear, then the fear habit takes over. In this case, the habit of responding as if your immediate life is at stake in the execution of this *soleá*, causing neurological and muscular fear of death responses.

This is why precisely the *soleá*, or any flamenco, is important; because you learn over and over again that this place, this situation, is not life threatening, even though it is scary, and somewhat unpredictable. EMDR's goal is to replace negative cognitions (thoughts and sensations) with positive cognitions. These positive cognitions in flamenco exist side by side with bilateral stimulation, much like EMDR. Therefore, although most people do not approach flamenco with the intention of processing a specific memory like EMDR, the bilateral stimulation still allows for REM-like processing through repetitive, rhythmic movement, while experiencing positive cognitions that can work to replace the negative sensations and cognitions often associated with PTSD, even if this is not the intention.

### **Ballistic Flamenco**

One goal of this investigation was to identify ballistic movements within flamenco. What I found to be ballistic about flamenco movement, is the intention. Movements which I identify as ballistic can all be executed in a way that does not require ballistic facilities. However, they are the most effective when done with ballistic intention and, although the term ballistic is not used, teachers of flamenco often find various images to encourage students to aim for something when they are dancing. For example, Manuela Rios instructs her students to throw their energy at the wall when changing their direction. Singer Juan Jose Amador says specifically that you must throw your voice and

then pull it back and then throw it again. Now, other forms of dance encourage and require high levels of focus and aim as well. I believe, however, that, although many of the elements discussed in this thesis can be attributed to other disciplines, flamenco has a make-up of elements that make it uniquely accessible, attractive, and useful for vulnerable populations. Below is a non-exhaustive list of elements of flamenco I argue are ballistic in nature:

*Palmas:*

*Palmas* is hand percussion, and arguably the most important part of the flamenco *cuadro*. The *cuadro* consists of a singer, a guitarist, a hand-percussionist, and a dancer. When keeping fast time, a specific sound quality is required. It is a clear, sharp, piercing sound that can cut through all of the other sounds happening on stage. All of the other musicians depend on the hand percussionist to keep everyone in time. This sound quality can only be achieved by hitting the fingers against the palm in a certain way, while having the skin of the palm being struck at a certain level of tautness, much like a drum-skin. There really is only one way to achieve this sound, and it requires extreme precision at a very fast speed.

*Llamadas*

A *llamada* is a two or more measure long phrase that signals a change. If a dancer does a *llamada*, the other musicians know the next section of the dance is coming. Usually, depending on the structure of the song, a *llamada* is calling in *letra*, or verse. The timing of the *llamada* and the *cantaor's* subsequent entrance are very specific. It is almost as if the dancer is throwing something to the singer through the timing of the rhythm.

For example, in an *Alegrias llamada*, which is a song form done in a 12/12 time signature, in a major key, starts on the 1 count of the measure and should usually end on the 10 of the last measure. The dancer is responsible for ending on time, at which point the singer takes over and begins his or her verse on the 1, usually, of the next measure, and sets up a web of song on which the dancer moves. This can't be done if the dancer and the singer are not precise with their timing in how they communicate with each other.

### *Remates*

A *remate* is the end of something. It is a footwork phrase that is usually one or more measures, that can be used for a variety of functions. For example, it can be used to close a phrase, or it can be used to answer a line in a verse. Your *remate* has to be clear, or it won't read to the musicians. All musicians (including dancers) ideally will finish a *remate* at the same time. I think that the end of the *remate*, both physically and rhythmically, resemble ballistic activity, and the subsequent reward of *jaleo* that usually happens after a *remate* is similar to the cheering that happens after a good dart throw.

### *Footwork*

Rhythmically, precision in footwork is one of the most important aspects of flamenco. However, to achieve not only precision but tonal quality, where the foot hits (both the part of the foot, and where it hits on the floor) depends on accurate planning on account of lots of other leg and core muscles.

### *Rhythm*

Rhythm is arguably one of the most important aspects of flamenco. Flamenco is based around rhythm, and getting out of rhythm makes it difficult to succeed during its execution. This is not unlike other dance forms, however, the rhythms in flamenco can be

very dense and specific and require a lot of training, focus, and attention to execute well.

