



EXPLORING THE INTERSECTION OF SERVANT-LEADERSHIP  
AND INTERPERSONAL NEUROBIOLOGY

*Hope for Deep-Rooted Mental and Behavioral Transformation*

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People don't come preassembled, but are glued together by life.

—LeDoux (2002, 3)

The principles of interpersonal neurobiology (IPNB)—a rapidly developing field of study that emphasizes relationships, emotions, and the brain (Fishbane 2007)—can be applied to many leadership styles, be they good or bad. This article emphasizes servant-leadership because of the positive characteristics and values it espouses. It introduces some of the fundamental concepts of interpersonal neurobiology and servant-leadership and discusses how IPNB may benefit and encourage servant-leaders as they work toward deep-rooted transformation within themselves, their followers, their organizations, and ultimately society as a whole.

Cozolino (2012) wrote, “Because our brains are social organs interwoven with the brains of those around us, relationships have a direct impact on the biology of the brain” (336). Understanding how relationships literally sculpt the mind and the brain can help servant-leaders comprehend how positive, long-term changes may occur as a result of leader/follower relationships and neuroplasticity. This knowledge is important to the field of leadership studies because it brings a scientifically based tangibility to a discipline that is, for the most part, an intangible one. And that tangibility can bring hope.

Rock and Page (2009) indicated that it is only within the past decade or so that neuroscience has “provided support rather than discouragement for adults who wish to make profound changes” (453). It is now known that even older adults can produce new brain cells as a result of experience.



That means there is hope for permanent change that enriches the individual yet benefits society as a whole. This knowledge serves as a foundation for this article.

#### SERVANT-LEADERSHIP AND INTERPERSONAL NEUROBIOLOGY DEFINED

To scaffold the understanding of how servant-leadership and interpersonal neurobiology tie together, it is important to first explore the meaning behind each term.

#### *Servant-Leadership*

Spears (2004) noted that Robert Greenleaf's understanding of who a servant-leader is might be viewed through the lens of ten characteristics: listening, empathy, healing, awareness, persuasion, conceptualization, foresight, stewardship, commitment to the growth of people, and building community (13–16). The term “servant-leader” is a paradox. It denotes one who is willing to lead by serving first (Greenleaf 1977). The servant-leader is empathetic, loving, receptive, responsible, humble, and “concerned with the personal and emotional growth of others” (McClellan 2008, 289). Greenleaf's (1977) test of servant-leadership was encapsulated within his following questions: “Do those served grow as persons? Do they, *while being served*, become healthier, wiser, freer, more autonomous, more likely themselves to become servants? *And*, what is the effect on the least privileged in society? Will they benefit or at least not be further deprived?” (27, emphasis in original).

When servant-leaders are committed to the growth of people and to building community, they will exhibit “a long-term, transformational approach to life and work, in essence, a way of being—that has the potential for creating positive change throughout our society” (Spears 2004, 12). Servant-leadership is a leadership model that correlates well with many of the concepts of interpersonal neurobiology.

#### *Interpersonal Neurobiology*

Interpersonal neurobiology (IPNB) is an interdisciplinary and transdisciplinary field that investigates how relationships influence the architecture of the brain



(Cozolino 2014). It involves the study of “wisdom from more than a dozen different disciplines of science to weave a picture of human experience and the process of change across the lifespan” (Siegel 2006, 248). IPNB raises awareness of the need for attunement to the self, others, and the world at large and it addresses how relationships and experiences shape, strengthen, or modify functional systems within the brain.

New neuroscientific data and the subsequent insights addressed in the burgeoning field of interpersonal neurobiology can be attributed in part to the significant advances in technology that have exponentially increased knowledge about how the human brain processes thoughts and forges new neural pathways. According to Demetri (2007), neuroscientists are now able to view real-time changes in the brain and map brain activity through the use of instruments such as positron emission tomography, electroencephalograms, x-ray computed tomography, nuclear magnetic resonance imaging, magnetoencephalography, and near-infrared spectroscopy. Camerer, Loewenstein, and Prelec (2004) explained, “Feelings and thoughts can be measured directly now, because of recent breakthroughs in neuroscience” (558). Johnson (2009) echoed that thought: “We now have technology in place to picture that inner landscape. . . . These are tools for capturing who we are, on the level of synapses and neurotransmitters and brain waves” (4).

