

## REMEMBRANCE AND RESILIENCE: HOW THE BODYSELF RESPONDS TO TRAUMA

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*Abstract.* How do the experiences of people who undergo extreme suffering and trauma in one generation get passed on to the next generation? And how do these experiences affect religious–spiritual beliefs and practices? Can we help to create resilience in these later generations through these religious–spiritual beliefs? In order to answer these questions, one must remember and understand not only how trauma is embodied and inherited, but also the role that religious beliefs and practices play in facing and overcoming the trauma. People who have experienced trauma can pass on the effects to subsequent generations biologically through epigenetic changes to their DNA, but also through their religious and spiritual beliefs and practices. The ways people remember and recover from trauma involve complex biological, psychosocial, and spiritual processes. We use the sciences of embodied cognition and epigenetics to analyze the heritability of trauma and its spiritual–religious manifestations in the next generations. Having done so, our hope is that we can understand how spiritual and religious practices can be developed to help people who undergo trauma so that they can become resilient and thrive.

*Keywords:* embodied and extended cognition; epigenetics; historical trauma; religious and spiritual practices; stress

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Anamnesis is the process of recalling past events that shape and empower the present. Physicians practice anamnesis when they listen to and help patients tell the stories of their bodies and the life events that may have affected their health. When Jews and Christians recall how God saves and heals

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those who have suffered great trauma, they draw on the biblical language of remembrance. For example, in Genesis 8:1 when the waters of the flood destroyed millions of humans and animals, God *remembered* Noah. Christian pastoral leaders recall the saving acts of God (anamnesis) and then during the Eucharistic liturgy create ways for the congregants to enter into and participate in the paschal mystery of faith. When the Body of Christ gathers to break bread and drink wine, they do so as they recall the suffering and passion of Christ with the words: “Do this in remembrance of me.” Recall and memory are physical processes that come to life when people remember through religious acts and practices in the present. How people acknowledge, remember, and recover from trauma and suffering is related to the way that mental processes are embodied and embedded in the human bodyself and environment (Hefner et al. 2015, 1–10). Memories are inherited, embodied, and passed on through spiritual and religious traditions, rituals, and beliefs. When people of different faith traditions remember and share their stories with one another, they encounter the sacred in salvific acts and practices that help them to face the effects of the trauma and to cultivate spiritual resilience.

We have described how during the liturgy and in the Bible Christians remember the past traumatic events of early Jews and Christians. However, people in every generation, including our own, experience extreme trauma. Therefore, we ask, how do the experiences of people who undergo extreme suffering and trauma in one generation get passed onto the next generation? And how do these experiences affect religious–spiritual beliefs and practices? Can we help to create resilience in these later generations through these religious–spiritual beliefs? In order to answer these questions, one must remember and understand not only how trauma is embodied and inherited, but also the role that religious beliefs and practices play in facing and overcoming the trauma. People who have experienced trauma can pass on the effects to subsequent generations biologically through epigenetic changes to their DNA, but also through their religious and spiritual beliefs and practices. The ways people remember and recover from trauma involve complex biological, psychosocial, and spiritual processes. We, the writers of this article, use the sciences of embodied cognition and epigenetics to analyze the heritability of trauma and its spiritual–religious manifestations in the next generations. Having done so, our hope is that we can understand how spiritual and religious practices can be developed to help people who undergo trauma so that they can become resilient and thrive.

#### EPIGENETICS AND EMBODIED COGNITION

Research from the scientific fields of epigenetics and embodied cognition suggests that the interactions between people and their environment are much more holistic and embodied than previously claimed by those who

worked in highly reductionist paradigms. Fraser Watts claims that biology is “emerging from a highly reductionist phase” (Watts 2013, 750). The future of biology resides in its exploration and interaction with “interacting systems” (Watts 2013, 750). To make his point, he explains that epigenetics is a good example of a field that recognizes that

There are important systemic mechanisms in which certain genes are involved but which are influenced by broader systemic processes. This makes old-fashioned genetic reductionism obsolete. More generally, the move toward organismic or systems biology puts the long-standing problems of reductionism in a new context, making them less vicious and problematic. Embodied cognition can be seen as part of that wider paradigm shift toward a more systemic biology. (Watts 2013, 750)

The science of epigenetics examines the expression or suppression of genes based on environmental exposures without changing the genetic code itself. One example of epigenetic changes due to environmental exposure is in smokers; particular genes are activated in a smoker’s lung that predispose that person to lung cancer (Vaz et al. 2017). Nutrition is also an important factor in epigenetics, and the effects of undernutrition can be passed on to subsequent generations if the person experiencing the nutritional deficit is a pregnant woman. During the Nazi occupation of the Netherlands during the winter of 1944, there was an extreme food shortage. The children born to women who were in their first trimester during the time of the food shortage were adversely affected, and had greater incidences of cardiovascular disease and obesity later in life (de Rooij et al. 2006). This was caused by changes to the epigenome of the fetus during development, and adversely affected the hormones that regulate metabolism—turning on genes that are critical for starvation-like environments. Later, when that same child is grown and living in a situation where food is abundant, the body’s metabolism is still in starvation mode because of the genes that had been turned on during development, and thus the body becomes very efficient at storing and using calories. Therefore, the person has a higher risk of becoming obese, and suffers from the related cardiovascular problems.

