

## **Towards the Development of a Conceptual View of the Body Construct as Aliveness in Movement<sup>1</sup>**

**Zadok Ruben**

### **Introduction**

“There really isn’t a primary control as such. It becomes a something in the sphere of relativity”, Alexander wrote to Frank Pierce Jones in December 1945<sup>2</sup>. Alexander’s statement could appear to contradict the main pillar of his life’s work, as described in his four books. In my view, however, the statement represents Alexander’s most important concept, a foundation of the Technique.

When I read Alexander’s statement, I experienced a great relief. I could stop wrestling with questions about the nature of the ‘primary control’. “It becomes a something in the sphere of relativity” offered me a base towards understanding the nature of the body as a holistic construct; a construct where aliveness manifests in movement. Over the past seven years I have developed this view – that the primary control is about aliveness manifested in movement.

### **Personal Background**

By the time I decided to train as an Alexander teacher, I had twenty-five years as a veterinary anatomical pathologist and a general toxicologist, investigating the harmful and beneficial effects of putative pharmaceuticals and other medications for human diseases. Investigating biological form-structure-function associated with health or dysfunction was the building block of my professional work. As for my own body, from age nine through my twenties, I had sustained several lower back/thigh injuries. Their effects built up with time and by about age fifty, it was clear that I was on my way to serious limitations in my movement. Despite the pain and the diagnosed spinal structural effects, I chose not to undergo spinal surgery. Instead, I pursued various mind-body methods, including the Alexander Technique. The outcome of these methods was a remarkable reclaim of my constructive proprioceptive-kinesthetic behavior - my self in use. I prefer this phrase, self in use, to ‘use of the self’, based on my understanding of *The Universal Constant in Living*<sup>3</sup>. My reasoning behind this is that I see my “self” as a subject that is active and in *use*, versus *using* my “self” as an object.

While learning ‘the Work’, something was changing in my experience – in the way I experienced being alive. As a scientist, it was important for me to seek clarity – to try to bridge the science I knew with what I felt was happening in me. After I graduated, my trainer, Martha Hansen-Fertman, offered me the opportunity to teach anatomy in her course, which I welcomed. I asked myself how I could select and interpret from the vast amount of anatomical (and

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<sup>1</sup> Parts of this paper were presented in a workshop (*Holistic-Relational Anatomy and the Use of the Self: A Conceptual Presentation and Hands-On “Work”*) with Tommy Thompson; 10<sup>th</sup> International Alexander Technique Congress, Limerick, Ireland 2015.

<sup>2</sup> Alexander, F.M. 1945. Letter to Frank P Jones – unpublished

<sup>3</sup> Alexander, F.M. 2000. *The Universal Constant in Living*: Mouritz, London pp XXXI-XXXII

physiological/pathological) information so it was beneficial to the trainees. Martha advised me: “Don’t teach anatomy; teach *a conceptual understanding of anatomy*” - instead of teaching detailed body anatomy and nomenclature, the emphasis should be on the body as an integrated and living mechanism. This advice has guided me through the subsequent years of inquiry and teaching<sup>4</sup>. In the process, I have become an observer-witness of the body and its aliveness in movement. Additionally, my perception of nature has shifted, towards one that sees the relationship between aliveness and movement as holistically interrelated. Concurrently, the scientist in me has inquired whether my new observations were in line with the principles of Mr. Alexander’s writings.

### **Physical background and tensegrity**

Basic characteristics of mass (matter) are form, volume, and being composed of particles. The particles relate to one another during movement. Mass, form and volume are a manifestation of the particles’ inter-relatedness at movement.