This technology can record changes in brain circuitry as people experience various emotions or engage in specific thoughts or actions. Scientists use this technology to help “pinpoint which brain neighborhoods are active during any given mental activity” (Schwartz and Begley 2004, 22). These technological advances have brought about monumental changes in the field of neuroscience and have helped create numerous subdisciplines, such as neurotheology (Brandt, Clément, and Re Manning 2010), neuroeconomics (Camerer, Loewenstein, and Prelec 2004), neuromarketing (Iacoboni 2009), and neuroleadership (Ringleb and Rock 2009).

According to Siegel (2007), interpersonal neurobiology furthers understanding of how the mind and the brain change each other, how personalities and character strengths are formed, how new learning is acquired, and how relationships influence growth. Fishbane (2007) advanced the idea that “interpersonal neurobiology identifies how the brain is wired through relationships and connection” (396), and Siegel (2012a) indicated that IPNB researchers investigate how embodied neural maps generate long-term modifications within relationships, the mind, and the brain.



As the concepts of interpersonal neurobiology are discussed, it will be important to step away from the Cartesian dualism mind-matter debate because, as Shilling (2003) emphasized, “instead of being separate from the body, the mind is located within, and is inextricably linked to, the body” (173). Schwartz and Begley (2002) pointed out that “the neural connections that form brain circuits are necessary for the mind as we know it” (36), and Whitehead held that the “mind and brain are manifestations of a single reality, one that is in constant flux” (45). The nondualistic interface between the mind and the brain is what activates neuroplasticity and results in changed thoughts and behaviors.

Neuroscience can sometimes lean towards reductionism and mechanics, so it is important to keep in mind that humans cannot be reduced to simple biological, physiological, or electrochemical processes. However, Shilling (2012) wrote that certain of neuroscience’s “exponents enable us to think creatively about the neurological processes that may inform social actions and interactions” (16). He also emphasized, “Our embodied being is not just a location for society and culture, however, but *forms a basis for* and *shapes* our relationships and creations” (15). The embodiment of a human mind is an important reality, and it should be noted that this embodiment arises within the domain and shelter of relationships.

#### THE IMPORTANCE OF RELATIONSHIPS IN SERVANT-LEADERSHIP

##### *Relationships*

Leaders place a heavy emphasis on relationships. Burns (1978), one of leadership studies’ forefathers, argued that point when he wrote, “The most powerful influences consist of deeply human relationships” (11). Braye (2002) emphasized that “leadership is also based on relationships where people are always considered more important than things. This is a foundation principle” (301).

Servant-leaders understand the value of relationships and direct their energy toward serving those they are in relationship with. This energy, whether expressed in words, thoughts, or actions, will aid in creating long-term, deep seated transformation in the minds, brains, and behaviors of both servant-leader and follower.

Relationships encompass internal as well as external experiences, and when those experiences are supportive, they help facilitate positive neuroplastic changes. Relationships have to do with understanding,



interconnectedness, and information-sharing. They involve “the sharing of the change in energy across time, the patterns of energy flow, that at times contain informational value” (Siegel 2012b, 14). Relationships include the sending and receiving of social signals, and the brain and the mind help regulate those signals.

To understand how servant-leaders can influence or stimulate positive changes in thoughts and behaviors, it can be helpful to understand the perpetual and recursive interactions that take place when systems such as the mind, the brain, and relationships converge. When these three converge, they “form an irreducible triad in producing the flow of information and energy that is human life” (Rock and Page 2009, 26). Understanding the interactions and interdependencies of the mind, brain, and relationships can prove invaluable to a servant-leader who desires to help facilitate new learning and reinforce positive behaviors.

### *Individuals Are Shaped by Relationships*

Relationally oriented servant-leaders can help transform the minds, brains, and behaviors of followers in a manner that enriches lives in personal, organizational, and social ways. That is because significant relationships—expressed through kinships, friendships, affiliations, and mental, emotional, physical, or even virtual connections—can change the mind and the brain due to the fact that the brain has the “capacity to change its patterns of neural connectivity in response to experience” (Gantt and Agazarian 2010, 516).

Relationships are experiences that influence and stimulate changes in the brain. Relationships can include a vast array of experiences where information and energy are shared, either interpersonally or intrapersonally. This can include experiences such as playing fetch with the family Labrador, sitting in quiet meditation or prayer, cheering with other fans at a football game, or reading a newspaper. A relationship might also involve linking a new idea to a previous idea; it could be experiencing a fiery debate across the board room table, or it could be the quiet connection that occurs when one sits silently with someone in their dying hours.