This includes the need for precision of timing and sequencing of the body in order to execute that timing.

## Conclusion

I know now that I was responding to the fear that accompanies flamenco with a fear of death response. I was moving like I was trying to escape, which is, for example, a form of expansion. If you are trapped, you are trying to expand your space with a lot of effort, that is an effort to not die. In the *Soleá*, I was instructed to expand. However, because the expansion was not a life or death need, it could be executed in a different way, replacing the escape expansion with a flamenco expansion. An expansion that brings with it gentleness and reward. This is an example of a negative cognition being replaced by a positive cognition through the daily practice of flamenco.

The muscle memory of expansion that holds fear of death can slowly be replaced with a muscle memory of expansion that is non-life threatening and rewarding. Flamenco is scary, but the consequences of this fear are non-life threatening. It is non-life threatening fear with built-in support, reward, and bilateral stimulation. If your “threat to life” responses are being re-associated on a regular basis with flamenco responses, slowly, like polishing stone, flamenco has the potential to be an asset for people who are working through PTSD.

When undertaking this research, I did not expect to encounter these issues, as I was only searching for ballistic movements in flamenco dance. What I found was a multi-faceted experiential and communal process that has elements of ritual, EMDR, and ballistic activity that all affect brain function in, not only a positive way, but in the specific ways that counter the degenerative effects of trauma and PTSD on the brain, body, and subsequently, the community in which it exists.

This thesis begins a discussion on the possibility of flamenco as a tool for surviving and living with PTSD in a way that gives patients a higher quality of life. PTSD is a serious illness that claims the lives of its sufferers in many ways. If flamenco is a site for traumatic responses and mediations through bilateral stimulation, ballistic activity, and a reward-based system, then flamenco can restore the brain, set-up new positive habits and cognitions, and replace the fear circuits set up by traumatic experiences. Further research would consist of replicating brain imaging studies referenced in this thesis on flamenco practitioners to study the effect of flamenco practice on the brain. It would also include studying the effectiveness of flamenco in restoring brain function and memory processing and reducing over-all symptoms of PTSD in comparison with other treatments, such as EMDR.

In further research, it might also be important to look at flamenco as, not only a site for healing and survival of individual trauma, but as a site for traumatic witnessing, recall, and response through the call and response that exists between the singer singing verses and the dancer responding to them with rapid and intense footwork. In many cases, the dancer interrupts the verse with footwork, as a response to the song. The songs often, although not always, deal with serious subjects such as death, prison, lost love, persecution, and other types of suffering. It would be beneficial to explore this specific relationship to study its comparison with the idea of traumatic memory recall while undergoing bilateral stimulation as in EMDR.

Through singing flamenco *letras* and receiving bodily transmissions of movement, flamenco may serve as a site for witnessing. Through the song, the body, and flamenco's communal nature, it contains the three types of witnessing outlined by Dori

Laub (61-74): being a witness to one's self, being a witness to the testimony of others, and being a witness to the process of witnessing one's self. This is very much like the process of EMDR, and what goes on between patient and doctor, as well as within the patient. Flamenco *letras* and flamenco movement are how flamenco shares and passes down the experiences of the community, traumatic or otherwise.

The creation of the *soleá* as an investigation into the trauma-combatting aspects of flamenco has only just begun as one person's individual experience with PTSD, EMDR, and flamenco. Other studies on performance blocks and EMDR, and PTSD and EMDR have used different types of brain imaging studies to record the progress and effects of EMDR in a concrete way that goes beyond self-reporting, and this type of study is the next phase of research in identifying flamenco as a therapeutic activity for those suffering from severe PTSD.

PTSD is our body's natural response to a life-threatening situation. Repeated exposure to life-threatening situations compromises the brain's ability to mediate between real and perceived threats, creating a habitual fear circuit in the brain that is activated on a regular basis, causing many detrimental effects to the brain, body, and nervous system. I propose that flamenco, as a daily practice, holds within it multiple inherent components that replace the habitual fear circuit, help to reduce the severity of flashbacks, replace negative thoughts and sensations with positive thoughts and sensations, and strengthen certain parts of the brain thought to be weakened or atrophied by PTSD.

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