



Wudang

A MONTHLY E-NEWSLETTER

5/20



From Sifu Paul

Greetings, everyone,

May has arrived and with it the kind of weather that beckons us outdoors. I have had a couple of T'ai Chi and Qigong practices outside already and look forward to my next one without my shoes on. The plant world is in bloom, reminding us that life goes on in spite of the rhythm change to our lives brought on by the coronavirus.

T'ai Chi is based on the principle of yin and yang as opposites that can't be separated. They're complementary, interconnected, and interdependent forces in the natural world that give rise to each other and simultaneously create and balance each other. There is no shortage of reporting on the negative aspects of the pandemic; yin and yang theory states there will be positives in equal measure. Some quick observations reveal that literally millions of doctors, nurses, and engineers, to name a few, around the world are all working on a unified cause to defeat the virus.

An excerpt from a recent *New York Times* article illuminates this well: "While political leaders have locked their borders, scientists have been shattering theirs, creating a global collaboration unlike any in history. Never before, researchers say, have so many experts in so many countries focused simultaneously on a single topic and with such urgency. [...]"

Normal imperatives like academic credit have been set aside. Online repositories make studies available months ahead of journals. Researchers have identified and shared hundreds of viral genome sequences. More than 200 clinical trials have been launched, bringing together hospitals and laboratories around the globe."



On a personal level, there are opportunities to get more sleep, exercise, meditation, have quality time with family, eat better, learn new things, clean, make music, make art, and change your mindset, among other things.

"A negative mindset will never lead to a positive life."
—Peter Diamandis

"Ultimately, the only way to truly be in control of your life is to be in control of your thoughts." —James Clear

Something we can't control is that Governor Walz announced this week an extension of the Stay at Home Executive Order to May 18. **I will resume a limited class schedule at the Studio beginning Wednesday, May 20** (see the class schedule on p. 4).

Also in this issue: An article on the complex fractal nature of our bodies and the aging process and how T'ai Chi can have a positive effect on slowing the aging process; and a reflection on my time spent with Stig Severinsen in 2015 and learning his Breatheology method.

Breathe deeply and enjoy the warming weather.

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Solo Form classes
will resume on
May 20.

The Real Secret of Youth Is Complexity

Our physiological processes become increasingly simple as we age.

By Lewis A. Lipsitz

Simplicity, simplicity, simplicity!” Henry David Thoreau exhorted in his 1854 memoir *Walden*, in which he extolled the virtues of a “Spartan-like” life. Saint Thomas Aquinas preached that simplicity brings one closer to God. Isaac Newton believed it leads to truth. The process of simplification, we’re told, can illuminate beauty, strip away needless clutter and stress, and help us focus on what really matters.

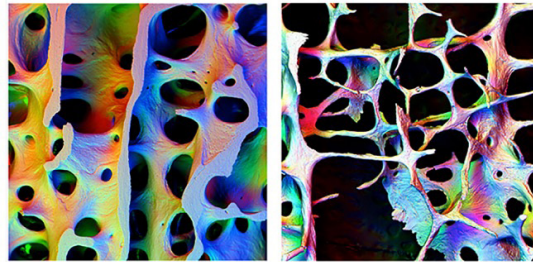
It can also be a sign of aging. Youthful health and vigor depend, in many ways, on complexity. Bones get strength from elaborate scaffolds of connective tissue. Mental acuity arises from interconnected webs of neurons. Even seemingly simple bodily functions like heartbeat rely on interacting networks of metabolic controls, signaling pathways, genetic switches, and circadian rhythms. As our bodies age, these anatomic structures and physiologic processes lose complexity, making them less resilient and ultimately leading to frailty and disease.

To understand this loss, we must first define what we mean by “complexity” in the scientific sense. Consider a Rube Goldberg machine, in which one action leads to another, then another, and so on in linear fashion to finally, say, scratch one’s back or bring a napkin to one’s mouth. Although this over-engineered contraption may look complicated, it’s actually quite simple: A given input always produces the same output. Its simplicity makes its behavior easy to predict. It also makes the system vulnerable because a single break in the chain will undermine its entire function.

A complex process, in contrast, involves multiple different components interacting across multiple scales in time and space. Because these interactions are nonlinear, outputs are not proportional to inputs and thus are more erratic and unpredictable. For instance, think of what it takes just to lift your foot. Electrical, chemical, and mechanical

parts must continually coordinate across molecular, cellular, organ, and systemic levels. Genetic machinery inside cells generates proteins to power muscles; gastrointestinal organs digest and metabolize sugars to provide energy; motor centers in the brain plan and command movement, while nerves relay these messages to muscle fibers and deliver feedback to the brain about your foot’s location in space. As a whole, the process is something more than the sum of its parts.