Fosha (2013) stressed the importance of relationships and their healing qualities: “Receptive affective experiences of feeling cared for, loved, seen, and delighted in are transformative” (144). The experience of feeling loved and welcomed can activate a “transformational process in the form of a



nonlinear, nonfinite transformational spiral” (145) that allows the mind and brain to change and grow, resulting in transformation of thoughts, emotions, and behaviors.

Humans do not survive or mature without having functional relationships with the environment (both inner and outer) and with other people. While general neural pathways related to basic human functions are connected by the time a baby is born, relationships play a major part in neural growth because, as Cozolino (2014) noted, “The healthy, living brain [is] embedded within a community of other brains: *Relationships are our natural habitat*” (4, emphasis in original). Fishbane (2007) said, “The structure and wiring of our brains require the attunement and attentiveness of others” (396), while Rock and Page (2009) suggested that “the brain cannot become a human brain without social input” (367). Cozzolino (2012) stated, “We are born into relationships and come to our individual identity while resting upon social connectivity” (p178–179) and Shilling (2003) noted that

1. The human body at birth is itself the product of evolutionary processes which are affected by social as well as biological processes.
2. As the body develops it is taken up and transformed, within limits, by social factors.
3. The body is not only affected by social relations but forms a basis for and enters into the construction of social relations. (173)

Each of these statements suggests that humans require relationships to survive and indicates that relationships are a necessary part of life.

Relationships involve learning and what a person learns is a result of where they focus their mind’s attention. New learning can ultimately modify the brain because, as Siegel (2013) indicated, “where attention goes, neuronal firing occurs” (253). Learning is what forms the tangible neural architecture that enables people to sustain change (LeDoux 2002).

Fishbane (2007) pointed out that learning (which entails a new experience) can change the brain by causing the formation of new neural circuitry. She said that “experience alters the brain, even as we age. Whenever we learn something new, whether new attitudes, perspectives, or behaviors, we are changing the physical structure of our brain” (397). Her comments on experience and brain alterations explain why each event, movement, glance, or smile can create a trace action in the brain. It reveals how, when behaviors,



words, or gestures are repeated, neural connections are strengthened in a way that can forge new pathways, resulting in living neural maps that reflect the life of a relationship.

### *Social Relationships*

DeGraaf, Tilley, and Neal (2004) observed that a “community is a sum of its parts,” (159–160). Siegel (2012b) echoed that statement: “The whole of we is greater than the sum of our individual parts. We are embedded in each other and what arises is beyond two separate brains just interacting as isolated entities” (320). Cozolino (2010) wrote that “relationships are our natural habitat, while the isolated brain is an abstract concept” (179). He discussed the emotional circuitry of the human social brain and indicated that “we are born into relationships and come to our individual identity while resting upon social connectivity” (178–179).

McGilchrist (2013) said, “the brain already understands that the world is a living complex of relations” (85), and Gardiner (1998) described what could happen when individuals come together in community: “In redefining relationship as a *living* reality, instead of a coming together of two selves, a new paradigm is created that serves our emerging collective consciousness” (118). This collective consciousness can create a community.

When individuals form communities, those communities subsequently form a group’s social consciousness. This might be termed “the social mind.” The “social mind” can emerge when people come together in mind (virtually) or physically. Siegel (2012a) asserted that two or more minds can function as a single system and stated “that a self is part of a much larger interconnected whole: the self can be seen as a ‘plural verb’” (387). Buber (1970) expressed the importance of the self living in communicative connection with others, “I require a You to become; becoming I, I say You” (62). Rock and Page (2009) wrote, “Neither human brains nor human minds exist without social relationships” (25–26), and Siegel (2012a) maintained “the brain can be considered as a living system that is open and dynamic. It is also a part of a larger system” (27).

The interconnectedness between the mind, the brain, and social relationships becomes apparent in light of Cozolino’s (2010) observation that “the brain is a social organ connected to other brains via the social synapse” (195). His definition of the social synapse is “the space between us.



It is also the medium through which we are linked together into larger organisms such as families, tribes, and societies. When we smile, wave, and say hello, these behaviors are sent through the space between us via sights, sounds, odors, and words. These electrical and mechanical messages received by our senses are converted into electrochemical impulses within our brains. These signals stimulate new behaviors, which, in turn, transmit messages back across the social synapse” (179–180). The concept of a social synapse reveals the significance of relationships and social influences. Whether it be in the workplace, family, community, or world, what happens within the social synapse has the power to change minds, brains, and behaviors due to the principles that lay behind the brain’s neuroplasticity.