In the 1960s, W. Buckminster Fuller proposed the term “*Tensegrity*” (tension integration or tensile integrity).<sup>5,6</sup> He observed that for stability and shape, a body (mass) must have its firm, compressed particles (“building blocks”) separated from each other, while concurrently being continuously connected by tensile forces. This state of organization he termed “*discontinuous compression-continuous tension*”. The *skwish* (**FIGURE 1**) is an example. The rods (struts) are an example of discontinuous compressed-firm parts, whereas the tensile strings (cables) represent continuous flexible elements. A classical example of an architectural tensegric construct is the geodesic dome (**FIGURE 2**). Stability is achieved through the dynamic reciprocal relationship of its structural elements, which is different than that of a high-rise building (**FIGURE 2**), where stability is based on fixed stacked layers, one on top of the other. The structural relatedness of the latter in Fuller’s terminology is “*vertical compression*”. The sculptor Kenneth Snelson, working with Fuller’s concept, designed sculptures of dynamic tensegrity<sup>7</sup>.

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<sup>4</sup> Ruben, Z. 2012. *A view on a conceptual understanding of anatomy for facilitating a constructive kinaesthetic behavior (use of the self)*: The Congress Papers: 9<sup>th</sup> International Congress of the F.M. Alexander Technique STAT Books, London, pp. 327-347

<sup>5</sup> Kenner, H. 1973. *Bucky: a Guided Tour of Buckminster Fuller*: William Morrow: New York,

<sup>6</sup> Fuller, R.B. 1961. *Tensegrity*: <http://www.rwgrayprojects.com/rbfnotes/fpapers/tensegrity/>

<sup>7</sup> Snelson, K. <http://kennethsnelsen.com>

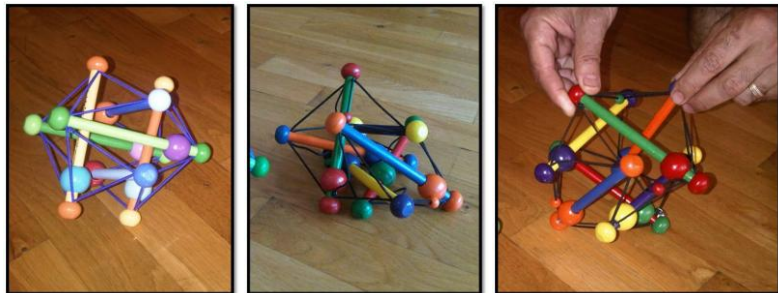


Figure 1. Skwish, an example of a tensegrity construct. Left: volume and form are attained by the firm wooden rods that are separated from each other, while continuous connectivity is provided by the pliable elastic strings (blue). Rolling the skwish will not alter its form or volume. Upon applying pressure, its form-volume will change (e.g., height will reduce). As long as the tensile-elasticity of the strings is retained, the form-volume will re-establish upon removal of the pressuring force. Middle: Collapse of the form and volume reduction is a result of reduction in tensile-elasticity of the pliable elastic strings. Right: Re-establishing the volume and form by mechanical lifting.



Figure 2. A geodesic dome —The Cinerama Dome Theatre on Sunset Boulevard (right in the left photograph) representing tensegrity architecture principle as compared to the high rise “vertical compression” building to its left, or The Empire State Building and its neighbor in construction in the right photograph [Internet public domain photos: [www.waterandpower.org](http://www.waterandpower.org) (left) and Wikipedia (right)].

## Tensegrity, human bio-structural construct and mechanobiology

Fuller’s principle of *tensegrity* can be well applied to the body construct of vertebrates including humans. The isolated bones (the “firm struts”) are continuously connected into an organic unity through tensile-softer structures such as muscles, tendons, ligaments, membranes and other fascia-tissues. The orthopaedic surgeon Dr. Stephen Levin proposed the term bio-tensegrity.<sup>8</sup> Practitioners of Rolfing, massage and other somatic therapy methods have increasingly recognized the importance of the fascia in continually connecting the isolated bones into an organised musculoskeletal system (more accurately “fascio-musculoskeletal” system).<sup>9,10,11</sup> The concept of tensegrity has also been applied to the Alexander Technique.<sup>12,13</sup> In my presentations, I devote a significant amount of time to tensegrity and the role of the fascia in the construct of the body<sup>4</sup>.

