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The Somatic Work of Thomas Hanna, Tai Chi, and Kinesiology

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Thomas Hanna's somatic work has been essential to the development of the field of somatic education. From redefining the word "somatic" and developing the concept of somatics as a field of study, to starting the magazine/journal *Somatics*, to developing theories and practices of somatic education, Hanna greatly influenced this fledgling area of work. This article presents the somatic philosophy, theories, and education techniques of Hanna, focusing on the aspects that are unique to this somatic explorer. Hanna's techniques are contrasted to the traditional somatic movement training of Tai Chi. The difficulties of researching a learning such as somatic education are discussed. Ideas are presented on how kinesiology and somatic education can inform each other.

Keywords: pandiculation, somatic education, Tai Chi

Integrating somatics and kinesiology—an interesting idea whose time has come? This is a big step, as first-person awareness, the very essence of somatics, is not a part of kinesiology education today. However, while the issue of self-awareness is large, this learning is just one of many that makes incorporation of somatics and somatic education into kinesiology a challenge. Indeed, one may need to make the distinction between somatics (the study of the soma; Hanna, 1991) and somatic education (the use of sensory-motor learning to gain greater voluntary control of one's physiology; Hanna, 1990) when it comes to bringing these two fields together.

Like most methods of somatic education, the first-person experience is central to the philosophy, theory, and practice of the somatic work of Thomas Hanna. Hanna made no claim of originality for this concept, but he did come to his way of somatic thinking in a somewhat unique way. Hanna was first a philosopher, a "happy existentialist." And he came to somatic thinking through his study of philosophy. He lays this all out in his first somatic tome, *Bodies in Revolt* (Hanna, 1970), where he redefines the word "soma." Techniques to help those who suffered from "sensory motor amnesia," his term for neuromuscular problems, came years later. Hanna's philosophical approach gives his work a unique tint in the rainbow of somatic arts and sciences.

Hanna started his somatic journey with the existentialists and phenomenologists. This led him to the somatically oriented scientists such as Charles Darwin, Konrad Lorentz, and Hans Selye. In addition, he studied neurophysiology and biofeedback and practiced yoga, gaining insight into how an individual could change. Only then did he find the work of the pioneering somatic educators. Moshe Feldenkrais and F.M. Alexander were his main influences, but he did not ignore the work of other early explorers of somatics, such as Elsa Gindler, Charlotte Selver (Gindler's student), and Gerda Alexander to name only a few. In addition, Hanna invited Feldenkrais to give a training in somatics, the first training in the United States by Moshe Feldenkrais. He also attended this training. Hanna never discarded any of what he learned from Feldenkrais but seemed to feel he was adding to Feldenkrais's work, much as Feldenkrais had added to what he learned from Alexander. Thus his somatic techniques arose from the work of both of these somatic geniuses.

Hanna redefined the word "soma" in 1970 and worked the rest of his life to promote somatics and somatic education. He wrote several books, as well as many articles in magazines, especially in the magazine/journal *Somatics,* which he founded and edited. As his experience as a somatic educator evolved, he saw somatic education as a "major new initiative in human health." Hanna felt that somatic education could be developed as a clinical practice, with repeatable results based on science. His unpublished book, *Somatology: An Introduction to Somatic Philosophy and Psychology,* suggests he felt it was time to move somatics to mainstream academia. In many ways Hanna was the voice of somatic education.

In this article, I begin with a short overview of Hanna's philosophical approach to somatics. I then describe the somatic theories that define Hanna's approach to somatic education. Next, I present the techniques he employed in his somatic education lessons. These sections are somewhat longer than what I might hope, but besides a short article I published shortly after his untimely death in 1990, there has been little published on Hanna's somatic work despite his important contributions to the field. Thus, I take this opportunity to highlight his perspectives and insights into somatic education. I also take this opportunity to show the relationship of Hanna's approach to Eastern "schools" of movement, especially Tai Chi, and present a short summary of research findings on the art of Tai Chi. ("Tai Chi" in this article is synonymous with the term "Tai Chi Chuan.") This leads to an exploration of some of the challenges one could encounter while performing research on somatic education. Finally, with this background I discuss the possible "joining" of somatics and kinesiology—what these two fields can offer each other.

Philosophy

In *Bodies in Revolt* (Hanna, 1970), Hanna referred to himself as a happy existentialist. He thought of existentialism as a happy philosophy because it dealt with "the happiest of human experiences—growth and adaptation." Clearly in this area he is greatly influenced by Soren Kierkegaard, Friedrich Nietzsche, and Albert Camus, as the work of all three of these philosophers is discussed in

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both *The Lyrical Existentialists* (Hanna, 1962) and *Bodies in Revolt* (Hanna, 1970). As existentialism is somewhat outside of my area of expertise, I will make no attempt to provide insight into these great thinkers as might be relevant here. However, I will share some thoughts Hanna took from these philosophers.

