



DESCRIPTIVE OVERVIEW

Analyzing the Gyrotonic[®] arch and curl

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Summary This article examines a foundational movement in the *Gyrotonic Expansion System*[®] known as arch and curl. The Gyrotonic Expansion System, created by Juliu Horvath beginning in the 1980s, is a relatively new approach to movement based on three-dimensional spiraling and circular patterns, with applications in exercise, therapy and rehabilitation. Beginning with an overview of the Gyrotonic Expansion System, this article will explore the basic principles of Gyrotonic movement, and define key concepts, before looking at the specific biomechanics of arch and curl. We highlight common problems clients encounter with arch and curl, and consider applications to movement and bodywork.
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Introduction

What do skateboarding, surfing, snowboarding, the many varieties of street/break/hip-hop dance, and the *Gyrotonic Expansion System*[®] have in common? The answer: movement that requires the body to spiral, curve, undulate, coil, twist and turn in three dimensions. These twenty-first century movement forms offer unique perspective and challenge to bodywork and movement therapists. This paper will explore one such basic movement from the Gyrotonic Expansion System, arch and curl (A&C), in its many dimensions: origin, basic principles, biomechanics, common problems and applications to movement and bodywork. The movement we have chosen is a relatively simple undulation of the

spine in the sagittal plane, accompanied by simultaneous movement of the limbs in the transverse plane. This movement is fundamental to other more advanced spiraling sequences.

Origin

The exercise known as A&C is a foundation movement in the Gyrotonic Expansion System. A&C is a full-body movement that includes within it all of the basic principles of Gyrotonic training. There are several series of exercises in the system that are based on it, and all Gyrotonic exercises include some aspect of A&C. Although the idea of alternating flexion and extension of the spine is familiar from various movement and dance forms, A&C in Gyrotonic training is unique in the specificity of its detail, and in the way it is used in interaction with the exercise apparatus.

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According to information available on the official Gyrotonic website (www.gyrotonic.com), Gyrotonic Expansion System founder Juliu Horvath is Hungarian, born and raised in Romania. As a child, he enjoyed swimming, gymnastics, rowing and other sports, becoming interested in classical ballet at the age of 19. After dancing with the Romanian State Ballet, he defected to the United States in 1970. He danced with the New York City Opera Ballet, and was a principal dancer with the Houston Ballet until an Achilles tendon injury halted his performing career. In 1977, Horvath moved to St. Thomas in the Virgin Islands to live simply in the mountains while commencing a deep experience of yoga. In the process, he discovered what he understood to be the inner workings of the body, and began to teach these to others. In 1984, he opened the White Cloud Studio in New York City. Since that time, the Gyrotonic Expansion System has expanded around the world (Gyrotonic, 2000–2002).

The first step in the evolution of Gyrotonic training was a series of movements performed without any equipment other than a small stool. Originally known as Yoga for Dancers, these exercises are now called *Gyrokinesis*[®], and are the basis of the Gyrotonic exercises. During the process of attempting to teach people how to use their bodies to do the Gyrokinesis movements correctly, Horvath began to develop the beautiful and unusual equipment used in Gyrotonic exercise. Horvath conceived the original idea for his equipment by experimenting with two revolving, backless parlor stools; the equipment line has since grown to include the Pulley Tower Combination unit, the Floor Handles Unit, the Jumping/Sliding Board, the Leg Extension Unit and the Gyrotoner.

The curvilinear, carved wood apparatus allows unique freedom of movement. Movements flow uninterrupted without a beginning or an end; the movement travels in spiral or circular paths, rather than in the straight-line patterns of more traditional exercise techniques. Because it is designed around the human body, the equipment allows maximum versatility to enhance coordination, strength and flexibility. Favored by many dancers, Gyrotonic training also attracts athletes, bodyworkers, individuals seeking rehabilitation, seniors and ordinary people seeking a new approach to health and fitness.