This wider paradigm shift to explain how physical processes operate in concert with the environment occurs also in the science and religion field in the works of theologian-scientists such as Arthur Peacocke (Peacocke 1993; Watts 2013, 750). Peacocke applied his categories of “top-down causation” or “whole-part constraint” to explain how God interacted in the natural world, particularly in humans (Peacocke 1993, 2007, 3). For Peacocke, the theological category of incarnation corresponds to the physical processes of embodiment in nature. God acts in, with, and under the world through natural and embodied ways (Peacocke 2007, 35–41). Likewise, Philip Hefner argues that grace inheres in nature, and that God’s incarnation in the world is a central theological category corresponding to the broader

explanation about physical processes from the biological sciences (Hefner et al. 2015, 136–51). This paradigm shift to an embodied, contextual, systemic, and holistic framework in both science and theology will help us explain how trauma is embodied and remembered.

The relationship between the mind/brain and body/self are ongoing philosophical, theological, and scientific problems. For example, to create a caricature of popular views of the mind–brain, we might imagine that the brain is the warehouse for the mind that floats independently inside. Or we might think that the self is a separate substance from the body, or that the body is external and the self as internal. In these views, we understand reason and memory as disembodied entities or activities that separate the mind from brain and the self from body. In contrast to these perspectives, the field of embodied cognition claims that the mind, body, and environment act as a complete cognitive system (Clark and Chalmers 1998). Andy Clark and David Chalmers explain: “We advocate a very different sort of externalism: an *active externalism*, based on the active role of the environment in driving cognitive processes” (Clark and Chalmers 1998, 7). Mental processes are not confined to the brain, or even to the body, but extend and are embodied in the contextual environment. This shapes the ways that we, the authors, explain and interpret how trauma is inherited and remembered. The notion that we are embodied selves is integral for both sciences.

#### BODYSSELVES

We argue that people are not selves separated from their bodies, or bodies separate from their minds: they are complete *bodyselves*. Hefner, Ann Pederson, and Susan Barreto reinforce this notion in *Our Bodies Are Selves*: “We want to make two points, however: (1) that the idea of separation is at odds with our wider scientific and religious understandings, and (2) if carried forward in certain exaggerated ways, separation thinking can close off important experience and insights, and it can be very destructive” (Hefner et al. 2015, 3). Not only are we bodyselves, but these bodyselves are subject to manipulation from outside and inside forces. This more holistic, embodied understanding of the bodyself doesn’t go against science, but it can be extended beyond science to philosophical, religious, and theological language. Hefner and colleagues, for example, argue that the Christian doctrine of the incarnation, of God in the flesh, fits well with this description of the bodyself. “Hence, we call this a *full-bodied* and *God-intoxicated* idea of nature” (Hefner et al. 2015, 145).

The concept of bodyself reminds us that when people are systematically traumatized and abused over a long time, the effects of the trauma create wounds for succeeding generations. “The bodyself is both a given and work-in-progress that has yet to be attained” (Hefner et al. 2015, 8).

Bessel van der Kolk, a leading trauma theorist, explains that these wounds are deep and lasting and our bodies remember: “The body keeps score. If the memory is encoded in viscera, in heartbreaking and gut-wrenching emotions, in autoimmune disorders and skeletal/muscular problems, and if mind/brain/visceral communication is the royal road to emotion regulation, this demands a radical shift in our therapeutic assumptions” (van der Kolk 2014, 86). We argue that the same radical shift must occur not only in therapeutic communities, but also in religious and spiritual assumptions about addressing the effects of trauma on the human person. These wounds go to the very heart of a person’s spiritual and religious beliefs and practices, and so, in order to heal from the wounds, the religious and spiritual dimensions of the trauma must be articulated and interpreted for healing to occur. Frasier Watts explains: “It is also worth noting that the importance of embodiment is assumed in religious practices, not just in religious thought. . . . If the assumptions of religious communities are to be found in what they do as much as in what they say, the importance attached to embodiment is very clear” (Watts 2013, 756). Religion and spirituality are not disembodied; they are practices, rituals, and beliefs that create living traditions passed on to succeeding generations.

#### THE HERITABILITY OF HISTORICAL TRAUMA

How is trauma passed on from one generation to another? And how does it affect the succeeding generations? Historical trauma is a term used in different disciplines to explain the devastating consequences of inherited abuse and suffering and is defined as “cumulative emotional and psychological wounding across generations, including the lifespan, which emanates from massive group trauma” (Brave Heart 2003; Brave Heart and DeBruyn 1998; Brave Heart et al. 2011, 282). We explore the effects of historical trauma not only on the emotional and physical health of a people (and individuals within a population) but also on an individual’s and a people’s psychological health as well as spiritual and religious beliefs. Traumatic events are “causal agents for health disparities or as mechanisms for transmitting trauma, and historical trauma responses (e.g., high rates of AOD [Alcohol and Other Drugs] abuse, depression, anxiety, chronic preventable diseases) as health outcomes” (Walters et al. 2011; Schultz et al. 2016, 22; see also Walters et al. 2011). Social class discrimination may also affect the epigenetic transmission of trauma. For example, Charles Dupras and Vardit Ravitsky conclude that “[r]ecent findings in epigenetics have been attracting much attention from social scientists and bioethicists because they reveal the molecular mechanisms by which exposure to socioenvironmental factors, such as pollutants and social injustice, can influence the expression of genes throughout life” (Dupras and Ravitsky 2016, 26). Poverty, race, gender, sexual orientation, religious affiliation, age, and other

factors may shape the ways people express their genetic inheritance and their religious beliefs and spiritual practices.