#### NEUROSCIENTIFIC FOUNDATIONS

##### *Neuroplasticity*

Siegel (2012a) defined neuroplasticity as “the ability of the brain to change its structure in response to experience” (53). It is the term used by neuroscientists to describe how “the structure and function of a mature brain remain open to change across the life span” (Moore 2001, 141). Neuroplasticity occurs when neurons are activated through new learning and experience. Neuroplasticity involves new learning and, as Fosha (2013) emphasized, “energy, motivation, curiosity, and pleasure” (145), along with repetition and practice, are vital for strengthening neuroplasticity.

Relationships elicit neuroplasticity by triggering neurochemical events (LeDoux 2002), and this creates, modifies, or strengthens neural circuitry. When neurons are associated together, learning is facilitated and new thoughts, behaviors, and neural circuitry are formed. Hebb’s law states that “neurons that fire together, wire together” (Fishbane 2007). This law describes why the formation, modification, or strengthening of experience-dependent neuronal connections is possible and why those connections can bring about deep-rooted changes in thoughts and behaviors. It can happen because, as Panksepp (1998) said, the human brain is “the most complex and most plastic organ in the known universe” (98). This characteristic of the brain is called *neuroplasticity*.

The principles behind neuroplasticity can provide relationally oriented servant-leaders with scientific substantiation that positive mental, emotional, and behavioral changes can become indelible actualities in both



servant-leader and follower. LeDoux (2002) pointed out that over the past two decades, researchers have gained significant insights into how experience-dependent neuroplasticity forms tangible neural architecture, enabling people to create and sustain lasting transformation in both thoughts and behaviors. This understanding of the brain's neuroplasticity can bring hope (Leaf 2013) and added confidence to leaders and followers who would like to experience positive transformation.

### *Mirror Neurons*

Mirror neurons are specialized brain cells activated when a person sees someone engaged in functional behaviors. They give people the capacity to perceive and “share the emotions of others . . . making possible the communication of ideas” (Frith 2006, 531), and they form neural systems that can mirror or resonate with others. Preeminent neuroscientist Ramachandran (2011) called mirror neurons “the neurons that shaped civilization” (117), and he claimed that they will influence psychology in the same way that DNA influenced biology (Humphrey 2007).

Mirror neurons play a strong role in relationships and emotional awareness and they “demonstrate the profoundly social nature of our brain” (Siegel 2007, 166). They can activate in response to communicative gestures, and they are thought to be intricately involved in how humans perceive the actions of others. They are stimulated not only by actions but also by emotions (Frith 2006). The mirror neuron system offers insights into social behavior, imitation, and empathy (Siegel 2006) and they “undoubtedly provide, for the first time in history, a plausible neurophysiological explanation for complex forms of social cognition and interaction” (Iacoboni 2009, 6).

Cozolino (2014) indicated that “mirror systems are suspected of being involved in many social functions” (52) such as learning, gestures, and speaking. He also stated that mirror neurons help people “link up across the social synapse” (187). Keyzers (2011) observed that mirror neurons open doors between a teacher and a student. He noted that “the discovery of mirror neurons made it clear to me that our brains are indeed almost magically connected to each other. We are not born with a brain that deals exclusively with ourselves, but with one capable of feeling with other people. Our brain is set up to resonate with the people around us” (61–62).



Mirror neurons “might be thought of as ‘sponge neurons’ because they help us sponge up the feelings of others . . . (allowing) us to feel part of what he or she feels, not to become them” (Siegel 2012b, 137). These neurons can be found in many areas of the brain, and they play an important role in interpersonal attunement and empathy, a highly valued servant-leadership characteristic.

According to Siegel (2007), the mirror neuron system and resonance circuitry are intertwined. When these two systems are activated, people can mirror actions and moods, and they can “simulate another’s internal state and imitate that person’s behavior. Mirror neurons link what we see from others with what we feel and what we do” (Siegel 2012a, 79). Consistent mirroring will cause neuroplasticity to occur. This can create neural maps that embed the values and attributes of the leader into the minds and brains of followers.

### *The Mind*

The mind can be defined in many ways. Siegel (2011) defined it as “a relational and embodied process that regulates the flow of energy and information” (52), while Bateson (2002) described it as “an aggregate of interacting parts or components” (85). Solomon and Siegel (2003) emphasized that the mind is not stagnant; it develops throughout a person’s lifespan in response to experience. Additionally, Siegel (2011) noted that the mind helps people feel, think, talk, and create meaning and the “mind arises in both our bodies and relationships” (Siegel 2012b, 7).

