

The Rhythm of Resilience

A Deep Ecology of Entangled Relationality

Karen Hopenwasser

There's something happening here
What it is ain't exactly clear.
(Stephen Stills 1967)

Something happens between us, between clinician and patient, something happens over time in treatment that takes such great effort to describe. Sometimes we do not even know that this is a particular experience to be described. The felt sense of trauma resonates through generations. Each of us brings into the therapeutic process memories that have fallen off the arrow of time; memories from our individual histories, embodied and dissociated memories from parents, grandparents, great-grandparents.

The brilliantly talented, deaf percussionist Evelyn Glennie so beautifully states that to truly listen we must use our bodies as resonating chambers (Glennie 2007). But because our bodies *are* resonating chambers, we are always listening, with, or without, cognitive awareness. Intergenerational transmission of traumatic experience tells the story of information flow through our bodies which themselves are embedded in a resonant world.

The stories that we hear and the stories that we feel shape a narrative history each one of us carries through life. Hidden within this narrative history is an epigenetic transformation of our selves. From generation to generation stress alters the very expression of our genes, so that ultimately it is possible to inherit the consequences of trauma without any stories, without conscious awareness of what came before.

Understanding just a bit about the biophysics of communication and the molecular chemistry of epigenetics offers us an opportunity to listen beyond words. Translation from the biophysics of what we perceive to the cognitive meaning of what we know remains tricky and for that reason I hold as a mantra a byte from the poet Muriel Rukeyser:

Time comes into it.
Say it. Say it.
The universe is made of stories,
not of atoms.
(“The Speed of Darkness”)

Storytelling Without the Words to Say It

In our clinical work it is a challenge to hold in our minds an awareness of information that is dissociated and discontinuous (Bromberg 1998, 2006, 2011). It is even more difficult to hold in awareness information that is known through a felt sense, or a feeling state, that is not cognitively connected to the story (Hopenwasser 2008). I grew up in a family where the stories began in 1910 or 1915. The top layer of felt sense was as if life began in the new world and the life left behind never happened. But I have found clues to deeper, discontinuous layers of felt sense. I will share a personal experience of storytelling that was both discontinuous and traumatizing and will compare that experience with a kind of storytelling that is healing and builds resilience.¹

When I was as a young child, my mother told me the story of her arrival in New York. She was born in Montreal, where her family had settled at the turn of the twentieth century. History tells me her parents were running from repression and the impending pogroms in Kishinev, Russia, though I would never have known that on her account. As a five-year-old French- and Yiddish-speaking child she arrived illegally across the border from Canada into New York, a time when it was not so difficult to enter the United States illegally. The story told once, was that in the car, hiding in the “boot” was my Uncle Dave. I don’t remember why he had to be hidden and not my mother, or why he would not have been easily found. I just remember that is how they came to the United States. It never occurred to me to question the story. Really? Immigrants with limited means driving a car from Canada in 1920? Years later when I asked again about this the story was brushed aside. Not exactly denied. More like I don’t remember.

While my father was a lively raconteur, mostly tales of his adventures riding the rails as a young man during the depression, my mother said nothing about her childhood. Her father died on my fourth birthday and her mother was gone by the time I was eight. It never occurred to me,

growing up, to notice that there were no stories about her childhood being told.

For me it was a different kind of storytelling that left a footprint on my psyche. My mother was anxious and claustrophobic. By the time I could remember much she was depressed and would often fall asleep reading on the couch. Even though she was an avid reader, I do not have any memory of her reading to me. It was my intellectually precocious much older brother who would come each night and read to me – sometimes the age-appropriate stories of Lewis Carroll, often the less appropriate Sir Arthur Conan Doyle’s Sherlock Holmes and even less appropriate stories and poems of Edgar Allen Poe. This must have been the first words I heard of “The Tell Tale Heart”:

TRUE! – nervous – very, very dreadfully nervous I had been
and am; but why *will* you say that I am mad? The disease
had sharpened my senses – not destroyed – not dulled them.
Above all was the sense of hearing acute. I heard all things in
the heaven and in the earth. I heard many things in hell.
How, then, am I mad? Hearken! and observe how
healthily – how calmly I can tell you the whole story.

And then the end:

“Villains!” I shrieked, “dissemble no more! I admit the deed! – tear
up the planks! here, here! – It is the beating of his hideous heart!”

My recall suggests that I was too young to understand all the words being read. But I have a felt sense memory of fear. I can see in my child mind an image of a heart beating under the floor boards (which I remember as being in the wall) conflated with the sound of another Poe creation, “The Bells”:

The tintinnabulation of the bells, bells, bells, . . .
Oh, the bells, bells, bells!
What a tale their terror tells
Of Despair!