Hanna saw these existentialist philosophers as arriving at insights that were similar to those found in Hinduism and Zen Buddhism with their focus on *inner reality* and *living* a truth instead of knowing it. (Later I will show how Hanna also drew inspiration from the movement arts of the East.) These philosophers were tearing down the vestiges of the wall that Descartes put between the mind and the body. Their thinking brought them toward the conclusion that experience is what matters. This leads us to another influence, Merleau-Ponty and phenomenology. Hanna saw phenomenology in line with both neurophysiology and humanistic psychology and wrote, "What else could consciousness be but perception?" (Hanna, 1970, p. 198).

For Hanna, this concept of experience led to the realm of the soma: body/mind unity. For experience can only come from one's senses, and not only one's teleceptors but also, and essentially, one's proprioceptors. Hanna understood the unity of the soma—that input does not exist without output and output without input, especially in the neuromuscular system. When Hanna wrote, "Experience is a sensory-motor event, in which sensing cannot be separated from moving and moving cannot be separated from sensing"(Hanna, 1990, p. 9) he sounded quite Gibsonian (Gibson, 1979), connecting movement and perception. This moving-sensing loop driven by our first-person experience is the central core of his somatics.

Hanna's view of the human somas was also built on an evolutionary perspective. He saw the basis for his somatic work and thoughts in our evolutionary past. He knew that one's experiences involved both phylogenetic and ontogenetic aspects of ourselves, that one's conscious voluntary actions/experiences arise from and are dependent on one's unconscious involuntary (phylogenetic) being. Hanna saw evolution as a process moving from simple to complex in both structure and function, from fixed motor patterns to entirely learned motor patterns. In each step, adaptability is increased. And while Hanna never used the language of systems theory, his views are often in line with such a perspective.

Hanna perceived freedom as the ultimate attractor state. Eventually life had to get there, as it is the condition of maximal adaptability. Thus, humans are, from such a perspective, the end stage of life's increasing complexity. Humans, with our complex structure (especially our brains), have a uniquely complex ability to learn and to problem solve. To bring this back to our somatic focus, freedom is a requirement to discover movement solutions, and it enables humans to solve movement problems, appropriately or "inappropriately," as well as to learn to change our movement solutions. Evolutionarily, we grew from a simple organism with fixed motor patterns to a complex organism with (almost) entirely learned motor patterns. Humans, with our brain complexity on the scale of the estimated number of atoms in the universe, born with minimal programmed motor patterns, are free to learn, to move as we decide. Hanna saw natural selection and increasing complexity heading to a point of maximal freedom.

If there was anything that defined Thomas Hanna as an American, it was his love of freedom. Somatics fits well within this framework. When one understands the importance of experiencing one's inner self, one tends to become more independent, even anti-authoritarian. No one else has my inner experience; no other knows how it feels at this moment for my fingers to press the keys of the keyboard or how my neck and back feel while I sit and compose this paper. In somatics, one learns that one is the best authority on oneself. Hanna was an anti-authoritarian, freedom-loving philosopher. For Hanna it came down to a single question, "How can you say you are free, if you can't control your own physiology?" This question drove his somatic inquiries.

Somatic Theory

If we are, as Hanna suggests, the peak of life's evolutionary push, why then do we have the functional issues that require movement education? Humans are the greatest problem solvers and hence the greatest movers on the planet. (This is by definition, as every voluntary movement is the solution to a problem.) Why do so many in our society suffer from neuromuscular pain? The answer for Hanna was habituation of stress. This habituation leads to the loss of voluntary control of muscles, especially the ability to inhibit neurons to the muscles from firing. This in turn leads to stiff, sore muscles and movement problems. Hanna saw this habituation to stress as a problem of modern industrial society. He looked at the aging population of America and saw needless pain and loss of movement abilities. The result is that Hanna's somatic theory and practices were aimed at the vast number of people in our society that were otherwise "healthy" but had neuromuscular pain. While he saw and helped many clients who had neurological deficits, his theory is clearly focused on the former group.

Others had arrived at similar thoughts about habituation of stress. Where Hanna broke new ground was his identification of three distinct stress patterns. The first, the startle response, was also the focus of F.M. Alexander and Moshe Feldenkrais. Hanna added two other responses that he felt led to similar movement issues. One response pattern he connected to the Landau reflex/response and the other as a response to trauma. These responses will be familiar to those who study motor development because they have been described extensively in the literature (e.g., Fiorentino, 1981). The startle response occurs as a reaction to threatening or worrisome situations and is particularly easy to elicit with an unexpected and sudden burst of loud noise (e.g., a gunshot). Habituation to this response results in raised shoulders, depressed chest (with the associated shallow breathing), and contracted adductors of the hips. To oversimplify, the flexors of the body tend to shorten. One result of habituation to this pattern, shallow breathing, can affect the functioning of the heart and even create a chronic state of sympathetic nervous system dominance. Also, the habituation of this response (and it is easily seen in today's population) results in one's head being held in front of one's center of gravity in the sagittal plane. The posture of many individuals suffering from depression and posttraumatic stress disorder (PTSD) reveals a posture that suggests this habituation (see Figure 1).