<sup>8</sup> Levin, S. M. 1982. *Continuous tension, discontinuous compression: a model for biomechanical support of the body*: <http://ati.net.com/articles/Levin.php> (also, <http://Biotensegrity.com>)

<sup>9</sup> Juan, D. 1998. *Job’s Body: a Handbook of Bodywork*: Station Hill Press: Barrytown, NY

<sup>10</sup> Myers, T. W. 2001. *Anatomy Trains: Myofascial Meridians for Manual and Movement Therapists*: Churchill Livingstone: Edinburgh

<sup>11</sup> Schleip, R. 1998. *Adventures In The Jungle of Neuro-myofascial Net*: Rolf Lines, Vol. 26, pp. 35–37

<sup>12</sup> Boggs, C. 2012. *Biotensegrity and the Alexander Technique*: The Congress Papers: 9<sup>th</sup> International Congress of the F.M. Alexander Technique, STAT Books, London, pp.163-174

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Biologists' interest in cellular form-structure-function relationships goes back to the late 19<sup>th</sup> century. The emphasis has been on chemical, biochemical and genetic processes. By the early 20th century, the Scottish zoologist Sir D'Arcy Wentworth Thompson offered fundamental observations on cell particles' movement and form during cell division.<sup>14</sup> Recently, advances have been made on the effect of physical stimuli on cellular form, structure, and function. This opened a new field of scientific inquiry known as mechanobiology or mechanotransduction. Dr. Donald Ingber (pathologist and cell biologist at Harvard Medical School) demonstrated that the nature of cellular form-structure-function dynamics is consistent with Fuller's *tensegrity/discontinuous compression-continuous tension*, and proposed his findings as the "architecture of life"<sup>15</sup>. Further he proposed that advancements in mechanotransduction may lead to better understanding of processes associated with ostensibly unrelated diseases, and development of therapeutic remedies<sup>16</sup>. Importantly and congruent with the holistic nature of the Alexander Technique, Ingber has advocated a view of biology as an indivisible organization and network.<sup>17</sup>

### **Holistic-relational body-construct, proprioceptive-kinesthetic behavior and the Alexander Technique**

Around 2008, at the end of my teacher training, I experienced a distinct "openness and release" of restrictions related to my lower back and thigh injuries. While studying Fuller's path and observations, and reflecting on what I was experiencing, I conceived the human body as a dynamic whole made of particles (parts) that are connected as an integrated constellation. Together with the mind, this constellation is congruent with aliveness that is manifested in movement. Further, it maintains a dynamic and stable relationship with its environment. Within this concept<sup>4</sup>, movement and dynamic stability are a composition of four affinities that occur concurrently ("interactively play") towards an organized dimension:

- Expansion (the particles disperse away from each other).
- Compaction (the particles move toward each other).
- Flexibility (achieving a flexible-elastic state).
- Tonicity (suitable tone for the desired function).

The inter-relatedness between the four affinities is mutual and perpetual— a dynamic process akin to "an ongoing checks and equilibration".

Such a simultaneous coordinative integration applies to all body parts regardless of their size and to the whole human body. It can be understood that the body parts are organized as a replica of living form-units, functioning in a relational-multidirectional suspensory vectorial equilibration with each other (*vector* denotes direction in space combined with force; *equilibration* refers to a

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<sup>13</sup> Dietschy, D. 2011. Personal Communication: 9<sup>th</sup> International Congress of the F.M. Alexander Technique, Lugano, Switzerland, August 7-13, 2011

<sup>14</sup> D'Arcy, W.T. *On Growth and Form*: First paperback printed and manufactured in the USA

<sup>15</sup> Ingber, D. E. Jan. 1998. *The Architecture of Life*: Scientific American, pp. 48–57

<sup>16</sup> Ingber, D. E. 2003. *Mechanobiology and Diseases of Mechanotransduction*: Annals of Medicine, Vol. 35, pp. 1–

<sup>17</sup> The Ingber Lab. 2001. <http://www.children'shospital.org/research/Ingber/tensegrity.html>

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continuous dynamic state where zero equilibrium does not “exist”). By this, the proprioceptive-kinesthetic use of the body (self in use) is integrated as a dynamic indivisible organism. A response to a stimulus in one part affects others and the whole. Further, this dynamic-tensegric suspensory equilibration among the body parts is essential to stability, movement, vigor, vitality, and an ongoing bipedal upright orientation with gravity. This dynamic holistic-relational view of the human body is in contrast to the common view of a “firm-strong” erect body. This view of holding a vertical linear postural balance against gravity is more analogous to the high rise architectural model of *vertical compression*.