A growing body of scientific study suggests that the inheritance of trauma is passed on through disease and other health disparities. The onset and development of disease appears to be traceable not only through the blood of human bodies but also through the blood of the lands in which these bodies were born and to which they migrated. How is this different for more fluid and migrant religious and spiritual groups for whom landscape or place is no longer a central experience in their myth, ritual, or belief? The environmental factors that we explore in epigenetics and extended cognition will help to construct a new paradigm for healing from historical trauma. In this new paradigm, bodyselves can reconnect and remember their cultural and religious practices into a healing genealogy of hope. Stories about historical trauma may be inherited through bodies, the blood of ancestors, and the memories of family and communities. Geography, religion, and genetics influence the way that generations cope with and express the effects of historical trauma. Where and how we remember shapes what we remember. What we remember is not simply a product of our mind storing memories in the warehouse of our brain; instead it is an active process that involves our whole bodyself and its surrounding environment.

#### EMBODIED AND EXTENDED COGNITION: THE “WHERE” OF OUR BODYSELVES

A significant philosophical and scientific challenge to a disembodied view of mind and body comes from the fields of embodied and extended cognition. Extended cognition is also related to terms like “*embodiment, enactivism, distributed cognition, and the extended mind*” (Robbins and Aydede 2008, 3). In this view, reason does not confine itself to the brain or even to the body but leaks out into the environment. In the classic text *Philosophy in the Flesh*, George Lakoff and Mark Johnson challenge the Western notion that the mind or reason is disembodied, universal, emotionally disengaged, and confined to the insides of our bodies (Lakoff and Johnson 1999, 4). They argue that cognition, embodied in natural, cultural, and social contexts, engages the emotions, depends on the local and global environment, and operates actively not passively.

Thinking is a practice not unlike playing a saxophone. Alva Noe, well known for his ideas that cognition is an active and engaging process with the environment, writes: “Our minds bleed out of our heads, onto the paper, into the world. Thinking is more like bridge building or dancing than it is like digestion” (Noe 2015, 27). We claim that the religious and spiritual practices, rituals, and beliefs in religion share the same qualities. They are embodied, active, and contextual (Noe 2015, 27). The physical and biological nature of cognition suggests that memory is not a passive

process but involves active engagement with the environment. This active, contextual definition of cognition relates to the way that epigenetics frames how the body and environment can inform mental processes.

The way we see and know the world is inextricably connected to how we interact with our environment. This feature of embodied cognition is called extended mind. Knowledge is situated and embodied *extra somatic*. Our memories extend into the environment around us and also the environment or ecology of our place leaks into the expression of our memories. People often feel like they lose their memory when something like a fire or flood destroys family heirlooms such as pictures or furnishings, and mementos. Trauma affects our memories in similar ways. Our mental memories rely on the physical “stuff” that we have lost in the trauma and tragedy. Other examples might include:

1. The death of a partner or intimate friend sends people into such intense grief that they feel part of their self is also gone.
2. Graveyards become extended memory banks of who people are.
3. Senior citizens who move into retirement facilities and need to downsize all of their belongings feel a deep loss of their former life.
4. Looking at photographs, letters, or other mementos of one generation’s trauma can create a secondary trauma in the next generation.

How does the experience of trauma reveal itself to us in our memories? Our memories are located in an ecological environment. This translates into how we physically take in the world, of how we interpret the world. Seeing and interpreting the world are hermeneutical acts of the bodyself. Where we stand and where we interact literally determine how we interpret and see the world around us. We do not notice or perceive some things because we fail to ask the right questions or come with the right background to notice them. For example, Barbara Tversky explains: “The world serves not just our own minds but also our communications with other minds: a glance at the door tells a partner it is time to leave; the salt and pepper shakers on a dinner table act as props in a dramatic retelling; *here, that, and this way* can be understood efficiently but only in context” (Tversky 2009, 201). Our environmental context shapes our genealogy—spiritually and physically. The acts of seeing and interpreting are embodied, physical acts that affect how we respond either positively or negatively to stress and trauma.

John Teske’s helpful summation of current research on embodied and extended cognition indicates that for people to recover from trauma the whole body must be engaged (Teske 2013). “Empirical evidence suggests that the retrieval of memories is not independent sensorimotor mechanisms. . . . Sadly, the literature on trauma amply documents the existence

of trauma-related sensorimotor connections experienced involuntarily, and producing traumatic responses in the present (Herman 1992; van der Kolk 1994, 1996). Successful therapeutic treatment is greatly facilitated by directly addressing and manipulating sensorimotor states of the body, including agency (Ogden et al. 2006)” (Teske 2013, 770). The bodyself is the vehicle for treatment and recovery not only therapeutically, but, we would claim, religiously and spiritually. This is important for spiritual and religious communities to learn so that they can create embodied rituals, liturgies, and practices to help people to face and heal from their traumas.

These interpretive acts are often religious and spiritual in nature and are expressed in myth and ritual. Extended cognition and epigenetics offer a robust framework to interpret how bodyselfs inherit and express religious-spiritual beliefs through rituals, practices, and beliefs. Worship itself is the embodied expression of beliefs. The rituals and practices of belief are embedded in the very cells of our bodyselfs. When trauma occurs, beliefs about God and the world can be both a hindrance and help for facing and recovering from the trauma. In her theological memoir, *Bipolar Faith*, Monica Coleman describes the trauma of being raped and the historical trauma she inherits as a woman of color. Both experiences of trauma inform her understanding of bodyself. At one critical point in the recovery process, she discovers that participating in rituals of African dance bring a new expression of healing for her bodyself. She literally dances her way into transformative expressions of her faith. The women and men with whom she dances are the environment and co-participants with her healing. Coleman’s beliefs before the trauma often inhibited her ability to express anger and feelings of betrayal that she felt toward God. After several experiences of dance, as well as other embodied practices, she was able to express her rage at God and channel the anger into constructive ways instead of through self-destructive behaviors (Coleman 2016). Historical and personal traumas are often interwoven through people’s expressions of how they understand their relation to God and how that relationship is embodied in rituals.