The second stress response Hanna identified was a Landau response. The Landau response is seen in babies from around 3–12 months of age when they are supported in a prone position involving the extensors of the body, the paravertebrals, the rhomboids, gluteus medii, and hamstrings. The muscles involved in this response are antagonists of the muscles excited by the startle response. It was Hanna's view that arousal as an adult, that is, a call to action, excited this same group of muscles. The extreme of these muscles being contracted in a static posture can be seen in a soldier standing at attention.

It is interesting to explore how Hanna might have come to believe that the muscle tightness he found in working with people, especially in the paravertebral muscles, was due to more than

the startle response. Hanna had learned the importance that Feldenkrais attached to the startle response. In fact, we can look at this from the perspective of Darwin, who stated, "Serviceable actions become habitual in association with certain states of the mind and are performed whether or not of service in each particular case" (Darwin, 1872, p. 28). Thus habituation of the startle response would have made sense to Darwin. But Darwin went farther with his *Principle of Antithesis,* which he describes relative to the above (see Figure 2):

> Certain states of the mind lead to certain habitual actions, which are of service, as under our first principle. Now when a directly opposite state of mind is induced, there is a strong and involuntary tendency to the performance of movements of a directly opposite nature. (Darwin, 1872, p. 50)

Thus it seems Hanna applied the *Principle of Antithesis* to the startle response and found the Landau response. Following this principle, with the muscles of the Landau response opposite/antagonistic to those of the startle response, the state of mind should also be opposite. In other words, the emotions should be positive, not those of fearful anxiety but those of action, of moving forward in the world, even of joy. (In fact, Hanna would sometimes refer to the Landau as the "joy response.") That does not mean, however, that the end result is positive. Selye (1974) described that even good inputs (eustress) could negatively affect one if they overtaxed the system. Hanna consequently came to the conclusion that the painful backs of hard-working Type A personalities in our Western industrial society were the result not mainly of habituated startle/fear responses (distress) but of a habituated Landau/action/joy response (eustress). Thus negative results, the tightening of the torso extensors, are a result of habituation of positive inputs. (It should be noted that Feldenkrais was likely aware of Darwin's *Principle of Antithesis* and did not come to the same conclusions as Hanna.)

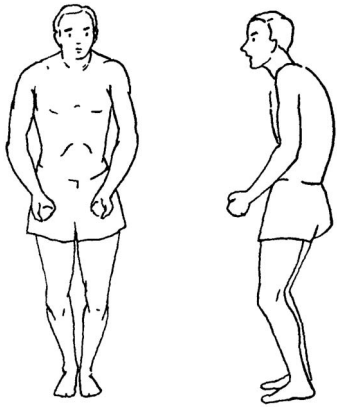

Figure 1 — The typical startle pattern from Hunt and Landis (1936).

Hanna named the trauma response as the third of his major sources of neuromuscular problems in humans. The trauma response occurs as a protective muscular response to injury. While both the startle and Landau responses are mostly seen in the sagittal plane, the results of a habituated trauma response are most commonly seen in the frontal plane. To favor a side after a leg injury seems most natural, as well as healthy. Avoiding deep breaths after breaking a rib is a good practice. But after the structural damage has healed and the pain long gone, or not, some individuals do not return to a symmetric movement pattern. Instead, they stay with the new, if somewhat dysfunctional, pattern. Over time, asymmetrically loaded joints can become painful and muscles overworked.

In actuality, most of us must deal with all three of these stress reactions, and most individuals who seek help from somatic educators have movement limitations that are the result of a combination of these three stresses. (It is important to realize that there are other causes of chronic neuromuscular problems, e.g., habitual actions that result in injury or overuse of body parts. However, they seem to exist to a much lesser extent in Western society, where low back pain is the dominant neuromuscular discomfort.)

Hanna labeled the condition that resulted from the habituation of these stress reactions "sensory-motor amnesia" (SMA). He saw SMA as a functional deficit "whereby the ability to contract a muscle group has been surrendered to subcortical reflexes" (Hanna, 1990, p 8), a condition where the sensory-motor neurons of the voluntary cortex have lost some portion of their ability to control all or some of the muscles of the body. SMA is nothing new (other than its name) in somatic education, as both Alexander and Feldenkrais held similar beliefs and understood the interconnection of input (sensory) and output (motor) in the human system. And like these two somatic educators, Hanna saw the solution to this problem as reeducation of the voluntary sensory-motor cortex. Also like Feldenkrais, Hanna saw this system in terms of cybernetics, the scientific study of control and communication in the

