The Missing Link: The Biology of Human Resilience

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In the face of so much turbulence and calamity in the world is it any wonder why for the past 50 years we have increasingly looked to the concept of resilience to guide us in understanding how to create a world in which all are safe, fed, housed, and nourished? Much has been written about resilience and increasingly we are seeing creative, determined, and often successful efforts implemented which bring the core concepts into action in behalf of planetary suffering; applying evidence-based approaches to rescuing and restoring the environment, rebuilding communities destroyed by natural and human-caused disasters, and strengthening the opportunities for poor and vulnerable populations.

There are several of us at the Bellagio Center whose work is focused on Resilience. And we know the Rockefeller Foundation is holding a conference on the topic on April 19. This essay is our effort to contribute a new but essential link to the discussion, the neurobiology of human resilience.

In *Resilience: A Literature Review* by Juech and Martin-Breen, a review commissioned by the Rockefeller Foundation, a framework for understanding the complexity of resilience theories as utilized by many disciplines is outlined and synthesized. The authors provide a review of key applications of the concept, linking theory and practice in a way that deepens appreciation for the many facets and domains of resilience as well as the challenges faced in trying to measure and manage it. The review increased our optimism that with so many good people focusing their efforts on understanding and building resilience across many domains and in a myriad of ways there is great cause for hope.

However, missing from the review is, what we believe to be the critical foundational building block of resilience: the biology of our amazingly resilient mind-body system.

Over the past decade vast amounts have been learned from neuroscience that can build human capital…one of our most valuable resources. In fact, it may even be safe to say that in many ways the workings of our internal mind-body system is a parallel process to the kinds of external micro and macro processes discussed in the Juech and Martin-Breen literature review on resilience. Such concepts, for example, as "robustness," adaptive capacity," and "transformability" are qualities that can also be applied to nervous system functioning. Exploring and drawing upon what neuroscience offers is extremely relevant in an age characterized by highly networked rapidly changing, and interdependent systems.

Advances in neuroscience, including neuroimaging capabilities (e.g. fMRI), have generated a cascade of scientific detail about the intricate wiring of the human mind-body system. And, thanks to the neuroplasticity (a form of "transformability") of the brain, it is possible to target interventions at this very elegant design and help people learn to regulate themselves, thus, deepening their capacity for nervous system balance and self-regulation (one way to define "resilience" at the biological level.) This dynamic capacity for individual-level change allows larger systems to combine both transactional as well as transformational aspects of adaptive change. When the resilience of the human nervous system, particularly the Autonomic Nervous System, is strengthened other key levels of functioning improve, ultimately facilitating networked communities that are complex, emergent, and adaptive to change. Thought processes are clearer and more organized and there are fewer disabling beliefs; emotions are more manageable; and social behaviors are more constructive. The system operates with heightened self-awareness. Resilience at the level of ANS functioning means that the rhythm between the two branches of the ANS is such that we are capable of more optimal functioning…our thoughts, feelings, and sensations are congruent and integrated and we are capable of responding rather than reacting to life's challenges. In our model we refer to this level of functioning as being in the "Resilient Zone" and it can become a core competency of any system, regardless of size, culture, and purpose.

In our Bellagio Center Fellowship we are applying key concepts from neuroscience to a model of embodied leadership. The nervous system-based, trauma stabilization skills,

Trauma Resiliency Model (TRM), developed by Laurie Leitch and Elaine Miller-Karas, have been used around the world in countries that have experienced large-scale traumatic events. Now, we are expanding the skills and embedding them in a global leadership model which can be used by “top-down” leaders, “people-up” leaders, and those in-between to enhance social resilience and foster adaptive change. Our goal in developing the model is to harness and contribute to the best of people; whether the person is at the top of a complex, multi-national organization, is an indigenous leader in a remote village, a U.N. peacekeeper, or living in an IDP camp. The leadership model is appropriate for self-care as well as care of others. It will provide vulnerable people with access to tools for their own self-regulation and empowerment, thus, fostering communities of healing, generativity, and sustainability capable of adapting to today’s constantly changing conditions.

Thus far, several TRM outcome studies have been published that used the trauma-focused approach following natural disasters. The outcomes indicate that using nervous system stabilization skills in low dosages (i.e., several sessions) can reduce symptoms of traumatic stress. A randomized control study of TRM in post-earthquake Haiti has just been completed and is in the data analysis stage. In Haiti we have trained over 50 Haitians as TRM trainers, thereby, expanding capacity for local people to provide TRM in their own communities. The Haitian TRM trainers have now trained over 800 people in the use of the skills. This means that self-regulation becomes a positive contributing factor in networked communities. We also have similar studies underway with veterans of the wars in Iraq and Afghanistan.