Donald Warne and Denise Lajimodiere explain that the trauma experienced by Native peoples at the hands of Europeans has left wounds that go to the spiritual soul of a people and to the lands on which they live (Warne and Lajimodiere 2015, 572). The cartography of trauma maps the relationships between family, genetics, and the land. Roadside markers trace the events of individuals and communities whose stories about their spiritual life are tied to their native land. The ways that religions have spread and migrated across territories can influence religious beliefs and spiritual practices. How cultural- and spiritual-specific aspects of health relate to the interpretation of place is a major focus of a recent study. The health discrepancies and problems that they face as a result of inheriting marks of this trauma are related to the places in which they live.

Katie Schultz et al. explain that “Qualitative data from tribal members suggest that engagement with place and experiential learning, particularly the physical and emotional challenge of the Trail, facilitated changes in health beliefs, attitudes, and behaviors. Deep engagement outside of traditional health service settings should be considered in interventions and may be particularly effective in promoting positive health behaviors in Native communities” (Schultz et al. 2016, 21). For example, women whose ancestors had experienced the horrors of the Cherokee Trail of Tears chose to heal from their inherited trauma by rewalking this trail, albeit with a very different strategy and purpose. Through guided wilderness programming experiences, the women learn new strategies for not only facing the trauma of the Trail of Tears, but also for developing ways to overcoming the trauma.

Our hermeneutical approach to the study of embodied trauma creates connections or ligatures—between the landscape and cells of our bodies, religion and culture, the past and present. The heritability of trauma is a vast genealogical mixture of multiple factors: genetic, environmental, contextual, spiritual and religious, familial, and cultural. To more fully understand this complex relationship, we turn to studies in epigenetics and trauma.

#### EPIGENETICS: MEMORY, TRAUMA, AND BELIEF

Memory plays an important part in each individual’s embedded and learned religious beliefs. Not only is memory passed down orally, but there is also a genetic component. How do environmental circumstances change the perceptions and memories of the individuals experiencing traumatic events and the accompanying beliefs? For example, scientific research suggests a greater prevalence of posttraumatic stress disorder (PTSD) and forms of major psychosis in both Holocaust survivors and in Native American communities and their offspring (Yehuda et al. 1998; Brave Heart et al. 2011). This predisposition to a greater reaction to stress changes how individuals live and perceive the world. Taken together, how do epigenetic factors, traumatic experiences, and memory influence an individual’s and a community’s religious and spiritual beliefs that get passed along to succeeding generations? By understanding mechanisms of gene expression alterations, the role of memory, and how our personal religious beliefs form, we can better understand intergenerational theological and religious reactions to historical trauma. Such constructive work operates with the hope that “an examination of epigenetics and its presentation in the public sphere, open to a conversation with the social disciplines and philosophy, could address this dichotomy and contribute to the discourse” (Gadjev 2017, 1).

During and after adverse times and traumatic experiences, the expression of certain genes can change. These genes received from each parent

can be either active or inactive, and the environmental effect of trauma and physically arduous times can be a major switch from inactive to active or *vice versa* (Ryan et al. 2016). These environmental switches can affect physical and/or mental health, depending on the circumstances under which the alteration of gene expression took place. Walters et al. take a unique approach in exploring the diverse types of historical trauma, suggesting that “HT [historical trauma] events that *disrupt ties* to family, community, or place (e.g., boarding school, forced relocation) may be associated with depressive symptoms, whereas HT events that cause *direct physical harm* to community, body, land, or sacred sites are more likely to be associated with anxiety or PTSD symptoms” (Walters et al. 2011, 183). This contribution to the development and alteration of the self is essential when considering each individual contribution to the entirety of the bodyself. This insight, however, impacts only the individuals or communities personally experiencing the trauma—there is still much to understand before we can make any distinctions about variously affected offspring. Epigenetic modifications are important in the context of theological development due to religious and spiritual beliefs being passed down from parents. We explore the connections between individual memory, others’ memories, and how personal and corporate beliefs might change with trauma.

Inherited diseases, such as Huntington’s and some forms of cancer, are a slow destroyer of an individual’s life, and a force that can tear families apart. Terry Tempest Williams writes simply, yet powerfully, “An individual doesn’t get cancer, a family does” (Williams 1990). This is true not only for the reality of genetic inheritance in cancer cases, but it also speaks to the emotional toll placed on family members. A diagnosis can cause physical pain as well as tremendous emotional unrest. This feeling of fear and unease about family members or one’s self can drive further issues in mental health, triggering reactions from already underlying causes. In addition to emotional pain for others, there is often pain for reasons not yet understood. These underlying reasons have a multitude of known sources, sometimes induced by a traumatic experience of sorts. The least understood aspect of reactions from such traumatic experiences is how the mechanisms are passed along to offspring, including the changes inflicted on them from the environment. There are data supporting intergenerational epigenetic priming of the bodily response to stress in subsequent generations of highly traumatized individuals, but these mechanisms are still not clearly understood.