Upon reflecting on my conception further, I was delighted to find biological support from what Ingber had put forth based on cell research<sup>17</sup>.

*“...the cell does not respond to mechanical stress like a ‘balloon filled with molasses or jello’. Instead, the viscoelastic behavior of living cells results from collective mechanical interactions within the tense molecular cytoskeleton”*

*“Thus, forces that are applied to the entire organism (e.g., due to gravity or movement) or to individual tissues would be distributed to individual cells via their adhesions to the extracellular matrix support scaffolds.”*

### **The head-neck complex: An example of a multidirectional suspensory construct**

For the following discussion I suggest viewing the head-neck complex being divided at the base of the skull: above the bony cranium and its internal content (brain and associated tissues) and below, the neck-face complex. This partition is congruent with what Patrick MacDonald realized during the first teachers’ training course—that the atlanto-occipital (AO) joint is pivotal to the head-neck relationship and balancing the head. Marjorie Barlow emphasised the importance of MacDonald’s anatomical clarification<sup>18</sup>. MacDonald writes<sup>19</sup>.

*“Dr. Andrew Murdoch, a keen pupil and follower of Alexander, was at considerable pains to find anatomical terms of the fundamental truths of Alexander’s discovery of a Primary Control of bodily behavior. In conducting investigations at the Edinburgh School of Medicine, he noticed that there was a set of small muscles at the atlanto-occipital joint (where the neck meets the skull), and that no function had yet been ascribed by medical science.”*

*The Universal Constant in Living* addresses Dr. Murdoch’s inquiry in more details<sup>20</sup>: the “set of small muscles” are now well known as the sub-occipital muscles, also termed “the sub-occipital triangle” (**FIGURE 3**). Since MacDonald’s clarification, the AO joint and the sub-occipital muscles have become the focal anatomical “staple” in the Alexander Technique community for pointing to the head-neck relationship.

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<sup>18</sup> Davies, T.A. 2002. *Marjory Barlow and the Alexander Technique: An Examined Life*: Mornum Time Press, Berkley, California

<sup>19</sup> MacDonald, P. 1989. *The Alexander Technique: as I See it*: Rahula Books, Brighton, Great Britain

<sup>20</sup> Alexander, F.M. 2000. *The Universal Constant in Living*: Muritz, London, p 179, pp. 309-311

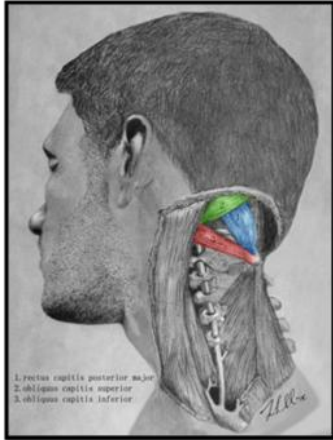


Figure 3. The three left sub-occipital muscles connecting the skull to the atlas (1<sup>st</sup> cervical vertebra) (Internet public domain images: [www.en.wikipedia.com](http://www.en.wikipedia.com)).

However, this focus on the AO joint and the sub-occipital muscles did not make sense to me. I noticed through anatomical illustrations (**FIGURE 4**), that the base of the skull is slanted up toward the forehead (compared to the feet that spread parallel to the floor), that the AO joint itself is similarly slanted and that the center of gravity area at the base of the skull (roof of the nasopharynx) is virtually devoid of tissue support connecting with underlying organs. All this indicated to me that there is too much burden on the AO zone if it is the focal area for a dynamic suspensory head-neck relationship. Further observations led me to the hyoid (lingual) bone (**FIGURE 5**).



Figure 4. Lateral x-radiograph view of the head and neck. The AO joint and the base of the skull are in a continuous up-frontward slant. The degree of the slant is somewhat exaggerated because the face is pointing up (Internet public domain images: [www.en.wikipedia.com](http://www.en.wikipedia.com)).