These nighttime tales were my first lesson about the power of storytelling in the lives of children.

I will probably never get to know more details of my mother's early life, as she died before I realized this was something I needed to know. And while it remains conjecture, I will also continue to believe that my older brother's fascination with the macabre was somehow a manifestation of a dissociated inheritance. I watched my brother pass this sensibility on to his children, while I took the opposite route of, at first avoidance (oh how I despise the writings of Poe) and then, processing this particular felt sense within a trauma wise psychoanalytic psychotherapy.

The Rhythm of Identity

The rhythms of life churn us like a great sea churns under a rising full moon.

(Roberta Hill (Oneida poet) 1998, p. 73)

For many families, stories pass down from generation to generation locking in a narrative that may or may not be accurate, but serve to heal, comfort or build a sense of community. Native American poet Luci Tapahonso tells the story of a brutal, failed, forced assimilation of Navajo people in New Mexico from 1864 to 1868 in her poem "In 1864". It is a narrative poem that tells the story of telling stories about remembering.

My aunt always started the story saying, "you are here because of what happened to your great-grandmother long ago".

(Tapahonso 1993, p. 7)

And Native American poet Simon Ortiz, in his story/poem, "Time as Memory as Story", writes about the movement of memory through time and compares the felt sense of either time standing still or the passage of time as if it were a trek toward finding oneself (Ortiz 2002).

In a European postmodern view of trauma and time, Pat Barker, in her novel, *Another World*, tells the story of three generations of trauma in a British family. She compares the passage of time to the flow of blood and describes how trauma causes coagulation, ultimately stopping the flow (Barker 1999).

Extreme traumatic experience in childhood has a profound impact on an individual's embodied, neurophysiologic processing of time. While each day our body ages, never defeating death, neurophysiologically we

seem to function more like a quantum computer, with the strange “spooky action” of entanglement and a posttraumatic difficulty distinguishing between past, present and future.

One of the hallmarks of posttraumatic adaptation is the belief that what happened in the past will happen in the future. And one of the hallmarks of dissociative adaptation is the belief that what happened in the past will happen in the future even when there is no narrative memory of what actually happened.

(Hopenwasser 2009, p. 72)

Even when there is little or no narrative memory of past trauma often the next generations carry this belief that what happened in the past will happen in the future.

I first understood how we can learn about this fragmentation of the lived past through poetry and fiction while reading Ann Michaels’ poetic novel, *Fugitive Pieces*, a fictional memoir of a holocaust survivor poet. In the first pages of *Fugitive Pieces* we are swallowed by the tale of a Polish boy hiding in a bog. He had witnessed through sound, hiding behind the wallpaper in a cupboard, Nazi soldiers murder his parents and drag away his 15-year-old sister. The boy is wrapped in darkness and filled with the sound of this overwhelming trauma. Later in the novel Michaels writes in her poetic voice how the dead entered into those who were forced to dig mass graves. Like Pat Barker she describes the flow into their blood streams and through them into future generations (Michaels 1997).

What Michaels writes as poetic metaphor is actually more than metaphor and near truth. Our stressful, traumatic experiences in childhood actually alter gene expression (through a process called DNA methylation) which is then transmitted onto future generations (Dietz et al. 2011; Malan-Muller et al. 2014; Skelton et al. 2012; van der Knapp et al. 2014). It has been shown that the offspring of male mice exposed to early traumatic experience show behavioral changes similar to those in the parent mice. This is thought to be secondary to changes in non-coding RNAs (Gapp et al. 2014). And recent research on the glucocorticoid receptor gene in children of Holocaust survivors reveals that paternal PTSD leads to hypermethylation while maternal PTSD has the opposite effect (Yehuda et al. 2014) with implication for differential symptomatology of PTSD, dissociation and depression. Chronic activation

of stress hormones alter protein synthesis and so memorialize our traumas within our bodies.

Sometimes, storytelling serves not to remember, but the purpose of forgetting. Gabriele Schwab, who grew up in West Germany post WWII, describes being told the dissociated stories of horrible war trauma, only later to realize the purpose of these stories to camouflage a profound very personal trauma. She writes:

As a child I thus became the silent witness to these war stories, the one not allowed to ask questions or interrupt the flow of words. Yet I became much more. I became an empty vessel to hold a deeper terror that remained untold, a silence covered by words, a history condemned to secrecy, a deadly guilt and mute shame handed down as shards of splintered affect.