The importance of a neurobiological approach to “top-down” leadership issues was reflected in a recent article about the World Economic Forum in Davos by Chris Zook in the Harvard Business Review (Feb. 12, 2012) titled "Desperately Seeking Simplicity." Zook reports what he calls an omnipresent theme at the conference: "... that while events are unfolding in the world at an accelerating pace, increasingly complex institutions are less and less able to deal with them." He reports that WEF founder Klaus Schwab talked about the "growing phenomenon of burn-out among world leaders with finite energy and time to put against seemingly bottomless complexity." Zook further

describes a session of "tired-looking finance ministers…defensive and elusive" about their efforts to deal with the Euro crisis.

This essay provides a brief overview of some key dimensions of the biology of threat, fear, and nervous system resiliency. It is our intention to highlight the contribution that neuroscience-based approaches can make across all forms of human suffering as well as to complex adaptation and global connectivity.

Key Concepts from Neuroscience

Wiring for Novelty and Risk.

Our brain is neurologically wired for survival…this is true for all living beings. Part of the brain (the amygdala) is focused on detecting novelty…especially novel risks that can threaten our survival. The amygdala's constant surveillance primarily takes place below our level of consciousness. If the amygdala senses that we are safe its focus on risk is inhibited and an array of options open up that otherwise would not be available…one is healthy social engagement and another is what we call "slow thinking." This essay specifically focuses upon these two processes.

Social Engagement

Let's look at social engagement first. When I *perceive* that I am safe a neurological process is set in place that promotes constructive relationships. I will be more expansive, have more compassion, be able to create thoughtful plans of individual and collective action, and be more capable of inclusiveness. I will be far less likely to engage in aggressive or violent actions. I will create collaborative processes that take more than just myself into account. Even my immune system will be stronger.

Notice that we used the word "perceive" in referring to whether there is safety or not. Objective reality doesn't necessarily drive our sense of safety. Depending on previous experiences, particularly previous experiences of a profound or enduring lack of safety, our amygdala's capacity to assess danger can be distorted…rendering almost

everything and everyone unsafe or perceiving that things and people who are truly unsafe are not; in other words, we may operate at one extreme or the other of our neurologically-based safety assessment with neither version being reality-based. Since our mind-body system is always attempting to find homeostasis or balance it may even oscillate between the two extremes…alternating between avoidance of relationships and a pattern of hyper-dependency. This process can go on for many years even in the absence of additional stressors and when the threat to safety has long passed.

What does this mean for the many places on the planet (homes, communities, work settings, regions and nations) that are profoundly unsafe? In situations like this it isn't possible, of course, to create consistent physical or emotional safety, but what can be done is to help the nervous system return to balance each time an event occurs. Using self-regulation skills we can equip people with a way to manage the reactivity that comes with threat, fear, and a lack of safety. We can teach people how to bring themselves back into balance when events have bumped them out. And they can teach others. We expand capacity at the local level by teaching members of a community to use the skills with their own members. And, when we motivate people to practice the skills (which we can do with accessible neuro-educational materials, including a cell phone app called iChill), we begin to wire in greater capacity for nervous system resilience. When this happens transactional adaptive change can become a core competency, first of the individual and then among growing numbers of others. This could even be said to be, biologically speaking, an example of species-specific learning. Learning in which, as increasing numbers of people are exposed to more self-regulated individuals in their communities (and with the benefit of mirror neurons which create neurological congruence between people), they begin to become better regulated themselves and may become motivated to learn the resiliency-based skills. A "new normal" evolves.

The definition of "resilience" used here at the individual level is "the ability to sense patterns of organization and disorganization in the nervous system and the capacity to self-regulate in order to strengthen the patterns of organization." There are far simpler

ways to describe this, of course, and some of our materials, used with low-literacy populations, rely primarily on drawings.

The neurological responses to safety and lack of it generate a cascade of neurochemicals and sensory experience (heart rate, muscle tension patterns, etc.) which is then translated into emotions and cognitions. It is a "bottom-up" process that takes place in everyone no matter who they are and where they live. We are all wired the same way for survival and for responding to safety, threat and fear. That's why our neurobiological model can travel across cultures and into systems of all sizes and shapes. The *meaning* given in different cultures to symptoms of distress and trauma may differ but the symptoms themselves are the same. Of course, some fortunate individuals are born with a hardiness that others don't have and some people are more inclined to one set of symptoms than another, but, in general, physiological responses to stress and trauma are similar. As we offer neuroscience-based self-regulation skills and as they are practiced in self-care or care of others we begin to re-wire the nervous system for more resilience (the ability to remain in or get back in to the Resilient Zone after distressing events) which, in turn, can generate entire ecosystems capable of creativity and generativity.

Neuroplasticity

This capacity for rewiring is available to us because of the marvel that is neuroplasticity…the brain's capacity to lay down new neuronal pathways based on experience. As the saying goes, "the neurons that fire together wire together." This is both the good news and the bad news. If a person is in a continual or frequent state of dysregulation that is what gets wired into the brain. Correspondingly, the better able a person is to return to balance the better s/he can be more stable and even live fully into her potential. Our model can be considered "self-directed" or "intentional neuroplasticity" because we actively re-work sensory patterns arising from nervous system dysregulation… wiring in a deeper Resilient Zone. This means we have an enhanced capacity for adaptability and flexibility. We call this "generative capacity." It is more than just being "stable" it is being able to move forward to a "new normal." In a rapidly

changing world this is a good thing! And, we would suggest that it is at the heart of what we mean by social resilience.