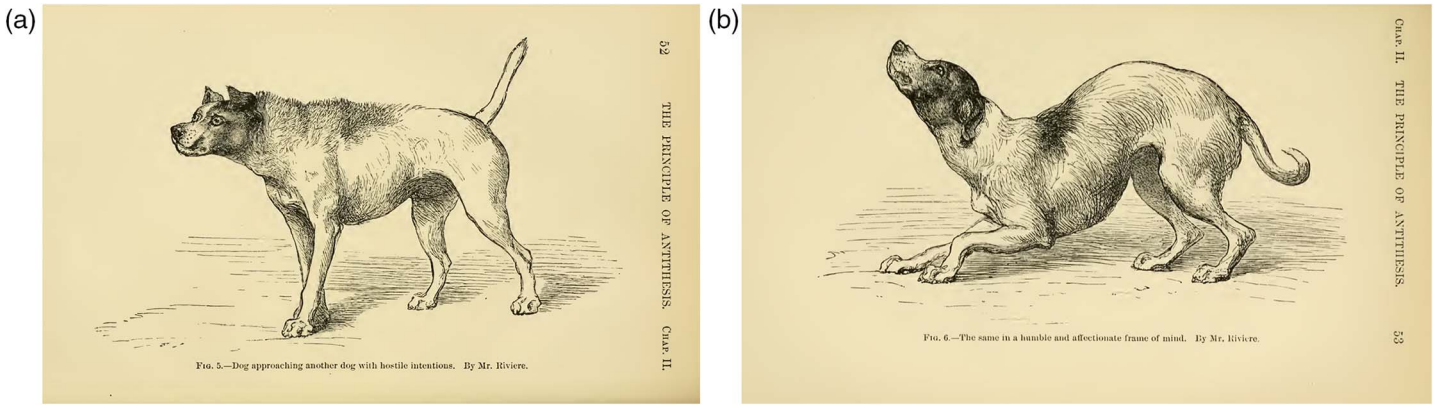

Figure 2 — Drawings of a (a) hostile and (b) affectionate dog used by Darwin to illustrate the principle of antithesis. From Darwin (1872).

animal and the machine (Wiener, 1948). Thus, by changing the feedback (sensory input) going to the brain one could change the output. Hanna and Feldenkrais saw the sensory-motor system as a basic feedback loop. The solution thus lay in new and relevant sensory information to the system.

There is another aspect of Hanna's approach that is not seen to the same extent in other Western somatic approaches. Hanna believed that movement was organized from the center of the body outward. As such, movement issues were best dealt with from the center out. In this way, Hanna adopted the view of the East. In Asia, where Descartes's thoughts never diminished the value of the first-person experience, it is believed that movement is organized and controlled by/around the center of the body. This tradition is demonstrated in the "internal arts" of Tai Chi and Aikido. (There are many more examples, and I chose these two due to their popularity and my familiarity with them.) In both of these two movement traditions, efficient movement is taught as originating from and led by the center of the body. In Tai Chi (Chinese) this center of the body is called the *Tan Tien*; in Aikido (Japanese) it is the *Hari*. Located some centimeters below the navel, the significance of this location in the body from the Western perspective is that the *Tan Tien/Hari* coincides with the center of mass (CoM) of the human body in a standing posture.

From physics we know that the CoM of an object has special properties. The path of any body moving in three-dimensional space can be described as the movement of a point mass following the path of the object's CoM. Any force on an object can be represented as a force through the CoM of the object and a torque/moment about the CoM. Thus, if we wish to apply a force without any rotational component it must go through the CoM. The CoM is a property of the body like rotational inertia, differing from immutable properties like an object's mass, that is a function of the organization/position of the body. If the arms are raised above the head, the body's mass does not change; however, the CoM moves upward some millimeters and the moment of inertia about the horizontal axis changes. Clearly, as movers, we implicitly know and manipulate the location of our CoM when we move. This fact is demonstrated on a gross level by the flips and twists of divers and gymnasts or even a child doing a cartwheel. Furthermore, research reveals the importance of organizing our movement around the total body CoM in daily tasks such locomotion.

A striking feature of the gait of children with cerebral palsy (CP) is the large amount of work they perform to walk. This led our lab to examine the work and motion of the CoM in children with CP and children with typical development (TD; Bennett et al., 2005). Both groups walked, as do adults, in a manner that conserved energy by exchanging energy between the kinetic and potential forms. In order to make this energy exchange, we move our CoM in a sinusoidal curve. In other words we are efficient walkers because we precisely control the movement of our CoM. In the children with TD, the total vertical excursion was only about 3 cm. However, the children with CP did not walk with the same efficiency as the children with TD. This was because they did not have sufficient variation in the speed of their CoM, and the phasing/timing of the velocity (kinetic energy) was farther from the ideal of 180° with respect to the CoM's vertical position. Thus, efficient walking requires precise control of the position and velocity of the CoM relative to each other. It is important to note that this is a learned skill. Ivanenko et al. (2004) showed that toddlers do not have this efficient energy exchange.