In the research that has been completed thus far, a transmission of environmentally influenced phenotypic variance has been shown in Holocaust survivors and their children. The group of Holocaust survivors studied were defined as “being interned in a Nazi concentration camp, having witnessed or experienced torture, or having had to flee or hide during World War II” (Yehuda et al. 2016, 373). It is obvious that the group

studied endured some incomparable suffering for a long period of time. This extensive distress was enough to change the expression of certain genes such that survival instincts and emotional strength were of utmost importance. The body's adjustment to such deprived and harsh conditions made the survivors more fit to require fewer and fewer nutrients. Because these were permanently damaging situations, the physiological response never returned to its original state. In a contrasting way, the emotional adjustments made to endure such a scarring experience had a sort of reflex reaction in the sense that the emotions all flooded back upon return to safety. This causes an inability to distinguish between the severity of stimuli—for both survivors and their offspring—as shown in a study led by Rachel Yehuda:

It is striking that for both the offspring and the comparison subjects, the rate of PTSD was not appreciably different in response to the potentially life-threatening events and to the non-life-threatening events. This result calls for further systematic study of the distinction, if any, between life-threatening (DSM-IV) and non-life-threatening distressing events. In order to understand clinical manifestations of trauma better, it would be interesting, for example, to assess biological concomitants of PTSD symptoms in response to each type of event. (Yehuda et al. 1998, 1169)

These PTSD symptoms also relate strongly to bipolar disorder, caused by a similar underlying biochemical mechanism. It has been argued that increased stress levels in Holocaust survivors and their offspring may be caused by changes in DNA methylation, chromatin remodeling, or histone modifications. These slight alterations of important regulatory mechanisms can be the difference between a normal lifestyle and frequent hallucinations. The pain of a survivor truly lives on through others: the biochemical remnants of such a traumatic experience persist on, even without a stress trigger in the offspring. One study concludes that epigenetic alterations change the gene expression in the survivor and the offspring, and the phenotypic variance and PTSD drastically change the upbringing of the children: "Typical responses included the physical and emotional damage to the parent, the emotional and/or physical neglect of the child by the parent, the responsibility of caring for the parent from a young age, the minimizing of the offspring's own life experiences in contrast to the Holocaust, the burden of compensating the parent for past losses, and being taught to fear the environment and react to it with inappropriate hyper-vigilance and distrust" (Yehuda et al. 1998, 1168).

Without a traumatic event to trigger reactions in the offspring of Holocaust survivors, we are left to explore how these predispositions to fear affect the perception of various situations. Perception is a powerful force of the mind, changing contextually and working in different forms. The way we process different stigma as humans largely leads to the way we react.

Not only do these changes in perception influence the individual experiencing them but also those around them. More specifically, the survivors of the Holocaust cannot share the physical pain they endured, but their emotional pain stretches across families and generations: "This issue is further compounded by the catastrophic magnitude of the Holocaust itself. Because the Holocaust was not only a personal trauma for the survivor, but also a conspiracy to eradicate the entire Jewish race, the Holocaust literature becomes much more than a vehicle for describing an individual's struggle with the effects of trauma, but also becomes a historical record of the persecution of the Jews and their ability to overcome this oppression" (Danieli 1998, 641). It is important to recognize not only the persecution the Jewish people have suffered in the past but also the current suffering they endure through fear of their oppressors.

By processing memories given to us by parents through unspoken gene transmission as well as through conversation, it may be possible to acquire a knowledge or stigma relating to certain individuals or groups. This knowledge of the traumatic events caused by such a group instills a fear of the known, in the possibility that another traumatic incident by the same means is possible. Using the top-down processing approach, we may be able to make educated decisions about how to react to certain stimuli. Whether these choices are morally acceptable in terms of overgeneralization of religious or political groups is debatable, but in the case of severe trauma, it is almost unavoidable to have such reactions. Traumatic experiences do not define who we are, but they change how we see the world. Our eyes see not only what we have encoded in our memory but also how our parents saw and see the world. The epigenetic alterations that occur in our bodies are a large part of our world that we cannot always bring to consciousness but they are necessarily embodied memories.

Our embodied memories as a part of our bodyself influence the way we experience the world. Intergenerational epigenetic priming can create fear in ways we are not aware, and these levels of fear potentially contribute to a higher rate of PTSD and other mental disorders. Because these disorders are rooted both in genes and in environment, we cannot simply discover a single cause. In further studies regarding the influence of epigenetics on mental disorders and memory, we search for a lens to look through. We create this lens by understanding the individual as an entire bodyself and exploring how each individual and group finds resilience. The possibility of another traumatic incident either empowers us or instills a reactive strategy. Do our embodied memories create resilience? How do we explain the presence of this resilience in conjunction with the ability to recover? Resilience and recovery must be explored in the context of the entire bodyself due to the polyfactorial nature of trauma's effect on the body as a whole.

INTERGENERATIONAL STRESS, RESILIENCE, AND RECOVERY:  
THE BODYSELF

People carry the memories and the physical wounds from trauma with them, often into succeeding generations. This is demonstrated in the American Indian and Alaskan Native (AIAN) population by studies that have shown that the low socioeconomic status of AIANs cannot fully explain the high rates of poor mental and physical health, particularly with respect to PTSD, anxiety, depression, diabetes, cardiovascular disease, and pain reactions among AIANs (Walters and Simoni 2002). Thus, the effects of years of historical trauma (relocation, cultural oppression, etc.) are taking a toll on succeeding generations in those communities.

We saw earlier in the example of the Dutch famine how poor nutrition can have negative outcomes for a developing fetus. However, maternal stress can be equally as harmful. Maternal stress and preterm birth is another example of trauma that is embodied through epigenetics and can be passed down through generations. Stress during gestation may affect hormones and other factors important for pregnancy maintenance, and thus may alter the timing of delivery (Olson et al. 2015). Social markers for preterm birth include socioeconomic status, past traumatic events, marital or relationship issues, abuse (childhood or domestic), discrimination, loss of a close friend or family member, or enduring a natural disaster. Ancestral exposure to stress can alter the epigenome (the inherited environmental impacts on DNA) by reprogramming the major hormone system in the developing fetal body called the hippocampal-pituitary-adrenal axis. Because this hormonal network is a major regulator of adult disease and behavior, the reprogramming of it during fetal development can be detrimental to the fetus's later health (Olson et al. 2015).