(Schwab 2010, p. 43)

If our bodies are in fact a resonant chamber, this sense of empty vessel is a disavowal of her inherited trauma, an attempt to make it not me. She goes on to say:

Yet, even as a child, I picked up on something amiss in these stories. That, more than anything else, left me confused. It was as if the words themselves were emptied of the very feelings invoked in me when I was confronted with the facts of horror. It was not that the stories were devoid of emotions but rather that words and emotions did not quite fit together; words echoed falsely. Children have a sense of this discrepancy but do not understand it. Today, I am convinced that I picked up on something untold, silenced, violently cut out. At the time, I was just confused and mortified by a silent terror that lay under the surface of what was told. It upset my trust in words, I think, as well as my sense of attunement. It complicated how I related to those I was supposed to trust, my parents and my grandmother. Words could be split into what they said and what they did not say.

(p. 43)

The key word here is attunement. What is the difference between a healing, reparative storytelling and this more dissociated transmission of

horror? Perhaps the difference is the relation of embodiment and environment. Perhaps the difference can be found in the rhythmic and resonant flow of memory between past and future. While Schwab is recognizing that “[w]ords could be split into what they said and what they did not say” we can also recognize that both cognitive and affective information is also transmitted without words. Information flows through deeply ecological and embodied processes shaping which storytelling fosters resiliency and which re-traumatize.

We are born into rhythm and music, we communicate through rhythm and music and we heal through rhythm and music. As W.E. Du Bois wrote about the precursor to the sorrow songs of slavery:

The child sang it to his children and they to their children’s children, and so two hundred years it has travelled down to us and we sing it to our children, knowing as little as our fathers what its words may mean, but knowing well the meaning of its music.

(1909/2012, p. 120)

Music (song) moves through time. It is the flow of knowing from generation to generation. It is the anti-coagulant for terrible events that stop the flow of time in our minds. It is both words and the music itself that carries information from generation to generation. And it is the experience of music and rhythm in a relational context that offers the possibilities of healing and builds resilience. Gratier and Trevarthan “have identified the motives and emotions for culture in narratives of mother–infant vocal interaction” and believe “that writing the story of life needs the sense of belonging to a community and that this is vital for well being” (2008, p. 151). From the very start in life the resonance of rhythmic pulse embeds us within a relational universe. And as we develop through childhood it is the coherence of rhythmic neuronal oscillations multiplexing in the brain that allows us each a sense of continuity in our personal identity (Watrous et al. 2013). When trauma disrupts this coherence, fragments of memory fall off the arrow of time. What happened then, years ago, is happening now. And in ways that are so difficult to understand, what happened a century ago is also still happening now.

Our minds and bodies are rhythmic entities that resonate within nesting hierarchies of dyads, families, communities, cultures and an ecosphere. I stop short of saying the Universe, because that would slip into a

spiritual realm to which I allude but goes beyond the scope of this chapter. What a challenge to separate sound and vibration from spirituality. This is very much illuminated in the teachings of the very early twentieth century Sufi Master Hazrat Inayat Khan, who equates all vibration as music, who has said: “Rhythm is life disguised in motion” and that “time is the rhythm that is in the whole universe” (1991, p. 151). Spiritual resonance through generations of storytelling can be found in the deeply spiritual poetry of Lucille Clifton, who traced her ancestry through slavery in Virginia to the African kingdom of Dahomey, a region known for its female warriors and writes:

in populated air
 our ancestors continue
 i have seen them.
 i have heard
 their shimmering voices
 singing.
 (“Two-Headed Woman”)

It is through sound and music that I have come to understand the biology of resilience. Sound (or the resonant feel of sound) and rhythm are what give us strength and continuity in the face of fragmenting violence. It is the congregation singing in synchrony while worshiping or mourning, in the aim of healing. It is the platoon singing and marching together in time, in the aim of destroying disguised as protecting (McNeill 1995).

Early in the film *12 Years a Slave*, based upon the life of Solomon Northup, we see Northup’s intense emotional struggle with his loss of freedom. Standing at a graveside with other slaves, we watch him listening but resisting participation in the song “Roll Jordan Roll”. Slowly the song rises up from within him until we see him sing forcefully in unison with the others. At that moment we can appreciate the power of communal voices in building resilience and supporting survival. Elsewhere in the film we see the same impact of humming – fostering resilience and survival. The musical complexity of this film addresses the dialectics of slave songs as both resistance and “imagined reconciliation” (Powers 2013).