Even more compelling evidence of the importance and control of the time-dependent location of the CoM is revealed when one looks at the angular momentum generated in three dimensions (3D) during walking. Research has shown that the angular momenta generated about the total body CoM during walking at different velocities is controlled at a near-zero value (Bennett, Russell, Sheth, & Abel, 2010; Herr & Popovic, 2008). In addition, since angular momentum is a vector quantity, having both direction and magnitude, the angular momentum of one segment can be cancelled by that of another. Bennett et al. (2010) applied 3D motion-capture data of an adult walking with a 12-segment model of the human body. A principal-component analysis suggested that a three-variable model could account for 97% of the variance in the angular momentum. That is, only three parameters were needed to control the movement of all 12 segments. In fact, during the swing phase of walking, when the angular momentum in all three directions is at its minimum magnitude, near zero, the angular momenta of the different body segments cancel each other out. In another study, Robert et al. (2009) used a 17-segment model and found synergies between the segmental angular momenta during the swing phase of walking.

The cited work suggests that we are aware, mostly on an unconscious level, not only of our total body CoM but also of the CoM locations and velocities of our limbs relative to the total body CoM in 3D. (There are two components of angular momentum of a limb about the total body CoM. In locomotion, the transfer term, the product of the velocity and the distance from the limb CoM to the total body CoM, dominates.) In other words, we organize our walking around our CoM, our *Tan Tien* or *Hari*.

To summarize, Hanna believed that most cases of SMA were the result of the habituation of the three stress responses discussed herein. He also believed that human movement was organized about the body's CoM, following the lead of movement systems of the East. Recent research validates this view, as it shows that humans organize walking around their CoMs. Hanna organized his somatic work around these concepts

Somatic Education

Hanna's somatic education techniques included both one-on-one hands-on work—where the practitioner physically manipulates the individual and guides the individual in active movements—and classes where groups of individuals are guided through somatic explorations. In this arena there were few, if any, Feldenkrais techniques that Hanna eschewed. This is especially true in the classroom work, where many of the lessons are very similar to what Feldenkrais himself developed and taught. However, as time went on, classroom lessons that exploited the "pandicular response" (as described below) and used the techniques he had developed proliferated.

There were three main techniques employed by Hanna in his one-on-one work. The first was "means-whereby," a technique developed by F.M. Alexander where the mover focuses on the means of moving rather than the goal of the movement. Hanna's work employed this technique in the manner of Moshe Feldenkrais and not with the verbal guidance used by Alexander.

Hanna labeled his second technique "kinetic mirroring." He applied this term to the technique developed by Feldenkrais in which the practitioner brings the insertion and origin of a muscle closer together with the student being passive. Originating from his judo practice of "going with" an opponent, Feldenkrais later saw this as a technique exploiting the cybernetic feedback loop of the sensory-motor system. In this view the system has a set point, a resting muscle tonus (output) related to the sensory input. For a

given input, here we refer to muscle length, there is a given output, muscle tonus. In kinetic mirroring, the practitioner uses her or his strength to shorten a muscle. This has the same effect as a room reaching a temperature above the thermostat set point and the furnace turning off. In kinetic mirroring, the system reduces the muscle excitation as the system senses that the muscle length is "too" short for the given neural signal.

The third technique, the technique that Hanna himself developed, takes a more direct and active approach to chronically/habitually tight muscles. This technique is especially effective with the group of people to whom he came to direct his attentions. This is the large group of aging adults who were otherwise healthy but had an aching back, sore hip or shoulder, neck pain, or other discomforts that restricted their ability to lead a full life. This technique differed from tablework he learned from Feldenkrais, in that it involved the student consciously tightening and relaxing muscles while controlling the length of the muscles. Hanna assumed that this technique was exploiting the pandicular response in the mover.

In a dictionary, one finds pandiculation defined as a particular type of stretching that often occurs on waking. Fraser (1989) stated, "The symmetrical, coordinated stretching and stiffening actions of the body as one unit is true pandiculation" (pp. 264–265). Your dog or cat will typically do this type of pandiculation on waking. However, Fraser also noted that a pandiculation may be complete or partial (i.e., only a portion of the whole pattern reproduced). He saw pandiculation as a method for the organism to regain its ability to move efficiently. He noted that it often occurred before periods of activity and postulated that it was stimulated by feedback of muscle stiffness.

Hanna created an active learning technique by simulating a full or partial pandiculation. The learner contracts and shortens a muscle or group of muscles and then eccentrically lengthens them paying attention to the sensations from the movement. In this way, the learner moves into a new range of motion while contracting the antagonist to the movement, perhaps a paradoxical learning.

To provide some insight into pandiculation let us examine how this might be applied to increase the resting length of the hamstrings of an individual. Imagine the student lying on her/his back with one leg in the air. (For this example, let us assume the knee is straight, although there are many variations of what is described here and details on taking care of the student are omitted.) The educator holds the student's leg in the air while the student attempts to extend the leg toward the ground. The educator does not allow the leg to move, instead matching the force of the student. (The amount of force is an important decision by the educator.) Once the desired force is achieved in a static contraction, the student then reduces the force of the contraction, a slight amount while the practitioner maintains the original force. The hip will then slowly flex increasing the length of the hamstrings. Typically, after the foot moves a few inches, the student is guided to increase the force once again, causing the hip to slightly increase its extension. The educator once again matches the force of the student and the leg stops until the student again reduces the force and the hip flexes. In this somewhat ratchety fashion the hamstrings lengthen. The student is directed to sense the movement and controls the whole process; both with respect to how slowly the movement occurs and how far a joint moves. The goal is slow smooth movements. This technique stands out from the other somatic methods discussed in that the student is an active learner and the contractions, often quite strong, create strong sensory signals.