The fractal-like networks of tissue in our brains, bones, kidneys, and skin all lose structural complexity as we age.



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Healthy bone (left) gets its strength from complex scaffolds of tissue. When this scaffolding loses complexity, osteoporosis (right) can occur.

We can quantify the complexity of biological systems by borrowing mathematical ideas from chaos theory and the fields of nonlinear dynamics and statistical physics. One of these is the concept of fractals. A fractal is an irregular geometric object whose shape obeys an underlying pattern: It appears similar to itself on multiple measurement scales. Clouds, coastlines, trees, rivers, mountain ranges, and fault lines are all examples of fractal-like structures. Whether examined from an airplane or on the ground, with a magnifying glass or a microscope, their appearance stays generally the same.

Inside the body, arteries, neurons, bones, and bronchi are organized in a similar way. And if

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we measure across time rather than space, we also see fractal patterns in the moment-to-moment fluctuations in physiologic signals, including heart and breathing rates, blood pressure, brain waves, and hormonal secretions. Contrary to what you might expect, these fluctuations don't follow regular, or periodic, patterns, but instead show a complex type of variability—what's known as “deterministic chaos.” Although the oscillations are irregular, they appear self-similar when observed over seconds, minutes, hours, or days.

One way to measure the complexity of a fractal-like structure is to compute its “fractal dimension.” Fractals exhibit a property called “power-law scaling”: The smaller the measuring scale, the larger an object's length. The fractal dimension, derived from this inverse relationship, tells us how much space the object fills. More space equals more complexity. A relatively bushy (more complex) branching structure such as a tree, for example, would have a higher fractal dimension than a leaner (less complex) one.

Another common metric of complexity, known as “multiscale entropy,” typically applies to processes, such as the beat-to-beat variability of your heart rate or the moment-to-moment postural shifts your body makes when balancing in a standing position. Multiscale entropy calculates the likelihood that a measured pattern repeats over various scales of time. Patterns with very low likelihood of repetition, such as white noise or randomness, aren't very complex. Neither are patterns with high likelihood of repetition over a single time scale, such as the sinusoidal tick of a metronome. Patterns likely to have similarities across many different time scales, however, are more fractal-like, and hence more complex.

A large and growing body of research suggests that biological complexity diminishes with aging, as various tissues and organs, and their communication pathways, gradually break down. The fractal-like networks of tissue in our brains, bones, kidneys, and skin all lose structural complexity as we age. This loss



impairs their capacity to adapt to stress, and may eventually lead to disease or disability. For example, when the microscopic struts in bone tissue thin and disconnect, as occurs with osteoporosis, bones become brittle and prone to fracturing. Likewise, the pruning of neural connections in the brain is associated with age-related neurodegenerative disorders, such as Alzheimer's and Parkinson's diseases.

Physiologic processes, too, lose complexity with aging. Take, for instance, heart rate. Although average beats per minute may stay relatively constant over a person's life span, tiny variations in the timing between beats become more regular (less complex) with advancing age. Numerous studies have linked this change to cardiac disease and mortality: The simpler the signal, the higher the likelihood of abnormal rhythms, heart attacks, and heart failure. Similarly, neural activity produces electrical signals that appear less complex in older adults. As complexity declines, so do motor control and cognitive functions, including gait, attention, and memory.

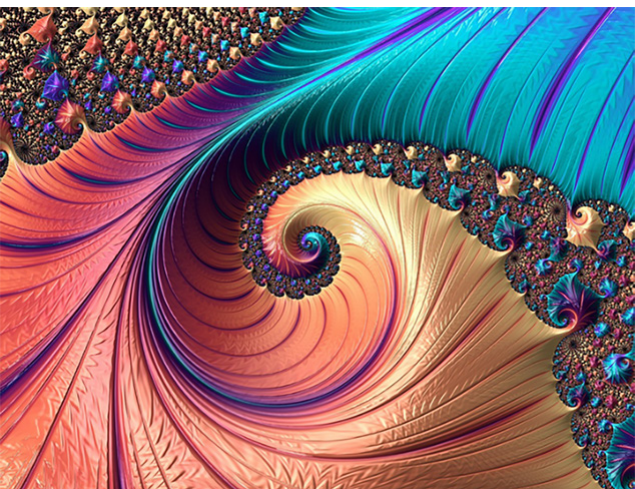
The good news is that we may be able to slow, or even reverse, some of the complexity loss that comes with getting old. Aerobic exercise and resistance training, for example, have been shown to increase heart rate complexity. The Chinese practice of tai chi, which combines

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Soreau's Fractal
Painting by
Paul Abdella

physical movement, breathing techniques, and meditation, has a similar effect on postural control. When you stand still, you may notice your body swaying ever so slightly as your muscles make tiny adjustments to keep you balanced on your feet. We can record these fluctuations on a force plate, which allows us to calculate their complexity. Lower complexity correlates with poorer balance, a slower gait, and risk of falling. But tai chi seems to provide an antidote: In one recent study, my colleagues and I found that just 12 weeks of tai chi training can improve the complexity of postural sway in elderly adults, including those in their 90s. Subjects who completed the training regimen also increased their gait speed and so may be more likely to avoid falls.