While the mind is not synonymous with consciousness, it still requires consciousness, which, according to Bandura (2001), “is the very substance of mental life that not only makes life personally manageable but worth living” (3). Damasio (2003) described consciousness as “the process whereby a mind is imbued with a reference we call self, and is said to know of its own existence and of the existence of objects around it” (184). Schwartz and Begley (2002) defined it as “more than perceiving and knowing; it is *knowing* that you know” (26, emphasis in original) and Donald (2001) portrayed it as “a multilayered, multifocal capacity and a deep, enduring cognitive system with roots far back in evolution” (10). He claimed consciousness “is the governor of mental life” (47).



## *The Brain*

The brain's work does not lie solely in the provenance of the skull; it unceasingly sends and receives signals via axons, dendrites, hormones, and neurotransmitters that work deep within the many complex systems of the body. It is an organizational, relational, social, and associational organ composed of over a hundred billion neurons that sit amid trillions of support cells that wire and fire together in a weblike network (Hanson 2013). Each neuron has around 10,000 synaptic connections with other neurons, creating a potentially astronomical number of on-off firing patterns in the brain. Even with all the activity of billions of neurons and quadrillions of synaptic connections, the brain weighs only two to three pounds and is small enough to fit into the palm of the hand.

The brain is considered a dynamic system because its neural network is not static; it changes based on experiences encountered. It is a vital part of a larger complex system that consists of the mind (regulation), brain (mechanism), and relationships (sharing) (Siegel 2012a). This system allows a person to self-regulate, engage in relationships, and create meaning out of experience.

There is an intimate, reciprocal connection between the brain and the mind. Siegel (2012a) noted that “the mind emerges at the interface of interpersonal experience and the structure and function of the brain” (xiii). Johnson (2009) described the brain as the “fingerprints of the mind” (217), while Leaf (2013) wrote, “when you think, you build thoughts, and these become physical substances in your brain” (25). The energy that flows through the mind is held in the brain. Together, the mind and brain form a complex communication system that sends energy and signals throughout the entire body as well as between the self and others (Siegel 2007).

Myers (2011) emphasized “everything psychological—every idea, every mood, every urge—is simultaneously biological” (35) (see Figure 1) and, according to Solomon and Siegel (2003), the mind and brain depend on one another because “the mind can alter the brain and the brain can alter the mind” (9). Rock and Page (2009) indicated that the mind and brain develop at the same time, and Leaf (2013) stated that “thoughts have the power to change the brain. The brain is changing moment by moment as we are thinking. By our thinking and choosing, we are redesigning the landscape of our brain” (32–33).

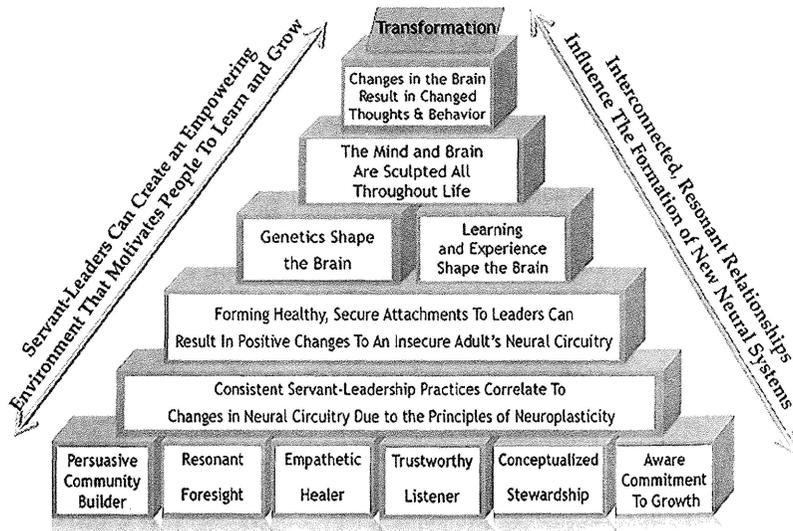


Figure 1. Transformation results when the mind and brain are sculpted through genetics and experience. Myers (2011) explained, “everything psychological—every idea, every mood, every urge—is simultaneously biological” (35). Consistently exhibited servant-leadership characteristics can serve as a foundation for neural change due to neuroplasticity and resonant relationships.