How ironic that song and rhythm are not more appreciated in our psychoanalytic work with adults, that we are in a way constrained by language and silence. Anything else would break a frame, whatever variation

of frame you chose. Though of course, this frame is broken anyway. Look at the work of Haidee Faimberg. Despite her strict adherence to a particular language, she describes how there is always another frame, one not noticed, not seen. She may choose not to use the terms trauma, or dissociation, or transgenerational, but she knows there is transmission of information going unspoken. She knows to listen to the listening, which means to use awareness for the knowing of the embodied and embedded (Faimberg 1988).

In recent years there has been increasing interest in the rhythmic pulse of therapeutic interaction (Nebbiosi & Nebbiosi 2007; Knoblauch 2011) but in psychotherapeutic work we seem to have forgotten one of the most powerful tools available: the management of pain through rhythm and sound. How complicated it might be if we brought song into the treatment. Perhaps too close, too intimate for comfort. At least for me too close for comfort.

I have never sung a song with even my most traumatized patients, and instead choose to use a Tibetan singing bowl to do the singing. It works extremely well without the feeling of boundary loss that singing together might create. The sound is balancing for the autonomic nervous system, soothing for all but the very most severely traumatized and the feeling of its vibration can facilitate a biological integration that has to be experienced to appreciate fully. In an exploration of the neurobiological nature of feelings, Damasio and Carvalho describe the evolutionary and neurobiological origins of feelings. They make a cogent argument for feelings as an emergent property for adaptation and survival. They present a view that the “felt experience” predates the evolution of humans and that much of the felt sense comes from a synchronization of pulses traveling in the body, not necessarily through direct neuronal synaptic pathways with which we are most familiar, but instead through something called ephaptic transmission, an electrochemical flow leaking between cells (Damasio & Carvalho 2013). When I use my Tibetan singing bowl I am also thinking about this ephaptic resonant pulsation. Used at the right moment, the singing bowl facilitates not just the integration of felt sense with cognitive coherence but also facilitates the entrainment of two humans pulsing together in an empathically shared felt sense.

The singing bowl does not distinguish between therapist and patient. The sound permeates and envelopes. Just as Solomon Northup was drawn into the shared energy of singing a spiritual, we are pulled into a vibrational

sphere that quietly communicates a shared vulnerability as well as strength. No words are needed. How powerful that can be when the anguish of trauma obliterates the words to say it.

If we are going to understand ourselves as embodied, embedded cognitive process with a felt sense of suffering, then we need to expand our concepts of transference and countertransference to include an embodied ecology. Biophysicists Farnsworth, Nelson and Gershenson state: “that life is an informational phenomenon, at every level of organization, from molecules to the global ecological system ... living is information processing, in which memory is maintained by both molecular states and ecological states” (2013, p. 203). In clinical work with traumatized patients and their descendants, dissociative attunement² becomes an emergent phenomenon, a frame not noticed, and a communication of information that is known through a dissociated process that can be experienced as intuition.

The Deep Ecology of Entangled Relationality

We don't always talk about dissociation when we talk about trauma, but neurobiologically, discontinuous bits of traumatic memory are inherently dissociated. And dissociation is a concept that leads us into complexity, the non-linear dynamics of information flow. For some it is a large leap from storytelling to complexity theory, but we cannot understand inter-generational transmission of trauma without expanding our knowledge base to neurophysics and perhaps even more broadly, to biophysics and deep ecology.³ Our appreciation of relationality is tied to the emergence of non-linear dynamics as it interweaves with phenomenology. From our earliest moments in life we are a biological system nested within larger systems. Sander writes in his exquisite integration of non-linear dynamics with developmental theory: “The living system is a symphony of biorhythmic systems within systems” (2002, p. 22). These biorhythmic systems, from cells, to neural networks, to the emergent property of mind are the essence of the deep continuity of mind and life (Thompson 2010).

Florence Chiew asks, in “Neuroplasticity as an Ecology of Mind: ‘Where does the Neurobiological End and the Sociopolitical Begin?’” (2012). She reminds us of the work of Gregory Bateson, his understanding that “the mind is an ecological ‘tangle’”; tangle, taken from the mathematics of Bertrand Russell and Alfred North Whitehead. To understand

the flow of traumatic, embodied information through generations, we might need to understand entangled, a quantum physics term taken from the work of Schrodinger, Einstein, David Bohm, John Steward Bell, et al. Quantum entanglement, a phenomenon Einstein called “spooky action at a distance” refers to information that is non-local, information transmitted and experienced simultaneously despite physical separation. Yes, Einstein, Bohm and Bell are referring to nuclear particles, such as electrons. But current discussions on quantum entanglement extend to macroscopic systems (Vedral 2008), physical, biological and social, and have emerged in what is called quantum information theory. The philosophical meaning of this is that over time information becomes increasingly diffuse but never disappears. Anyone wanting to know more about quantum information flow can look at the work of physicist Sean Carroll (2010), who offers an accessible discussion of memory, quantum physics and the arrow of time. While the most speculative application of quantum computation concepts to the brain, literally to brain matter, is the proposal that microtubules (resonating cytoskeletal proteins) are a physiological substrate of consciousness (Hameroff & Watt 1982; Hameroff & Penrose 1996), less controversial applications are growing in the cognitive sciences (Wang et al. 2013; Loewenstein 2013).