Intergenerational stress has been demonstrated by experiments using pregnant rats (Yao et al. 2014). A mother rat (called a "dam") is placed in a tube that restricts her movement (induced stressor) for thirty minutes/day. These stressed mother dams have a greater incidence of preterm birth, and their pups have higher incidences of cardiovascular disease, obesity, and diabetes. Neurological malfunctions are also present in the pups. However, the inherited stress of generations is demonstrated most shockingly in the granddaughters. Without any further stress to the daughters of the original stressed mother dams, the granddaughters have similar adverse outcomes (Yao et al. 2014). This may also be the case for stress in fathers; however, that has not yet been demonstrated experimentally.

The effects of stressful situations on pregnant human mothers have also been studied. After the 2008 flood in Iowa, several studies were conducted with women that were pregnant during the flood and their children. One study found that pregnant women had higher depressive symptoms and a lower sense of well-being for 2.5 years after the flood (Brock et al. 2015).

Another study found that children born to women who were pregnant during the flood had increased risk of obesity (Dancause et al. 2015).

Another example of environmental stress that can affect developing fetuses occurred during an ice storm in Quebec in January of 1998. A series of ice storms blew through Quebec, followed by freezing temperatures that collapsed the power lines and left three million people without power for as long as six weeks. Thirteen years later, the children born to mothers who were pregnant in Quebec during the ice storm showed altered epigenetic marker patterns on immune cells taken from saliva samples, indicating that the stress that the mothers had experienced had stayed with the children for a long time (Cao-Lei et al. 2014).

How might we stop this intergenerational cycle of stress and build resilience? A research team in Canada is hoping to find an answer using a journaling intervention with women who were pregnant during the fires in Fort McMurray, Canada, in May of 2016. The Canadian research team, led by husband and wife David and Joanne Olson, decided that, instead of studying the women who were pregnant during the time of the wildfires, they would do something to prevent adverse outcomes for them and their children. They built a website and recruited pregnant women or women who expected to conceive within six months of the fire to be a part of the study (<http://mommybabyfmm.ca/>). Women were placed in one of three experimental groups: (1) no writing intervention, (2) a writing intervention involving basic questions about day-to-day activities, (3) a writing intervention that involved women answering specific questions about their feelings concerning the fire, for example, “Is this the most traumatic thing that has ever happened to you?” Women who were a part of the writing groups were instructed to write for twenty minutes/day for four days. Although the effects of this study are not yet known, we anticipate that it will have a positive effect on the pregnant mothers and their offspring. Other studies have shown that increased social support for pregnant women during traumatic events can help to decrease adverse effects on the fetus. Studies of the children born to mothers that experienced the stressful conditions of the floods in Iowa in 2008 have shown that these children had higher birth weights, increased body mass index (BMI—a measurement of obesity risk) at thirty months. However, these effects were decreased if the pregnant woman had higher social support during the flood (Kroska et al. 2017). Therefore, providing increased social support to pregnant women during and after natural disasters may have positive consequences for generations after the specific traumatic event.

The neuroplasticity of the brain (the ability for the brain to form new connections) throughout life is another physical example of how resilience can be achieved. A meditative practice, undertaken for twelve minutes/day, can help to increase memory and cultivate feelings of compassion and empathy (Newberg and Waldman 2010). The researchers in this book

assert that many spiritual practices that involve repetition and physical movement (saying the Rosary, counting prayer beads, etc.) are beneficial for the brain (Newberg and Waldman 2010). These techniques, when compatible with the spiritual beliefs of the practitioner and practiced on a regular basis, can help to build resilience. For example, just eight weeks of a twelve-minute/day meditative practice can increase activity in the brain's prefrontal cortex. This area of the brain has decreased function when one is depressed, therefore, increasing its function can help improve the depressive state. This practice can also help to increase memory and cultivate feelings of compassion and empathy. We can thus understand how physical movement and conscious focus are directly embodied, and are therefore ingrained methods of spiritual practice in humans to naturally build resiliency.

We purport that further studies should be conducted using mindfulness and/or writing interventions that utilize the subject's own spiritual and religious practices. Resilience requires spiritual interventions or practices that help people to face and get through adversity. It is likely that resilience strategies that align most tightly to one's own spiritual background could be the most effective. Resilience can be learned and practiced. This process of learning is not unlike the practices instituted in religious communities such as chanting and reciting the Rosary. We offer this statement about the project with the women in Fort McMurray because it encapsulates the notion that studying trauma is not good enough without creating practices or interventions that actually can help people face the trauma. David Olson: "We didn't want to just monitor the outcomes in another tracking study — we said this time we have to do something about improving outcomes, and so we agreed we would try to develop an intervention to lower the stress levels of mothers that would improve their pregnancy outcomes as well as the developmental outcomes of their children" (Olson 2017). The spiritual practices can change not only individuals but also the way a community functions and thrives. Hopefully, spiritual practices like this one developed for the women in Fort McMurray will serve as a model for future interventions to offer hope and resilience.

Healing requires a systemic and holistic approach addressing the multiple dimensions of the specific trauma. Resilience and strategies for maintaining resilience must be implemented in the recovery process. We assert that such strategies would be more enriched and yield more promising results if they also address and include the religious and spiritual beliefs of an individual and community.