The interconnections of the mind, brain, and relationships result in a one-of-a-kind individual. This is due to the formation and modification of neural pathways that occur continuously when relationships, minds, and brains merge, emerge, and reciprocally influence one another.

#### SEEING SERVANT-LEADERSHIP CHARACTERISTICS THROUGH THE LENS OF INTERPERSONAL NEUROBIOLOGY

### *Applications*

The purpose of this section is to suggest ways in which servant-leaders can help modify brain circuitry and promote positive, deep-rooted change in both the self and others. Based on the information mentioned earlier, the material below includes some examples that may aid a servant-leader who would like to understand ways to work *with* the brain rather than



*against* it in the areas of empathy, resonance, change, insight, foresight, and awareness.

### *Empathy*

Empathy is one of the characteristics of a servant-leader. Greenleaf (1977) stated that empathy “is the imaginative projection of one’s own consciousness into another being” (33). He observed that a servant-leader who empathizes with and accepts others for who they are will most likely be trusted. When servant-leaders exhibit empathy, mirror neurons are activated. They can feel some of what their followers feel and that can help create a sense of resonance between the leader and the follower. This resonance can make room for trust and growth in the relationship, a key concern for leaders.

Empathy is not just an emotion; it is an embodied experience. It is both emotional and physical, and it carries with it copious definitions. It “means experientially recognizing and understanding the states of mind, including beliefs, desires, and particularly emotions of others without injecting our own” (Rock and Page 2009, 431). Burns (1978) described empathy as “the vital leadership quality of entering into another person’s feelings and perspectives” (100). Siegel (2007) said empathy “requires that we reflect on our own internal states” (169), and Gunnarsson and Blohm (2011) suggested that empathy tells people, “I want to see things from your perspective to understand how you can develop as a person” (70). These definitions are certainly not all-encompassing, but they provide solid insights into the value of being an empathetic leader.

Servant-leaders who exhibit empathy can help families, communities, organizations, and societies actively meet more of their goals because, as Boyatzis and McKee (2005) said, empathy “helps us get things done” (178). Empathy can be “a radical force for social transformation” (Krznaric 2012, 1) whenever it activates prosocial behavior and motivates people to try to alleviate pain or distress. It can encourage people to take action and create positive change; it can actually ensure physical survival. As Hall (2010) noted, the notion “that our neurons bristle harmonically with an external reality—is not simply an interesting concept that offers a possible route to explaining the biology of empathy: it likely represents an aspect of biology that has a very long evolutionary history” (129).



Empathy is a “key business survival skill because it underpins successful teamwork and leadership” (Krznaric 2012, 5) and it significantly aids in relationship building. Empathetic leaders are compassionate, emotionally intelligent, and they resonate with others. “They know that emotions are contagious, and that their own emotions are powerful drivers of their people’s moods, and ultimately performance” (Boyatzis and McKee 2005, 4). They are mindful of how their subtle emotional attitudes and nonverbal mannerisms might affect their followers, and they are willing to take on the work required to “read their world” (123).

Bridges of communication and understanding can be created when people interact with an empathetic mindset. The result can be closer relationships, deeper understanding of the self and others, and positive modifications of negative thoughts and behavior. These changes can be accomplished at least in part due to the mirror neuron system and the brain’s resonance circuitry.

*Example:* According to Krznarik (2012), a leader can learn how to empathize with others by practicing six habits: (1) cultivating curiosity about strangers, (2) challenging prejudices and discovering commonalities, (3) trying another person’s life, (4) listening hard—and opening up, (5) inspiring mass action and social change, and (6) developing an ambitious imagination.

### *Resonance*

Physicists describe resonance as “a sympathetic vibration between two elements that allows these elements to suddenly synchronize signals and act in a new harmony” (Johnson 2009, 273). The mirror neuron system and the resonance system become activated through relational interactions, and they can give rise to significant changes in thoughts and behaviors. Resonance between people indicates a certain harmony between them—a harmony that goes strong and deep—and harmony between people is a boon to any family, organization, or society.

Boyatzis and McKee (2005) discussed how “resonant leaders are in tune with those around them” (4). This attunement helps build a sense of trust into the relationship between a servant-leader and a follower. That trust can help people remain open to relationships and to new learning.