It is at the intersection of physics and the sociopolitical that we find complexity, the self-organizing systems of an ecosphere. From our anthropocentric view we are primarily concerned about how *we* humans feel, how *we* humans think, how *we* humans know. But we humans remain embedded in an ecosphere within which we evolved. The Georgian ethnomusicologist Joseph Jordania traces the evolutionary importance of humming (song without words), comparing its function to that of the bird’s sentinel song (a form of communication that the moment is safe) as well as a means for managing fear and anxiety (Jordania 2010). We hum when we feel well. We hum when we need to feel better. And we hum when the silence of helplessness would otherwise be lethal. The precursor of sorrow songs, in the various languages of enslaved Africans, evolved into the sorrow songs of slavery, the gospel, blues, the jazz of postbellum America and the freedom songs of the American Civil Rights Movement. Freedom Singer Bernice Johnson Reagon says: “When we sing, we announce our existence”... “Singing is running this sound through your body. You cannot sing a song and not change your condition”.

The sorrow songs of slaves incorporated West African polyrhythmic call and response patterns into secular and religious spirituals that were complex expressions. These were work songs, songs of protest, and songs encoded with secret messages (Wright 2006). As Frederick Douglass described in his writings, “A keen observer might have detected in our repeated singing . . . something more than the hope of reaching heaven. We meant to reach the *north* – and the north was our Canaan” (Douglass 1994, p. 308).

In Haiti, the unique evolution of voodoo cult songs were instrumental in the organization and execution of the only fully successful revolution against slavery, which was launched through the Bois Caïman ceremony in 1791. In Brazil, where nearly 40 percent of African slaves disembarked, and the last place in the Americas to abolish slavery (on May 13, 1888), the *jongo*, an African-based dance/song ritual also served a similarly complex purpose and now represents an intergenerational movement in Brazil. It has been said about the *jongo* that

those who recorded the *jongo* during the nineteenth century failed to grasp what these slave meetings really entailed, that is, oral histories versified in music containing the ironic criticisms of their masters, mistresses, and foremen; internal disputes; reverence for the past, and respect for Africans and their ancestors. Proverbs, metaphorical images, and coded messages were neither perceived nor mentioned by travelers.

(Mattos & Abreu 2013, p. 80)

And through both protest song and jazz one finds the web of sound linking the American civil rights movement with the South African anti-apartheid movement, in the jazz of Hugh Masekela and the songs of Miriam Makeba and the evocative motif of Max Roach and Oscar Brown’s 1960 collaboration *We Insist! – Max Roach’s Freedom Now Suite*.⁴

The Dialectical Relationship of Memory and Resilience

For me the memory of frightful stories at bedtime mingle with the memory of my mother’s love of music – the Saturday afternoon opera on the radio, the Beethoven symphonies and the voice of Paul Robeson

singing the Negro Spiritual, “Sometimes I Feel Like a Motherless Child”. Along with the felt sense of Edgar Allen Poe, I remember the felt sense of this sorrowful song. Too young to understand the metaphor within, I experienced a literal resonance. Sometimes I felt like a motherless child. And sometimes I felt like music was my mother. This was my own experience of resilience born from within vulnerability and in that dialectic lay the seeds of empathy and joy. For most people this dialectic is dependent upon acceptance into and participation in a community. For some people this requires a *de novo* creation of community.⁵

When we use our own personal narratives to understand the reverberations of pogroms, holocausts, middle passage, colonial oppression, the tyranny of fascism, we do not always find the sameness in our differences. Storytelling does not always bring us together. With few exceptions (there are some significant cultural differences in tonal systems), music and rhythm seem to be a universal language of healing. As psychologist and infant researcher Colwyn Trevarthan says:

[m]usic is therapeutic in a more fundamental way than talk because it attunes to the essential efforts that the mind makes to regulate the body in both its inner processes and in its purposeful engagements with the objects of the world. It is also a direct way of engaging the human need to be sympathised [*sic*] with – to have what is going on inside appreciated by another who may give aid and encouragement.