We've also found that we can improve the complexity of postural control by applying very weak, random vibrations to the soles of the feet. How this intervention works isn't clear. It's possible that the vibrations, which can't be felt, add low-level noise to the sensory system, increasing input to nerve receptors, and thereby lowering their stimulation threshold. This phenomenon, known as stochastic resonance, may boost nerve cells' ability to gather and react to information about the location and position of the feet. As a result, the body is able to make more complex, and hence more adaptive, postural adjustments.

There are additional benefits to be gained from maintaining complexity on the social scale. Studies consistently show that having an extensive and diverse social network is linked to better health and wellbeing. Compared to the socially isolated, connected individuals live longer, are less depressed, and are more likely



Limited Class Schedule Beginning May 20

T'ai Chi Solo Form Classes will resume at their regularly scheduled times:

Afternoon classes on Tuesday, Thursday, Saturday starting at 12:30 p.m.

Evening classes on Monday, Wednesday, Thursday starting at 6:00 p.m.

There will be a Healing Tao Meditation class on Wednesday evening from 7:30–8:30 called Introduction to Taoist Breathing Methods. The class will focus on cultivating the breath for health and building the immune system.

More classes and styles will be brought back into the schedule beginning in June.

to recover from heart attacks, strokes, and other acute illnesses. Simply adding complexity to your daily routine can have far-reaching effects: Learning new skills or solving mental puzzles, for instance, can help improve cognitive function and may help stave off dementia.

So if you dream of retiring to a quiet beach or to the woods, like Thoreau, "to live deliberately, to front only the essential facts of life," I invite you to embrace a new mantra: Complexity, complexity, complexity!

Lewis A. Lipsitz is the director of the Institute for Aging Research at Hebrew SeniorLife, a professor of medicine at Harvard Medical School, and chief of the Division of Gerontology at Beth Israel Deaconess Medical Center, where he is a practicing geriatrician. His research focuses on the causes and prevention of impairments in mobility and cognition associated with aging.

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Beautiful chaos:
A fractal is a pattern
that is self-similar
across different
scales; an infinitely
complex kind of chaos.

Breatheology: Challenging Limiting Beliefs

In 2014, I took an online course from a Swedish voice and performance coach named Per Bristow. Per teaches throughout the world, promoting his method for freeing the voice based on muscle isolation, strength development, and relaxation techniques. As someone who uses his voice a lot, I was interested in Per's T'ai Chi-like approach to helping me save vocal wear and tear and help me improve my speaking voice. Per would do frequent mailings, introducing his students to teachers in other disciplines that he felt had something of value to offer them in developing their voice and breath control.

One such teacher was Stig Severinsen, a Danish free diving champion who had developed a method of breath control he called Breatheology, which develops breathing, breath holding, and mental training techniques. Per was ecstatic that he had arranged for Severinsen to teach a 12-week course in his Breatheology method. The following is a brief summary of the course with a link to a recorded conversation I had with Stig in 2015.
—Paul

Stig Severinsen began unwittingly developing his Breatheology method as a child by experimenting with holding his breath at the bottom of his parents' swimming pool. He started swimming at the age of 6, and by the age of 9, he was a Danish national champion for four consecutive years. At 20 years old, he was a member of the national underwater rugby team for three years, and at 28, he played underwater hockey for the Spanish national team in Barcelona while studying medicine and biology at the university there. I can't imagine how fans might enjoy these sports, but I can imagine the breath control required to play them. This background brought him to the sport of free diving, in which he secured four world records.

Stig codified his knowledge of breathing into a system he called Breatheology.

After retiring from the sport of free diving, Stig wanted to bring worldwide attention to his Breatheology method and the awareness that "through working with the breath, a link can be created between body and mind that enables a person to control stress, increase



energy, perform better physically and mentally, alleviate pain and improve health." To that end, he proceeded to set a series of Guinness world records. In March of 2010, he swam 236 feet under the ice wearing only swim trunks and goggles, breaking the previous record set by Wim Hof. That same year, he held his breath for 20 minutes and 10 seconds in a tank full of sharks. (As a marine biologist who loves animals, he added the sharks not to show how brave he was in the face of danger but rather that sharks get unfairly portrayed in the media and that it wasn't dangerous.)