Siegel (2012b) wrote, “We resonate with each other, mutually influencing each other’s neural and mental realities as we connect with each other along our walk” (320). A person doesn’t lose his or her individuality when empathizing or resonating with others. As Siegel (2011) observed, “resonance requires that we remain differentiated—that we know who we are—while also becoming linked” (63). He noted that resonant leaders can influence others best by maintaining their own internal states rather than being identical to others.

*Example:* When people resonate with each other, the mirror neuron and resonance systems are active, allowing people to soak up what others are feeling or doing (Siegel 2012a). For example, a child who is afraid of the dark can sense and absorb her mother’s calmness. Over a period of time, the child can learn to calm herself like her mother does. In much the same way, servant-leaders can resonantly “lend” their healthy emotional resources to others and help them shift into a more positive state (Rock and Page 2009). When this type of harmonic connection happens, positive changes can take place, benefitting any relational structure—personal, organizational, or social.

## *Change*

Change occurs as a result of the neuroplastic wiring and rewiring of the brain that takes place when the brain reconfigures itself based on what it learns (Ratey 2002). Leaders can have hope and confidence, knowing that their lives are making a difference when they consistently interact with others in ways that facilitate positive, healing changes.

Servant-leaders do not exert control over others to resolve problems or create change. Rather, they purposefully remain committed to being humble, open, tolerant, honest, and empathetic—willing to acknowledge that they do not always have the “right” answers. Senge (1977) emphasized that a leader should humbly embrace uncertainty and doubt as they decide what course of action to commit to: “Without uncertainty or doubt, there is no foundation for tolerance. If there is one ‘right view,’ which we will generally see as our own, we have no space for the possibility that a different point of view



may be valid. Because of that, we have no empathy for those with different views” (354).

Change involves a certain sense of uncertainty, and Zohar (1997) observed that it is important for leaders in the workplace to realize that some people are more at ease with uncertainty than others. She shared statistics that indicate that in a large company, 85 percent of the people, when “properly led, *will change*” (93). Approximately 5 percent of the large company will never change, and about 5 to 10 percent will be the company’s top innovators, creators, and leaders. These statistics indicate the importance of knowing how to lead in ways that help people accept change.

Change can create stress, but fortunately, stress is not always a negative. Cozolino (2010) indicated that “the power of mild to moderate levels of stress to trigger neural plasticity is a key element in the success of . . . any learning situation” (21). Leaders can learn how to integrate change activities into their relationships and organizations that incorporate just enough stress to activate “neural growth hormones supportive of new learning” (20). In this way, leaders may facilitate the growth of new neural circuitry that can alter thoughts and behaviors.

Servant-leaders who introduce change into a relationship, community, or organization need to realize that the brain loves novelty in small doses, but if the brain’s “error-detection circuitry fires too often, it brings on a state of anxiety or fear. This partly explains humanity’s universal resistance to wide-scale change: big changes have too much novelty” (Rock 2009, 51). When a leader appreciates that too much new information can overwhelm the brain and cause people to become resistant, he or she can approach change processes more effectively.

*Example:* Servant-leaders can help those who are resisting change by engaging in a process called “chunking” (Rock 2009). This process enables a person to consider and experience change in smaller doses, and it helps reduce the sense of threat that can accompany the thought of wide-scale change. When leaders chunk information, they shift people’s attention to things the leader wants them to focus on. Purposefully focusing on smaller bits of information reduces the sense of threat and decreases resistance to change because the brain is engaged in an appropriately novel way. This will help people function more effectively and more willingly during times of change.



## *Insight and Inspiration*

Greenleaf (1977) equated insight with inspiration. Rock (2009) defined insight as a moment that brings about change because that moment carries with it a burst of dopamine and adrenaline that provides a person with energy and a sense of courage. Although the rush of neurochemicals is rather short-lived, it can powerfully motivate a person to take action.

Greenleaf (1977) emphasized the importance of attaining insights, personal enlightenment, and inspiration: “The forces for good and evil in the world are propelled by the thoughts, attitudes, and actions of individual beings. What happens to our values, and therefore to the quality of our civilization in the future, will be shaped by the conceptions of individuals that are born of inspiration. Perhaps only a few will receive this inspiration (insight) and the rest will learn from them. The very essence of leadership, going out ahead to show the way, derives from more than usual openness to inspiration” (28). Greenleaf (1977) indicated that people need more than leaders with inspiration. They need leaders who are willing to take up the challenge of the insight, saying, “I will go; follow me!’ While knowing that the path is uncertain, even dangerous” (29).