(Trevarthan 1999–2000, p. 198)

The sound and rhythm of drumming, humming, shouting and dancing together entrains us as a group. This entrainment, or synchronization of biological rhythms, boosts our immune system, improves heart rate variability and can create a trance-like sense of well-being. While the felt sense of well-being may be transient, the physiological changes over time are persistent. Studies in neonatal intensive care units show the sustained, positive impact of live music not seen when the music played is a recording (Arnon et al. 2006; Gilad & Arnon 2010). We need living, breathing social contact to entrain and that is one reason why social support boosts resilience. When I use the Tibetan singing bowl in my office with a patient I am facilitating entrainment. And perhaps in our clinical work, as our bodies entrain in a psychotherapeutic rhythm, we are having an epigenetic impact for generations to come.

Notes

- 1 The term resilience has become something of a buzzword. The American Psychological Association brochure on resilience states,

Resilience is the process of adapting well in the face of adversity, trauma, tragedy, threats or significant sources of stress – such as family and relationship problems, serious health problems or workplace and financial stressors. It means “bouncing back” from difficult experiences. Research has shown that resilience is ordinary, not extraordinary. People commonly demonstrate resilience.

(www.apa.org/helpcenter/road-resilience.aspx)

However, resilience is not simply about bouncing back. In a world challenged by deforestation, water scarcity and overpopulation, resilience has become a way of thinking about the biosphere. The Stockholm Resilience Center defines resilience as

The capacity of a system – be it a forest, city or economy – to deal with change and continue to develop; withstanding shocks and disturbances (such as climate change or financial crises) and using such events to catalyse renewal and innovation.

(www.stockholmresilience.org/download/18.10119fc11455d3c557d6d21/1398172490555/SU_SRC_whatresilience_sidaApril2014.pdf)

It is this concept of renewal and innovation that feels most relevant to the intergenerational transmission of trauma and resilience.

- 2 “Dissociative attunement is another way of talking about conscious, unconscious, embodied and embedded flow of information, addressing the physiological, neurobiological and mental synchronization of information processing within the therapeutic dyad” (Hopenwasser, 2016).
- 3 Deep Ecology is a term associated with the Norwegian philosopher Arnie Næss, referring to the interrelatedness of all systems on Earth as well as a belief that anthropocentrism is misguided. The concepts of deep ecology are well covered by Fritjof Capra in *The Web of Life: A New Scientific Understanding of Living Systems*.
- 4 In *We Insist!* the album opens with “Driva Man”, in which Abby Lincoln sings a tale of slavery with tambourine and then rimshot starkly marking the sound of the whip. In “Triptych: Prayer, Protest, Peace”, Lincoln sings a wordless song including shouting and screaming and humming. The final track, “Tears for Johannesburg”, was written in response to the famed Sharpeville massacre in South Africa in 1960.
- 5 For example, Sidiki Conde, a Guinean born paraplegic drummer and dancer, along with other disabled performers, founded *Message de Espior* (The Message of Hope) in Conakry the capital city of Guinea. He is the subject of a documentary film, *You Don't Need Feet to Dance*.

References

- Arnon, S., Shapsa, A., Forman, L., Regev, R., Bauer, S., Litmanovitz, I. & Dolfin, T. (2006) Live Music is Beneficial to Preterm Infants in the Neonatal Intensive Care Unit Environment, *Birth*, 33(2), pp. 131–136.
- Barker, P. (1999) *Another World*, New York: Farrar Straus Giroux.
- Bromberg, P. (1998) *Standing in the Spaces*, London: Routledge.
- Bromberg, P. (2006) *Awakening the Dreamer*, London: Routledge.
- Bromberg, P. (2011) *The Shadow of the Tsunami*, London: Routledge.
- Capra, F. (1997) *The Web of Life: A New Scientific Understanding of Living Systems*, Norwall, MA: Anchor.