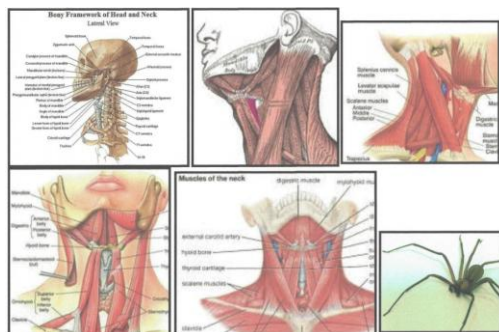


Figure 5. Composite of anatomical illustrations to demonstrate the suspensory multidirectional connectivity of the hyoid bone and its analogy to a spider (Internet public domain images from top clockwise: [www.googleimages.com](http://www.googleimages.com), [www.en.wikipedia.com](http://www.en.wikipedia.com), [www.snipview.com](http://www.snipview.com), [www.pinterest.com](http://www.pinterest.com), [www.britannca.com](http://www.britannca.com), [www.wildmaryland.blogpost.com](http://www.wildmaryland.blogpost.com)).

The hyoid bone is unique among other bones in the body. Its articulation with other bones is not via regular joints.<sup>21</sup> It is in a suspensory multidirectional connectivity: above, with the root of the tongue, mandible, chin, and skull (at two sites) and below, with the laryngeal cartilages, sternum, and shoulder blades. In addition, via additional intermediary tissue it reaches to the soft palate, pharynx, and the base of the skull and AO joint area. Using the image of a spider as an analogy (**FIGURE 5**), the hyoid bone is the spider's body, and the multidirectional myofascial connections are the spider's legs. The spider's body manifests a suspensory organization that allows elevation, lowering, forward, backward, right and left mobility. The crucial role of the hyoid bone-AO-cervical spine complex in the multidirectional suspensory construct compatible with "neck free, head forward and up" became apparent.

By further studying the head-neck complex as a total construct, I noticed that the front face area is internally connected to the cervical spine-AO-hyoid bone complex via bony structures. Internal tissue connectivity among these structures is rather tight and inflexible. Yet, by experimenting on myself, I noticed that during intentional eye movements (while the rest of the face is "stationary"), a reciprocal movement response occurs at the cervical spine-AO-hyoid bone complex. This movement was accompanied with a sense of openness that flowed to the entire internal head-neck complex and the whole body and upon my breathing. Following this experience, I could not find in my research any internal soft tissue connectivity that is associated with this continuous "flow" (that is initiated at the extraocular muscle). Further, Thomas Myers' related discussion in *Anatomy Trains*<sup>10</sup>, and what Peter Grunwald proposes in *Eyebody*<sup>22</sup>, together with the extensive scientific evidence for neural mediation<sup>23</sup> on the topic of the neck and extraocular muscles, did not offer the answer I was seeking. I envisioned the base of the skull as a construct that is compatible with the concept of tensegrity, where the bones are separated from each other while continuously connected by a "dense yet somewhat pliable" fibrous tissue.

<sup>21</sup> Netter, F. H. 2004. *Atlas of Human Anatomy*: Icon Learning System, Teterboro, New Jersey, pp 25, 49, 55, 61, 64, 69

<sup>22</sup> Grunwald, P. 2004. *Eyebody: the Art of Integrating Eye, Brain and Body*: Eyebody Press in Association with Steele Roberts, New Zealand (English edition)

<sup>23</sup> Sparks, D. L. 1991. *The Neural Control of Orienting Eye and Head Movements; In Motor Control: Concepts and Issues*: D.R. Humphrey and H.-J. Freund, eds. John Wiley & Sons Ltd., Hoboken, New Jersey

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Later, I found a similar hypothesis from craniosacral osteopathy, referring to the role of the bony orbit but not addressing the participation of the extraocular muscles<sup>24</sup>.