In 2012, he broke his own world record by holding his breath for 22 minutes in a water tank (free of sharks) at the London School of Diving. In 2013, he set two new world records. He held his breath and swam 500 feet in 2 minutes, 11 seconds, under the ice in a frozen lake in Greenland, wearing a wet suit and a mono fin. The next day, he held his breath and swam 250 feet under the ice wearing only swim trunks. He then announced that would be his last record attempt and that he would be devoting himself to teaching Breatheology to

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Champion free diver and Breatheology founder Stig Severinsen demonstrates breath-holding technique in a pool

help anyone who wants to cultivate their breath and mental outlook and improve their quality of life. I signed up for the course.

Over the next 12 weeks, a series of weekly modules progressively brought conscious awareness to different aspects of the breath and body. Stig's approach to breathwork is grounded in his background in yoga and experience as a free diver. In the course, the body was reshaped through various postures—standing, seated, and reclining—that relaxed the body and freed up its breathing apparatus. Like in T'ai Chi, the emphasis was always on relaxing the body-mind more deeply.

Yoga's breath work, called pranayama (manifestation of vital energy), shares some similarities with Daoist breathing methods, such as the importance of full abdominal/diaphragmatic breathing to more efficiently bring oxygen into the body, stimulate the parasympathetic nervous system, and work with the subtle energy body and direct it through various energy pathways. Daoist breathing methods tend to always keep the breath energy moving, while pranayama methods often control and contain the breath using sealing or locking at the perineum, diaphragm,

or throat. Other differences exist, but both view the breath as a vehicle to higher levels of consciousness and health.

In each module, there were demonstration videos, guided audio meditations, and other practices, and once a month, there was a live teleconference call with Stig. These were quite interesting, as people from all over the world called in. The calls were only supposed to be an hour long, but each of them went 3 hours; this spoke to Stig's enthusiasm for teaching and his spirit of generosity.

During the second month, I was able to get through on the call and ask him a question.

I wanted to know how he transcended his limiting beliefs in order to perform the extraordinary breath-holding feats that had secured him his many world records. I recognized there was a double layer of limiting belief that he needed to break through: the limiting beliefs imposed on him by science and those of his own mind. In addition to being a marine biologist, Stig also has a PhD in medicine, so for a scientist, there was much that science had to say about what a body could and could not do.



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Stig Severinsen and a
diving buddy

Most of the callers had questions about techniques to improve their breath holding or about personal health concerns, so Stig seemed unprepared for my question about his own internal process to break through his limiting beliefs. I don't think anyone had asked him this question before, as he seemed to be exploring the answer as he spoke. I have made a recording of our conversation available in the members' section of our website; be sure to check it out.



In preparing to write this piece, I sought out some more recent interviews with Stig to see how he may have evolved his thinking on breath work since we spoke in 2015. I found an interview recorded this year in which he introduced the topic of breaking through limiting beliefs without being asked about it. I like to think I may have had a small part in bringing that subject more fully into his awareness 5 years ago.

Grappling with our own limiting beliefs is a natural part of being human. Our perceptions of the outside world, our thoughts, and our feelings are often sources of limit rather than liberation that keep us fixed in our self-identity and draw us away from an inner knowing of the true self. A meditation teacher of mine likened the inability to transform the limiting beliefs of our perceptions, thoughts, and emotions to barnacles. If left unchecked, the tiny crustaceans attach themselves and cover a ship's hull and propel-

ler, reducing efficiency, power, speed. They enter the water intake system and engine, until finally they leave the vessel dead in the water, unable to move on course or in any direction.

Belief is the interpretation of our perceptions, thoughts, and feelings, and the function of the belief is to prove itself right, often canceling our ability to see or consider another way of looking at something. When we exercise, we introduce stress into the body in a controlled and deliberate manner. We might not like to exercise, but if we regularly embrace the process and routine of it, we become stronger and more flexible, and we gain greater endurance. When unwanted stress enters our life, as it's bound to do, it's much more difficult to relax and release it—especially if we perceive it as life threatening. But it's possible.

I enjoyed the Breatheology course. I came to it with experience in various breath work practices but let go of them and surrendered to Stig's method. There's something primal and threatening about not breathing—even voluntarily—that challenges one's ability to remain calm and experience the hold as a meditation.

As another meditation teacher of mine once said, "Meditation is not an escape from life, it's a rehearsal for life." I always have that in mind before meditating and when exhaling after a long breath hold and taking my next life-giving breath.

*"It may be that when we no longer
know what to do
we have come to our real work,
and that when we no longer know
which way to go
we have come to our real journey."
— Wendell Berry*