- Carroll, S. (2010) *From Eternity to Here: The Quest for the Ultimate Theory of Time*, Boston, MA: Dutton Adult.
- Chiew, F. (2012) Neuroplasticity as an Ecology of Mind, *Journal of Consciousness Studies*, 19(11–12), pp. 32–54.
- Clifton, L. (1980) *two-headed woman*, Amherst, MA: University of Massachusetts Press.
- Damasio, A., Carvalho, G.B. (2013) The Nature of Feelings: Evolutionary and Neurobiological Origins, *Nature Reviews Neuroscience*, 14, p. 149.
- Dietz, D.M., LaPlan, Q., Watts, E.L., Hodes, G.E., Russo, S.J., Feng, J., Oosting, R.S., Vialou, V., Nestler, E.J. (2011) Paternal Transmission of Stress-Induced Pathologies, *Biological Psychiatry*, 70, pp. 408–414.
- Douglass, F. (1994) *Autobiographies: Narrative of the Life of Frederick Douglass, an American Slave/My Bondage and My Freedom/Life and Times of Frederick Douglass Henry Louis Gates*, New York: ed. Library of America.
- Du Bois, W.E. (2012) *The Souls of Black Folk*, digireads.com.
- Faimberg, H. (1988) The Telescoping of Generations: Genealogy of Certain Identifications, *Contemporary Psychoanalysis*, 24(1), pp. 99–118.
- Farnsworth, K.D., Nelson, J., Gershenson, C. (2013) Living is Information Processing, from Molecules to Global Systems, *Acta Biotheoretica*, 61(2), pp. 203–222.
- Gapp, K., Jawaid, A., Sarkies, P., Bohacek, J., Pelczar, P., Prados, J., Farinelli, L., Miska, E., Mansuy, I.M. (2014) Implication of Sperm RNAs in Transgenerational Inheritance of the Effects of Early Trauma in Mice, *Nature Neuroscience*, 17, pp. 667–669.
- Gilad, E., Arnon, S. (2010) The Role of Live Music and Singing as a Stress-Reducing Modality in the Neonatal Intensive Care Unit Environment, *Music and Medicine*, 2(1), pp. 18–22.
- Glennie, E. (2007) www.ted.com/talks/evelyn_glennie_shows_how_to_listen.
- Gratier, M., Trevarthan, C. (2008) Musical Narrative and Motives for Culture in Mother–Infant Vocal Interaction, *Journal of Consciousness Studies*, 15(10–11), pp. 122–158.
- Hameroff, S., Marcer, P. (1998) Quantum Computation in Brain Microtubules? The Penrose–Hameroff “Orch OR” Model of Consciousness, *Philosophical Transactions: Mathematical, Physical and Engineering Sciences*, 356(1743), Quantum Computation: Theory and Experiment, pp. 1869–1896.
- Hameroff, S., Penrose, R. (1996) Orchestrated Reduction of Quantum Coherence in Brain Microtubules: A Model for Consciousness, *Mathematics and Computers in Simulation*, 40(3), pp. 453–480.
- Hameroff, S., Watt, R. (1982) Information Processing in Microtubules, *Journal of Theoretical Biology*, 98, pp. 549–561.
- Hill, R. (1998) Immersed in Words, in Ortiz, S.J., *Speaking for the Generations: Native Writers on Writing*, Tucson, AZ: University of Arizona Press, pp. 73–91.
- Hopenwasser, K. (2008) Being in Rhythm: Dissociative Attunement in Therapeutic Process, *Journal of Trauma and Dissociation*, 9(3), pp. 349–367.
- Hopenwasser, K. (2009) Bearing the Unbearable: Meditations on Being in Rhythm, *Voices, The Journal of the American Academy of Psychotherapists*, 45(2), pp. 67–73.
- Hopenwasser, K. (2016) Dissociative Attunement in a Resonant World, in Howell, E., Itzkowitz, S., *Psychoanalysis and the Dissociative Mind*. Oxford: Routledge, pp. 175–186.
- Jordania, J. (2010) Music and Emotions: Humming in Human Prehistory, Proceedings of the International Symposium on Traditional Polyphony, held in Tbilisi, Georgia in