Hanna, using these techniques, created three lesson outlines that could be adapted for students. Each lesson focused on the muscles of one of the three stress patterns he identified. Thus he created one lesson that works with the muscles of the startle, one that deals with the muscles of the Landau, and finally a lesson that deals with the major muscles of frontal plane movement to address lateral asymmetry. Since all of us are affected by all three of these stress patterns, individuals typically can benefit from each of these lessons. The organization of these lessons was not accidental. It was his belief that by working with all the major muscles in a stress response, there would be less of a tendency for the mover to return to her/his original "stressed" state if all of the major muscles in the response had changed their resting tonus.

Naturally, with his view that movement was organized around the CoM of the body, Hanna typically began his one-on-one work at the center of an individual. Importantly, this happens to be where most of the large muscles of the body originate. Indeed, the focus of these first three lessons is on teaching the individual to better control the largest muscles. Subsequent lessons would be tailored to the individual's particular needs and desires to an even greater extent.

Hanna did not prescribe how people should move. Once again, he had a view that is in line with a systems perspective. Hanna felt that if he could help people learn to change their morphology, they would naturally find a new/better movement solution. This does not imply that suggestions were not made or specific exercises given to guide a person. Individuals were instructed to be aware, sense their movements, and enjoy their changes.

Hanna also gave his clients "homework" to be done daily. Typically this would be a whole-body movement whose design was to "remind" students of what they had learned. Sometimes these movements would involve some type of third person objective measure that demonstrated any changes (e.g., how far one could reach). These homework lessons were very short, typically less than five minutes. However, with a daily exercise, Hanna once again connects with the somatic practices of the East, such as Tai Chi, which is based upon daily practice. Let us take a look at Tai Chi to see how it compares to our Western somatic methods, especially the work of Hanna.

Tai Chi Chuan

The first-person experience focus combined with a holistic view of the soma brings somatics into line with the Eastern movement traditions such as Tai Chi, where movement is used to inform individuals about their ability to be self-aware. Outwardly, Tai Chi is a series of slow, smooth, circular movements controlled by the waist. Once a martial art, Tai Chi is different in that there are no belts or ranks and there is no singular way to do it. Each mover has his or her own way to move and different teachers emphasize different aspects of the art (see Figure 3). From a motor control perspective, we would say each person's unique morphology results in a unique movement solution. And Tai Chi, like the Western somatic practices, has a unique goal. The goal of the movement is to learn about how you move. (It should be noted most Tai Chi is not taught with this goal explicitly stated. Instead the teaching is implicit. Students are told to relax and perform slow smooth total body movements, guided by the waist. However, these movements cannot be appropriately performed without being aware of oneself, without being able to move with relaxation.)

Thus, the goal of Tai Chi is the same as the goal of somatic education, but the methods are slightly different. Let us explore

these differences. Tai Chi students learn a "form," a connected series of movements that over the years have been designed to show how to move efficiently with little effort. The first principle of Tai Chi is relaxation. Thus, rather than doing simple movements in a unique setting as is done in most somatic methods (e.g., lying down to create a different orientation to gravity), Tai Chi employs complex movement patterns done standing, often balancing on one leg. The movements can only be done correctly when one is "relaxed," that is, when one has voluntary control of the muscles used. In this way, an individual's understanding is revealed in her/his own movements. As might be expected, learning in such a setting to overcome "ineffective movement patterns" typically takes years of *daily* training.

On the flip side, the movements of Tai Chi are similar to movements of daily activities, such as walking, sitting, lifting, and pushing. Consequently most people find it very easy to apply the skills they learn in Tai Chi to their daily lives at all levels of mastery. Not surprisingly, many individuals report positive outcomes, similar to those reported from somatic education, from their daily Tai Chi practice, from reduction of headaches, backaches, and sore hips to more energy and better sleep. Again, Tai Chi arises from the Eastern perspective of a daily practice to maintain health.

One could ask, "Is this type of somatic education effective?" The National Center for Health Statistics estimated there were about 2.5 million adult Tai Chi practitioners in the United States in 2012 (Clarke et al., 2016) and estimates are that nearly 250 million people worldwide practice this somatic art (Scutti, 2013). This has led to more research on the effects of Tai Chi than on the Western somatic practices. This is clearly illustrated by the fact that there are

Figure 3 — Variations of the single whip pose through four generations of practitioners: (a) Wu Chien-chuan (Jianquan), the founder of the Wu style; (b) Cheng Wing-kong, one of Wu Chien-chuan's top students; (c) Hubert H. Lui (Lui Hok Hoi), a student of Cheng Wing-kong in 1955; and (d) the author, Bradford Bennett, a student of H.H. Lui. The weight distribution, height of the stance, and arm positions vary between practitioners. Photos of Wu Chien-chuan and Cheng Wing-kong reprinted with permission of Michael Clarke, Qilin School of Tai Chi Chuan.