## CONCLUSION

The interpretation of the bodyself and trauma from different theological and religious-spiritual traditions in light of the sciences is relatively new

constructive work within the religion and science dialogue. We offer the following themes that we believe might spark ongoing conversation:

- (1) The relationship between the divine/sacred and the human. We agree with Daniel Weiss that “because knowledge of the divine is not conceptually separated from action, it is also not conceptually separated from the divine” (Weiss 2013, 793). This confirms our claim that spiritual and religious *practices* and *actions* are what will help those who face and seek resilience in the midst of trauma and suffering. The rituals and liturgies that convey the relationship of the divine and human must be embodied, enacted, and contextualized. “Religious practices make use of a relatively embodied mode of cognition, and seem designed to emphasize the role of embodiment in religion” (Watts 2013, 753).
- (2) The role of tradition: Epigenetics and embodied cognition emphasize inheritance and its embodiment in, with, and under relationships. Context is constitutive of cognition, and this includes not only the present but the effects of the past. Therefore, both positive and negative effects of a religious–spiritual tradition can impact a person undergoing trauma. The trauma of previous generations, as it is embedded in beliefs and actions that are inherited, shapes the practices of contemporary generations. Religious and spiritual traditions are living, active, emergent, and embodied.

Understanding what it means to be a human bodyself is a work in progress, a process of translation and interpretation of massive quantities of genetic and epigenetic information. The bodyself is an “environment” of relationships and consequently perceives and interprets the world within that environmental context. We can welcome the insights of medicine and biotechnology that offer healing and hope to those whose lives are shaped by the debilitating effects of trauma. The more we learn about our bodyselves from sciences such as embodied cognition and epigenetics, the more we can understand the role of religious beliefs/spiritual practices and memory for recovery and resilience from trauma.

## REFERENCES

- Brave Heart, Maria Yellow Horse. 2003. “The Historical Trauma Response among Natives and Its Relationship with Substance Abuse: A Lakota Illustration.” *Journal of Psychoactive Drugs* 35:7–13.
- Brave Heart, Maria Yellow Horse, Josephine Chase, Jennifer Elkens, and Deborah B. Altschul. 2011. “Historical Trauma among Indigenous Peoples of the Americas: Concepts, Research, and Clinical Considerations.” *Journal of Psychoactive Drugs* 43:282–90.
- Brave Heart, M. Y., and Lemyra M. DeBruyn. 1998. “The American Indian Holocaust: Healing Historical Unresolved Grief.” *American Indian and Alaska Native Mental Health Research* 8:56–78.

- Brock, Rebecca L., Michael W. O'Hara, Kimberly J. Hart, Jennifer E. McCabe-Beane, J. Austin Williamson, Alain Brunet, David P. Laplante, Chunbo Yu, and Suzanne King. 2015. "Peritraumatic Distress Mediates the Effect of Severity of Disaster on Exposure on Perinatal Depression: The Iowa Flood Study." *The Journal of Traumatic Stress* 28:515–22.
- Cao-Lei, Lei, Renaud Massart, Matthew J. Suderman, Ziv Machnes, Guillaume Elgeili, David P. Laplante, Moshe Szyf, and Suzanne King. 2014. "DNA Methylation Signatures Triggered by Prenatal Maternal Stress Exposure to a Natural Disaster: Project Ice Storm." *PLoS One* 9(9):e107653.
- Clark, Andy, and David Chalmers. 1998. "The Extended Mind." *Analysis* 58:10–23. Reprinted in *The Philosopher's Annual*, vol. XXI (1999), edited by Patrick Grim. <http://www.pgrim.org/philosophersannual>
- Coleman, Monica. 2016. *Bipolar Faith: A Black Woman's Journey with Depression and Faith*. Minneapolis, MN: Fortress Press.
- Dancause, Kelsey N., David P. Laplante, Kimberly J. Hart, Michael W. O'Hara, Guillaume Elgeili, Alain Brunet, and Suzanne King. 2015. "Prenatal Stress Due to a Natural Disaster Predicts Adiposity in Childhood: The Iowa Flood Study." *Journal of Obesity* 2015(6):570541.
- Danieli, Yael. 1998. *International Handbook of Multigenerational Legacies of Trauma*. Berlin, Germany: Springer.
- Dupras, Charles, and Vardit Ravitsky. 2016. "Epigenetics in the Neoliberal 'Regime of Truth'." *Hastings Center Report* 46:26–35.
- Gadjev, Ilya. 2017. "Epigenetics, Representation, and Society." *Zygon: Journal of Religion and Science* 52:491–515.
- Hefner, Philip, Ann Pederson, and Susan Barreto. 2015. *Our Bodies Are Selves*. Eugene, OR: Cascade Books.
- Herman, Judith. 1992. *Trauma and Recovery*. New York, NY: Basic Books.
- Kroska, Emily B., Michael W. O'Hara, Guillaume Elgeili, Kimberly J. Hart, David P. Laplante, Kelsey N. Dancause, and Suzanne King. 2017. "The Impact of Maternal Flood-Related Stress and Social Support on Offspring Weight in Early Childhood." *Archives of Women's Mental Health*. 21:225–33.
- Lakoff, George, and Mark Johnson. 1999. *Philosophy in the Flesh: The Embodied Mind and Its Challenge to Western Thought*. New York, NY: Basic Books.
- Newberg, Andrew, and Mark R. Waldman. 2010. *How God Changes Your Brain*. New York, NY: Ballantine Books.
- Noe, Alva. 2015. *Strange Tools: Art and Human Nature*. New York, NY: Hill and Wang.
- Ogden, Pat, Kekuni Minto, and Clare Pain. 2006. *Trauma and the Body: A Sensorimotor Approach to Psychotherapy*. New York, NY: W. W. Norton.
- Olson, David. 2017. "Mommy Baby Study." Available at <http://mommybabyfmm.ca/>
- Olson, David M., Emily M. Severson, Barbara S. E. Verstraeten, Jane W. Y. Ng, J. Keiko McCreary, and Gerlinde A. S. Metz. 2015. "Allostatic Load and Preterm Birth." *International Journal of Molecular Sciences* 16:29856–74.
- Peacocke, Arthur. 1993. *Theology for a Scientific Age: Being and Becoming—Natural, Divine, and Human*. Minneapolis, MN: Fortress Press.
- . 2007. *All That Is: A Naturalistic Faith for the Twenty-First Century*, edited by Philip Clayton. Minneapolis, MN: Fortress Press.
- Robbins, Philip, and Murat Aydede. 2008. *The Cambridge Handbook of Situated Cognition*. Cambridge, UK: Cambridge University Press.
- de Rooij, Susanne R., Rebecca C. Painter, Tessa J. Roseboom, D. I. W. Phillips, C. Osmond, D. J. Barker, Michael W. T. Tanck, R. P. J. Michels, Patrick Bossuyt, and Otto Bleker. 2006. "Glucose Tolerance at Age 58 and the Decline of Glucose Tolerance in Comparison with Age 50 in People Prenatally Exposed to the Dutch Famine." *Diabetologia* 49:637–43.
- Ryan, Joanne, Isabelle Chaudieu, Marie-Laure Ancelin, and Richard Saffery. 2016. "Biological Underpinnings of Trauma and Post-Traumatic Stress Disorder: Focusing on Genetics and Epigenetics." *Epigenomics* 8:1553–69.
- Schultz, Katie, Karina L. Walters, Ramona Beltran, Sandy Stroud, and Michelle Johnson-Jennings. 2016. "'I'm Stronger Than I Thought': Native Women Reconnecting to Body, Health, and Place." *Health Place* 2016. <https://doi.org/10.1016/j.healthplace.2016.05.001>