2008. International Research Center for Traditional Polyphony of Tbilisi State Conservatory.
- Kaufman, J., Herzog, A. (2006) *The Collected Poems of Muriel Rukeyser*, Pittsburgh, PA: University of Pittsburgh Press.
- Khan, H.I. (1996) *The Mysticism of Sound and Music*, Boulder, CO: Shambhala Press.
- Knoblauch, S.H. (2011) Contextualizing Attunement within the Polyrhythmic Weave: The Psychoanalytic Samba, *Psychoanalytic Dialogues*, 21, pp. 414–427.
- Loewenstein, W.R. (2013) *Physics in Mind: A Quantum View of the Brain*, New York: Basic Books.
- McNeill, W. (1995) *Keeping Together in Time: Dance and Drill in Human History*, Cambridge, MA: Harvard University Press.
- Malan-Muller, S., Seedat, S., Hemmings, S.M.J. (2014) Understanding Posttraumatic Stress Disorder: Insights from the Methylome, *Genes, Brain and Behavior*, 13, pp. 52–68.
- Mattos, H., Abreu, M. (2013) *Jongo*, Recalling History, in Monteiro, P.M. and Stone, M., *Cangoma Calling, Spirits and Rhythms of Freedom in Brazilian Jongo Slavery Songs*, www.laabst.net/.
- Michaels, A. (1997) *Fugitive Pieces*, New York: Alfred Knopf.
- Nebbiosi, G., Nebbiosi, F. (2007) “We” Got Rhythm: Miming and the Polyphony of Identity in Psychoanalysis, in Anderson, F., *Bodies in Treatment: The Unspoken Dimension*, London: Routledge, pp. 213–236.
- Ortiz, S.J. (2002) Time as Memory as Story, in *Out There Somewhere (Sun Tracks)*, Tucson, AZ: University of Arizona Press.
- Powers, A. (2013) NPR music blog, www.npr.org/blogs/therecord/2013/11/12/244851884/12-years-a-slave-is-this-years-best-film-about-music.
- Rukeyser, M. (2006) The Speed of Darkness, in *The Collected Poems of Muriel Rukeyser*, Pittsburgh, PA: University of Pittsburgh Press.
- Sander, L.W. (2002) Thinking Differently: Principles of Process in Living Systems and the Specificity of being Known, *Psychoanalytic Dialogues*, 12(1), pp. 11–42.
- Schwab, G. (2010) *Haunting Legacies: Violent Histories and Transgenerational Trauma*, New York: Columbia University Press.
- Skelton, K., Ressler, K.J., Norrholm, S.D., Jovanovic, T., Bradley-Davino, B. (2012) PTSD and Gene Variants: New Pathways and New Thinking, *Neuropharmacology*, 62, pp. 628–637.
- Tapahonso, L. (1993) *Sáanii Dahataati: The Women are Singing*, Tucson, AZ: University of Arizona Press.
- Thompson, E. (2010) *Mind in Life: Phenomenology and the Sciences of Mind*, Cambridge, MA: Belknap Press.
- Trevarthan, C. (1999–2000) Musicality and the Intrinsic Motive Pulse: Evidence from Human Psychobiology and Infant Communication, *Musicae Scientia*, Special Issue, pp. 155–215.
- van der Knaap, L.J., Riese, H., Hudziak, J.J., Verbiest, M.M., Verhulst, F.C., Oldehinkel, A.J., van Oort, F.V. (2014) Glucocorticoid Receptor Gene (NR3C1) Methylation following Stressful Events between Birth and Adolescence, *Translational Psychiatry*, 4, p. e381.
- Vedral, V. (2008) Quantifying Entanglement in Macroscopic Systems, *Nature*, 19 June, pp. 1004–1007.
- Wang, Z., Busemeyer, J.R., Atmanspacher, E.P. (2013) The Potential of Using Quantum Theory to Build Models of Cognition, *Topics in Cognitive Science*, 5, pp. 672–688.

- Watrous, A., Tandon, N., Conner, C.R., Pieters, T., Ekstrom, A.D. (2013) Frequency-Specific Network Connectivity Increases underlie Accurate Spatiotemporal Memory Retrieval, *Nature Neuroscience*, 16(3), pp. 349–356
- Wright, J. (2006) Songs of Remembrance, *Journal of African American History*, 91(4), pp. 413–424.
- Yehuda, R., Daskalakis, N.P., Lehrner, A., Desarnaud, F., Bader, H.N., Makotkine, I., Flory, J.D., Bierer, L.M., Meaney, M.J. (2014) Influences of Maternal and Paternal PTSD on Epigenetic Regulation of the Glucocorticoid Receptor Gene in Holocaust Survivor Offspring, *American Journal of Psychiatry*, 171, pp. 872–880.

Copyright information

- “For What It’s Worth”. Words and Music by Stephen Stills. Copyright © 1967 (Renewed) COTILLION MUSIC INC., TEN EAST MUSIC, SPRINGALO TOONES and RICHIE FURAY MUSIC. All Rights Administered by WARNER-TAMERLANE PUBLISHING CORP. All Rights Reserved. Used By Permission of ALFRED MUSIC.
- “The Speed of Darkness” by Muriel Rukeyser, Used by Permission. All rights reserved.
- From Sáanii Dahataal/The Women Are Singing: Poems and Stories by Luci Tapahonso. © 1993 Luci Tapahonso. Reprinted by permission of the University of Arizona Press.
- Copyright © 1980 by Lucille Clifton. Now appears in The Collected Poems of Lucille Clifton 1965–2010 by Lucille Clifton, published by BOA Editions. Reprinted by permission of Curtis Brown, Ltd.
- 1991 PBS program, THE SONGS ARE FREE, www.pbs.org/moyers/journal/11232007/profile3.html.