10 times more citations in Web of Science for "Tai Chi" than for "Feldenkrais method" or "Alexander technique." While the amount of research is too great to cover in detail here, Huston and McFarlane (2016) reported more than 500 studies and 120 systematic reviews on Tai Chi. The overall findings are summarized briefly below.

Mostly, the research findings on the effects of Tai Chi on health are positive. Huston and McFarlane (2016) rated evidence as excellent, good, fair, or preliminary, or evidence of no direct benefit. They reported the highest level of evidence of benefit from the practice of Tai Chi for (a) preventing falls in older adults in the community, (b) osteoarthritis, (c) Parkinson disease, (d) chronic obstructive pulmonary disease (COPD), and (e) cognitive functioning. Lower levels of evidence were reported for conditions such as depression and back pain. The NIH endorses these findings stating on their website:

> Practicing tai chi may help to improve balance and stability in older people and in those with Parkinson's disease, reduce back pain and pain from knee osteoarthritis, and improve quality of life in people with heart disease, cancer, and other chronic illnesses. (National Center for Complementary and Integrative Health, 2016)

Thus, the somatic art of Tai Chi, acclaimed by the Chinese for centuries for its holistic health benefits, has benefits that extend beyond just movement improvements. It should be noted that the research has included several styles of Tai Chi. Thus the findings cannot be the result of any one particular style but must be the result of the Tai Chi movement approach. While the body of research on Western somatic techniques is much smaller (there are no peer-reviewed studies of the effectiveness of Hanna's techniques), can we expect the same type of results? Let us look more closely at the differences and similarities between Tai Chi and the Western modalities, focusing on the work of Hanna.

Both East and West students of these methods learn novel movement patterns. Tai Chi is performed standing, while in most Western somatic practices students lie down. In Tai Chi, individuals actively move themselves, while in Hanna's work students are both active and passive (where the educator moves the student). Tai Chi is a daily practice. Hanna encouraged a daily practice, but many styles of somatic education do not have this feature. Tai Chi consists of total-body movements; all body segments move in a coordinated fashion in coordination with the breath. In Hanna's work and that of many Western systems, only a part of the work is done using total body movements. In both East and West systems, the focus of the student is inward, attempting to relax unneeded contractions (gain voluntary control) of muscles. Thus there seem to be more commonalties than differences between the approaches of the East and West. The main contrasts between the two seem to be that Tai Chi is total-body movement done daily while standing and consists of entirely active learning, while Hanna's work is done mostly lying down with both active and passive learning. The daily component of Hanna's work is shorter than is typical in Tai Chi practice, but there are many Tai Chi forms that can be performed in less than 10 minutes.

Somatic Education and Research

When one examines the positive findings of Tai Chi practice, one finds benefits that are holistic in their nature, such as reduction of falls or an improvement in quality of life. It seems the evidence is weaker when looking at something as specific as back pain. When we look for specific effects, are we running into one of the fundamental divides between somatic education and its first-person perspective and the third-person perspective of science?

When we run an experiment to study human movement, we give each individual the exact same instructions. We wish to avoid any subjective influence on the test. When a somatic lesson is given, the very goal is to influence and alter the individual's first-person experience. In somatic education one learns through "direct experience." The subjective experience is vital. The goal is to provide input to a person to allow her/him to learn. If you learn, you change. (It is important to note that much of the learning can be implicit in nature.) The somatic educator tells the individual where to look. And in the noticing, in the inner experience, in the new self-awareness, the subjective experience changes. Movement is easier, smoother, more controlled, and is experienced as such.

Measuring the effects of subjective change may be difficult and there appears to be a need to research how to research somatic techniques. Working from a systems perspective, I expect changes in morphology to result in new movement solutions. Of course new movement solutions are most easily seen when one works near a transition point where the form of the movement changes. Fortunately, even if there is no change in movement form, there should be changes in the movement patterns. (Here a change form would be switching from stepping over an object to walking around it, while a change in pattern might be an increase in step length.) If we have a somatic holistic perspective (e.g., how the use of the neck affects the knee), the measurement of total-body movement would appear important. It follows that changes that result from somatic practice may be subtle and may only be detectable with technology such as whole-body 3D motion capture with very fine precision. And even then the data may require complex analysis such as principal-components analysis to reveal potential effects. I draw on my own experience here, and naturally other scientists will see other directions for research to go.