I also considered the crucial role of two neighboring structures in the base of the skull: 1) the pharyngeal tubercle (located at the top of the throat) and 2) the sphenoid bone (centrally located at the base of the skull). These, together with the nasopharynx located below, play a crucial role in bipedal uprightness, air passage during breathing and vocalization. The importance of the relationship of these anatomical structures is best exemplified in the practice of the “whispered Ah” and various other voice exercises.

Putting it all together, I suggest that the internal tensegric relationship among the four zones, those behind the eyes, the sphenoid-pharyngeal tubercle, the AO-upper cervical spine, and the hyoid bone, is crucial for the dynamic head-neck relationship (**FIGURE 6**). Support for this suggestion of hands-on teaching is illustrated in **FIGURE 7**.

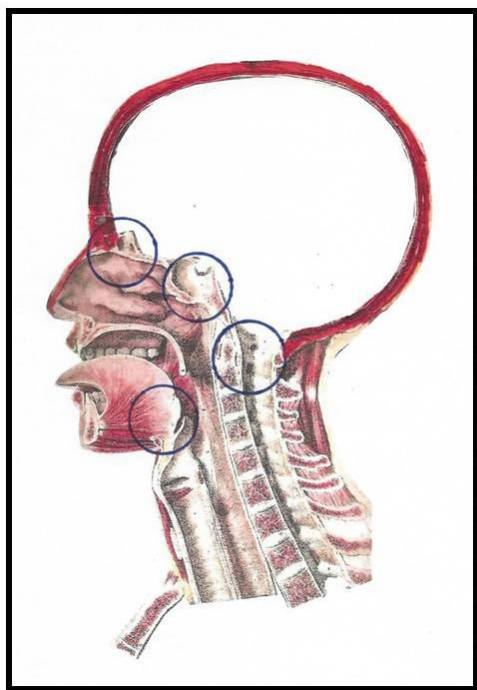


Figure 6. The circles represent the four zones, counterclockwise below: of the hyoid bone, AO joint-upper neck, sphenoid-pharyngeal tubercle, and behind the eyes. (Modified, from Internet public domain images, [www.pinterest.com](http://www.pinterest.com) [from Bourgerie J.M. and N. H.Jacob *Atlas of Human Anatomy and Surgery*; Jean-Marie Le Minor & Henri Sick, eds. Taschen-Barnes & Noble, New York]).

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<sup>24</sup> Cook, A. 2005. *The SBS Revisited – The Mechanic of Cranial Motion*: Journal of Bodywork and Movement Therapies, Vol. 9 (3), pp. 177-178



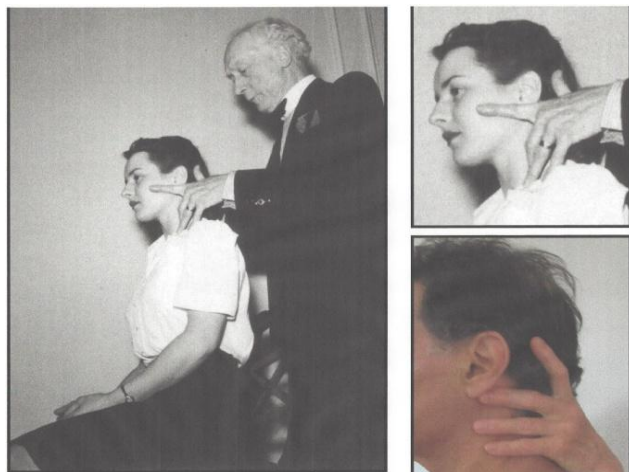


Figure 7. Teachers in a process of enlivening the student's head-neck relationship via two different approaches. In as much as both approaches are effective, their comparison provides support for the aforementioned view. In A and B, Alexander's index finger is in contact parallel to the base of the skull and with the thumb support the occiput and the AO-upper neck zone; and the other fingers are at the lower neck and thoracic inlet. The contact by the teacher in C is limited to the occiput-AO zone-down to the mid neck zone. The approach depicted in A and B provides lesser mind-bio-physical effort (more "energy" conservation) for the intended suspensory multidirectional vectorial equilibration of the head-neck relationship. In other words, by the approach depicted in A and B, there is less "demand" on the hyoid bone and the AO-upper cervical zones than by the approach depicted in C (Alexander's photo generously provided by Robert Britton).