*Example:* Leaders can create space for insights to occur in ways that will access brain circuitry and facilitate change. Rock (2009) said that when considering how to solve a problem or create a different scenario, a person can be encouraged to set aside thoughts or problems for a moment and become only lightly aware of them. This will result in a state of reflection which allows a person to look at the thought process and perceive concerns from a less detailed perspective. He further stated that engaging in this activity activates areas in the right hemisphere and moves the brain into a dreamier state that helps form different connections that can lead to moments of insight. During these moments of insight, the brain experiences a burst of gamma band brain waves, indicating that different brain regions are in communication. An awareness of this neural process can help leaders serve others more effectively.

## *Foresight*

To make changes to the self, relationships, an organization, or a society, decisions informed by foresight must occur. Greenleaf (1977) described



foresight as the ability to “go forward or backward from the instant moment . . . [it] is the essential structural dynamic of leadership” (39). Additionally, Greenleaf (2003) indicated that “prescience, or foresight, is a better than average guess about *what* is going to happen *when* in the future. It begins with a state of mind about *now*” (53, emphasis in original).

Rock and Page (2009) described how neural connections and neurotransmitters allow a person to “gather information from ‘out there,’ beyond our brain/body; to coordinate our different brain/body functions; to participate in sharing information; and to link past, present, and future” (188). Experiences and relationships create mental maps (memories) that can be accessed when one is seeking to answer questions concerning the present or the future. These “mental maps enable us to add past experience to present perception so as to guide future behavior” (256).

*Example:* Siegel (2012b) discussed how the prefrontal area of the brain “can make maps of time, connecting the past, present, and future. This is called mental time travel” (72–73), and it enables humans to “carve out maps of the future based on what happened in the past.” Servant-leaders realize the importance of living with their attention focused strongly on the here and now, even as they remain aware of the past and the future. They will draw on the mental maps created by experiences in the past, both good and bad, and will apply the lessons learned as they make current decisions which can positively influence the future.

#### AWARENESS

Greenleaf (1977) said awareness is “value building and value clarifying . . . it is a disturber and an awakener” (41). Awareness brings the “here and now” into consciousness. It is a process of knowing and knowing that you know. When this knowing is shared it “can be at the heart of creating large-scale shifts in human culture” (Siegel 2012b, 33–34). Shared awareness can create a sense of closeness to others. It can help people become conscious of their own or others’ needs and desires. It can also help a person “learn new skills and even change the structure of the brain itself, and to reflect on what has meaning. Awareness makes choice and change possible” (Siegel 2012b, 2–3).

Greenleaf (1977) surmised that “awareness has its risks, but it makes life more interesting; certainly it strengthens one’s effectiveness as a leader”



(40–41). He discussed the things that block one’s ability to be fully aware, such as the disappointments encountered in life’s journey, but he admonished people to lose those disappointing “blindnesses” so that they might have the opportunity to “be given the secret of the kingdom: awe and wonder before the majesty and the mystery of all creation” (340). His reference to these mysteries could certainly be thought to include those mysteries of the mind and the brain and the healing relationships that are forged by aware servant-leaders.

*Example:* When a person has encountered an impasse, such as how to perform a task at work or interact with another person, they should first quiet their mind. Then they can lightly think on their impasse from a more peaceful, generalized bird’s-eye view. “This activates right hemisphere regions that are important for insight, and allows loose connections to form” (Rock 2009, 82). Quieting racing thoughts can help bring unconscious answers and insights into conscious awareness.

## CONCLUSION

In this article I introduced a potential intersection between several characteristics of servant-leadership and the concepts of interpersonal neurobiology. I discussed the significance of neuroplasticity and the important connection between the mind, the brain, and relationships. I also introduced some basic techniques that can help modify brain circuitry and promote transformation.

Humans are intricately intertwined with others and with their environment. As Siegel (2007) said, “We have human minds dancing with our human brains within our social experiences of the shared construction of human culture” (95). Understanding the concept of neuroplasticity and the fact that relationships literally sculpt the mind and the brain can bring a sense of optimism to relationally oriented servant-leaders. That is because these concepts provide scientific substantiation that transformation occurs as a tangible reality in the brain. This knowledge is important to the study of servant-leadership because it brings a sense of tangibility to a field that is, for the most part, an intangible one. And that tangibility can increase hope in servant-leaders who desire to see deep-rooted, long-lasting transformation occur in the families, organizations, and societies they serve around the world.



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