Somatics and Kinesiology

We have been asked, "What can complementary and alternative approaches to movement education teach Kinesiology?" Conversely, we must ask, what can kinesiology teach somatic education? Addressing the first question is straightforward. Kinesiology can learn the importance of the first-person experience. This is no small thing. While all the philosophers have left Descartes's dualism in the dust, there remains a "cognitive" bias in both society in general and in research. Thus acceptance of the importance of the first-person experience will be one of many uphill fights. A second important learning that should be shared with kinesiology is the holistic nature of the soma. How one moves at the ankle may affect how one's neck moves. How one moves affects one's perception of the world around us. One's perception affects one's emotional and cognitive states. How one moves affects one's health. These statements, obvious to anyone with a somatic or even a systems perspective, show the distance between these groups and society in general. However, these learnings will not be easy as they are not subtle; rather, they require a change in one's world view.

With respect to the second question, kinesiology can teach somatics that diverse approaches can exist under a "single" roof. The field of somatic education is in a fractured state, perhaps natural for a nascent field. As somatic education exists outside of the mainstream the separate techniques have tended to have a counter-cultural bent to them. Around the founders of different

techniques (e.g., Feldenkrais or Milton Trager), a cult of personalities often develops. There are few meritocracies, only strongly guarded privileges. Read the certificates of most somatic trainings and you will see that they state only that the student attended the training, not that any level of proficiency was attained. Since the students are not broadly educated in the general field of somatics or human movement, they typically feel that their method is the *only* viable method. They tend to know very little of other modalities. The result is that somatic education is even more siloed than academia, a feat unto itself. Thus, kinesiology can "teach" somatic education the importance of an academic approach where ideas and theories are tested and evaluated, not ignored, and standards are created and maintained.

There are other important ways that kinesiology can inform somatic education. Kinesiology brings with it the scientific method—a method that somehow must be reconciled with the first-person experience. It also has the methods to effectively study somatic education. Kinesiology can provide a way to evaluate the pedagogical strategies of somatic education and suggest improvements. In addition, it can provide the full breadth of scientific subdisciplines that must be studied to fully understand how movement is organized, controlled, and learned, as well as a systematic way to learn these subdisciplines. Finally, kinesiology can lend somatic approaches some professional credibility.

The Potential

There would be a great benefit to society to have somatic educators who were educated in a department of kinesiology. What do we know about the health of our nation? The CDC reported that in 2012 more than 54% of adults reported having musculoskeletal pain with more than 20% having low back pain and 14% reporting neck problems (Clarke et al., 2016). Of those with musculoskeletal pain, 41.6% used some type of complementary health approach. As noted, the source of much of this pain is in the back as more than 80% of the population will have low back pain as adults. Total costs for musculoskeletal pain top $213 billion per year according to the United States Bone and Joint Initiative (2014). According to the American Academy of Orthopaedic Surgeons, one in two Americans has a musculoskeletal condition (Science Daily, 2016). There are three relevant points here. First there is a societal need to help people with musculoskeletal pain. Second, there are significant economic costs associated with these conditions. Third, people are already using these alternative approaches.

Already at many universities, students flock to classes like yoga and Tai Chi in droves. (I had little trouble attracting students to my somatic movement classes in a department of kinesiology in the late 1990s.) Thus students are already experiencing something from the field of somatics, but they don't have a framework to which to connect it. If kinesiology were able to expand its offerings in the somatics direction, the potential number of new students in the field is huge, perhaps ensuring the growth in the field that has occurred over the last 10–15 years would continue. Kinesiology students with a somatic foundation could apply this learning to help individuals overcome/avoid injury and achieve peak performance, whether in sports or performing arts, or to improve ergonomic studies and practice.

Conclusion

This article has covered a great deal of ground. I have endeavored to provide an outline of the somatic philosophy, theories, and practices developed by Hanna. I have not attempted to present a complete description of his work. Instead I have focused on the crucial aspects of his thought and work, especially those which diverged from those of other somatic educators. Hanna named the fields of somatics and somatic education and was a leader in their development. His magazine/journal, *Somatics,* was a platform that allowed communication within the field long before the Internet. Hanna built on what he learned from Feldenkrais and looked to develop a more "clinical" approach in somatic education. His work was cut short by his unexpected death in 1990, but he set the stage for us today.

As Hanna stated, "The somatic viewpoint complements and completes the scientific view of the human being, making it possible to have an authentic science" (Hanna, 1988, p. 21). This special issue of *Kinesiology Review,* and the foresight of its editor, David Anderson, marks a step in this direction, toward an authentic science, as well as toward the establishment of a legitimate home in higher education for the somatic viewpoint. Two questions need to be addressed. First, how can a somatic education perspective begin to be included in kinesiology departments to create new career opportunities for the students? Second, how should research studies be designed to reveal the effects of somatic learning in both healthy and pathological populations? In both cases it may be that a gathering of somatic kinesiologists may be the way to best address these issues. If somatic education is to provide the benefits to society that it is capable of we need to both step up our research and our educational efforts in ways that cross boundaries of the various somatic approaches.

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