- Teske, John A. 2013. "From Embodied to Extended Cognition." *Zygon: Journal of Religion and Science* 48:759–87.
- Tversky, Barbara. 2009. "Spatial Cognition: Embodied and Situated." In *The Cambridge Handbook of Situated Cognition*, edited by Philip Robbins and Murat Aydede, 35–51. Cambridge, UK: Cambridge University Press.
- van der Kolk, Bessel A. 1994. "The Body Keeps the Score: Memory and the Evolving Psychobiology of Posttraumatic Stress." *Harvard Review of Psychiatry* 1:253–65.
- . 1996. "Trauma and Memory." In *Traumatic Stress: The Effects of Overwhelming Experience on Mind, Body, and Society*, edited by Bessel A. van der Kolk, Alexander C. MacFarlane, and Lars Weisaeth, 182–213. New York, NY: Guilford Press.
- . 2014. *The Body Keeps the Score: Brain, Mind, and Body in the Healing of Trauma*. New York, NY: Viking.
- Vaz, Michelle, Stephen Y. Hwang, Ioannis Kagiampakis, Jillian Phallen, Ashwini Patil, Heather M. O'Hagan, Lauren Murphy, Cynthia A. Zahnow, Edward Gabrielson, Victor E. Velculescu, Hariharan P. Easwaran, and Stephen B. Baylin. 2017. "Chronic Cigarette Smoke–Induced Epigenomic Changes Precede Sensitization of Bronchial Epithelial Cells to Single-Step Transformation by KRAS Mutations." *Cancer Cell* 32:360–76.
- Walters, Karina L., Selina A. Mohammed, Teresa Evans-Campbell, Romana E. Beltram, David J. Chae, and Bonnie Duran. 2011. "Bodies Don't Just Tell Stories, They Tell Histories." *Du Bois Review: Social Science Research on Race* 8:179–89.
- Walters, Karina L., and Jane M. Simoni. 2002. "Reconceptualizing Native Women's Health: An 'Indigenist' Stress-Coping Model." *American Journal of Public Health* 92:520–24.
- Warne, Donald, and Denise Lajimodiere. 2015. "American Indian Health Disparities: Psychosocial Influences." *Social and Personality Psychology Compass* 9:567–79.
- Watts, Fraser. 2013. "Embodied Cognition and Religion." *Zygon: Journal of Religion and Science* 48:745–58.
- Weiss, Daniel H. 2013. "Embodied Cognition in Classical Rabbinic Literature." *Zygon: Journal in Religion and Science* 48:788–807.
- Williams, Terry Tempest. 1992. *Refuge: An Unnatural History of Family and Place*. New York, NY: Vintage Books.
- Yao, Youli, Alexandra M. Robinson, Fabiola C. R. Zucchi, Jerrah C. Robbins, Olena Babenko, Olga Kovalchuk, Igor Kovalchuk, David M. Olson, and Gerlinde A. S. Metz. 2014. "Ancestral Exposure to Stress Epigenetically Programs Preterm Birth Risk and Adverse Maternal and Newborn Outcomes." *BMC Medicine* 12:121.
- Yehuda, Rachel, Nikolaos P. Daskalakis, Linda M. Bierer, Heather N. Bader, Torsten Klengel, Florian Holsboer, and Elisabeth B. Binder. 2016. "Holocaust Exposure Induced Intergenerational Effects on FKBP5 Methylation." *Biological Psychiatry* 80:372–80.
- Yehuda, Rachel, James Schmeidler, Milton Wainberg, Karen Binder-Brynes, and Tamar Duveviani. 1998. "Vulnerability to Posttraumatic Stress Disorder in Adult Offspring of Holocaust Survivors." *American Journal of Psychiatry* 155:1163–71.