Think of the implications: in a state of on-going or recurrent dysregulation cognitive symptoms including impaired concentration, memory and attention impede learning. Physical symptoms such as pain syndromes, sleep and appetite problems, immune disorders abound. Emotional symptoms including depression, anxiety, anger and rage sap initiative. Behavioral symptoms flow from the others including physical, emotional and sexual violence, substance abuse, and risk-seeking behaviors. And spiritual symptoms like excessive or aggressive religiosity or disillusionment with a belief system shape a worldview. Over time many of these symptoms become wired into the nervous system as agitation and other hyper and hypo-arousal patterns. These can then spill over into families and communities, depleting human capital and compromising an entire community's capacity for adaptability and flexibility.

Fast and Slow Thinking

So, let's move on to another contribution from neuroscience, "slow and fast systems of response." Perhaps this can be considered the body's counterpart to Walker et al.'s (2002) macro-level concepts of "slow variables" and "fast" ones. At the individual level these nervous system response processes are automatic, wired into us to enhance our survival. Like the capacity for social engagement, they are also dependent on our sense of safety. We have two systems of response to the unexpected that are wired into us. One, "the fast system," relies on the neurochemicals of survival (adrenalin, cortisol, etc.) and makes a quick, "unthinking" response possible and the other, "the slow system," allows for careful reflection on available options.

For example, when something happens, particularly if unexpected, and our amygdala assesses danger a series of instantaneous neurological events happens, resulting in parts of our cortex being blocked and automatically generating a defensive response. This means that I don't stop to reflect on our options or use our problem-solving skills; I simply am jettisoned into a neurologically programmed fight or flight response. And, if our amygdala's perception is that I can't successfully fight or flee I may go into freeze.

More recently, we have also recognized another stress-related defensive response, “tend and befriend.” In this response, more common in women due to its link to estrogen, in a stressful or dangerous situation we may bond together in behalf of security rather than fighting or fleeing. Interestingly, this response generates the neurochemical oxytocin (produced during love making and nursing a baby) which enhances our immune function. This is in contrast to the neurochemicals that fuel the fight, flight, and freeze responses which can have a very toxic impact on the immune system.

So, these fast system responses of fight, flight, tend and befriend, and freeze are automatic…wired into us…and occur without intention or thought. They are the result of the amygdala’s assessment of danger and the need for a fast (potentially life-saving) reaction. However, they can be a source of guilt and shame for some people depending on the situation (e.g., going into freeze in a war-zone, fleeing a collapsing building during an earthquake while leaving children or loved ones behind, hitting a child in response to the disruption trauma in an IDP camp). They can also become a person’s default response when faced with stressors, making it difficult to be a constructive force in adaptive change.

Let’s take a look at the “slow system” of processing. The same initial process occurs as with the “fast system.” Sensory information comes in and goes through a couple of steps until it arrives at the amygdala. This time the amygdala’s assessment is “no danger.” Threat chemicals are not produced and, therefore, the cortex is not blocked. The incoming information can be contextualized and strategies for dealing with the situation can be deliberated and acted upon strategically. Slow thinking uses the full capacity of our cortex (the executive functioning part of the brain). We *respond* rather than *react.* Perhaps you can now begin to see why the calibration of your amygdala’s capacity to assess safety is so important in shaping your response patterns. When I am in my slow system (feeling safe) I will be more open to new ideas and less likely to be caught in rigid beliefs, a scarcity mentality, and unhelpful, even destructive, patterns of behavior.

Smart Globalization

As we translate neuroscience information into our model of global leadership we believe we have the potential to contribute to healing on a global level…building communities of creativity and compassion. Whether a project seeks to address environmental issues, natural and human-caused disasters, or poor and vulnerable populations the common element in each is human beings. They are the ones designing approaches, developing action plans, finding funding, getting community buy-in. They are the ones implementing new ideas (or resisting them), supporting and sustaining efforts in their families and communities.

Those of us determined to make a difference at the global level must include a focus on the most fundamental level first…the human beings that constitute all levels of social capital and organization. It is the individuals with resilient nervous systems who become "institutional entrepreneurs." And, it is self-regulated individuals who build, broker, and are a part of relationships of trust who create healthy communities; communities capable of not only providing a safety-net for those in need but also a springboard for their citizens, building local capacity and empowering ingenuity. Clearly, the impetus for change must not limit its focus to the individual level. However, equipping individuals with ways to self-regulate, thus enhancing functioning at the cognitive, emotional, physical, behavior, and spiritual levels of experience can be an essential building-block for community-level and larger social resiliency-oriented approaches, all of which definitely promote the Rockefeller Foundation's vision of "Smart Globalization."