The tensegric relationship between these four zones is attained by being in a dynamic state. Each of the four zones has a different quality of *discontinuous compression-continuous tension* (refer to commentary below). Together, they provide a tensegric construct through which the "sphere of relativity" of the head-neck relationship occurs. In my view, the aforementioned dynamic organization is the *means whereby* aliveness manifests in movement.

If we return to the notion of the "flow", its initiation may start at any locale; the fundamental state is one that allows flow dissipation through the whole. MacDonald<sup>20</sup> (in the chapter, *Teaching the Technique*) writes "forward in Forward and Up is an unlocking device." I am told that Jones had asked A. R. Alexander when working with a student "how will I know where to put my hands?" A.R. replied "put them where they are needed". If a "lock" occurs in one particle, the blocking affect in flow dissipation modifies the whole (the exercise of "group tensegrity"<sup>1,4</sup> is an excellent example).

It is evident that when the tensegric movement initiates at the head-neck vicinity, a flow would dissipate throughout the whole body. Anatomically, Myers<sup>10</sup> describes compatible myofascial connectivity with special reference to the *deep front line*. In addition, *body mapping*<sup>25</sup> is quite popular in teaching the Technique. In my view, regardless of the anatomical specifics, including the aforementioned four zones of the head-neck complex, the flow dissipation is multidirectional<sup>4</sup>. The movement of body particles is wave-like, curvi-linear arcs and spirals, folding in and out, forming and bursting bubbles, etc. I draw support for this view from observing topography of muscles, bones, and other body structures; tongue, heart or intestinal

<sup>25</sup> Geham, S. *Body Mapping*: <http://www.alexandertechnique.com/articles/bodymap/>

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movement; breathing cycles; animal movement including fish in the water; cells in culture; leaves in the wind; steam rising from boiling water; sea waves; etc.

## **Closing remarks**

In the above mentioned letter to Jones<sup>2</sup>, Alexander added (commas by ZR):

*“The primary control of the use of ourselves in the activity of living, may be most accurately defined as that relationship of the head to the neck, and the head and neck to the body, at a given time, which makes for the integrated use of the mechanisms of the self as an indivisible whole”.*

This statement is a more specific definition than the abovementioned “relativity”, and complements it. I propose that the holistic-relational view of body construct presented herewith and elsewhere<sup>4</sup> are congruent with Alexander’s combined statements, and it could shed some light on “it becomes a something in the sphere of relativity”.

In the context of Alexander Technique “Work” (the lived experience), the views, interpretations and explanations, and the described living body construct, tensegric state, movement, flow, or proprioceptive-kinesthetic organization that are presented in this paper, cannot be achieved by “doing”. In fact, any “doingness” results in “locks”, interference effect on the dissipating flow and aliveness characteristic to the tensegric self in use. What allows aliveness and its manifestation in movement is the lived mind-bio-physical state of “let”, a lesser undue tension.

## **Commentary**

The zone behind the eyes and its connection back to the AO joint, through the base of the skull, including the sphenoid-pharyngeal tubercle zone, is the most firm and “rigid”. The zone of the hyoid bone and its above and below connectivity is the most soft and flexible. The softness-flexibility of the AO joint-upper cervical spine zone is somewhere in between.

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Zadok Ruben (ATI, ISTAT) trained with Martha Hansen-Fertman at the Philadelphia School for the Alexander Technique, and additionally studied with Alexander Technique training directors and senior teachers in the United States and Israel. In addition to a teaching practice, he is on the faculty at the School in Philadelphia and presents 'holistic-relational anatomy' at teachers training programs and for other Alexander Technique groups worldwide. Zadok is a DVM, PhD, certified as a veterinary anatomical pathologist and a general toxicologist with a specialty in research and development of pharmaceuticals and other medicines for human diseases. His Alexander Technique inquiry attends to the nature of aliveness and mind-bio-physical oneness in movement, as related to form-structure-function dynamics in humans and animals. He has recovered from severe back injuries without surgical intervention.

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