Philosophy

Horvath has written that, 'the cause of all disease is *stagnation*, regardless if mental, emotional or

otherwise' (Horvath, 2002). In his paper containing notes on basic principles Horvath lists some effects of Gyrotonic training. These include: increased circulation of blood, lymphatic liquids and energy through aerobic and cardiovascular stimulation; increased elimination and absorption; increased mobility of the joints; stimulation and strengthening of the nervous system; mobilization of the spine and reduced rigidity of the spine; clearer sense perception; greater harmony and balance of energy flow; better coordination via neuromuscular regeneration. In a more general sense, 'GYROTONIC[®] Training increases the functional capacity of the entire organism in a harmonious way' (Horvath, 2002).

These concepts have some resonance with other bodywork models. For example, the physical therapist would identify areas of decreased range of motion (ROM) and work to assist the client in achieving increased ROM. Oriental medicine would talk about chi stagnation, which in its most basic form refers to the movement of fluids such as blood or lymph through meridian channels in the body, and the exchange of nutrient and waste products on the cellular level.

In this article, the authors use a kinesiological model to identify the coordination of muscular firing patterns which underlie the fluid motion of A&C. However, it must be emphasized that Gyrotonic movement cannot be fully understood on the kinesiological level alone. Only an encounter with the movement itself will provide the holistic experience of flow intrinsic to Gyrotonic training.

Basic principles

Knowledge of a few basic principles (Horvath, 2002) of Gyrotonic work will help clarify the following descriptions of A&C. These principles include stabilization through contrast, creating space in the joints, using appropriate breath patterns, and intention. The first one, stabilization through contrast, sets Gyrotonic training apart from many current exercise methods.

Instead of attempting to create stabilization by fixing or holding the body in a particular position, Gyrotonic training encourages the mover to find a balance between reaching or lengthening outwards (extending or expanding), and pulling inward towards the body's core (tensing or retracting). Imagine standing on the shore of a lake, reaching out to help pull a swimmer to shore. As you fully extend your arm to reach for the swimmer's hand you would simultaneously connect strongly into the

muscles of your abdominal core, while grounding your energy powerfully through your sacrum, legs and feet. Even this opposition is not static; instead, there is a continuous wave-like pulsation of reaching out and reeling in from the center of the body. In this way, stability is attained through a counter-balance of opposing forces.

The second principle is that of creating space in the joints. Joints that are overly compressed cannot move freely. One way of creating this space is through the opposition of forces described above. In addition, Gyrotonic exercise requires the mover to attempt to excursion *around* the joints using a 'scooping' motion. For example, when flexing the leg at the hip socket, traditional wisdom would suggest that the mover think of a crease at the hip socket, suggesting a 90° folding action. If instead one thinks of creating a scooping action at the hip socket, and moving around the joint in a circular manner, greater space may be attained in the socket. The same idea can apply to most major joints of the body.

For example, see yourself standing inside of a big, plastic exercise ball. It is large enough that when you stretch your arms out to the side with palms up at shoulder level, you cannot quite touch the inside surface of the ball. Actively lengthen the arms out away from your body, trying to touch the inner surface with your fingertips. As you slowly bring your arms overhead, maintain this reach, as if you were tracing a path along the inside of the ball rather than moving directly toward the endpoint overhead. Thus you create openness and space in your shoulder joint.

The third principle stresses the value of using a corresponding breath pattern for each movement. At its most basic level, this involves inhaling and exhaling at the appropriate place in the movement: generally, inhaling when movements expand or open, and exhaling when movements contract or close. Representative breathing patterns include the Expelling Breath, a slow breath that sounds like the sigh of the ocean, or the Coughing Breath, an intense breath similar to a slow-motion cough, which activates the deep abdominal muscles.

Finally, and perhaps most important, is the principle that 'intention is the driving force that moves the body' (Horvath, 2002). If you do not have a clear intention regarding your destination, you will never reach it. If you intend to drive from New York City to Chicago, but you set out toward Atlanta, obviously you are in trouble! The same is true in body movement. Often in Gyrotonic exercise, it is vision that guides the movement into the proper direction.

Definitions

In the following analysis, a few terms appear that are commonly used in Gyrotonic exercise, so some brief definitions are in order. The first term is the *seed center*. The seed center corresponds to the body's center of gravity located in the center of the bowl of the pelvis, but the concept goes beyond a specific location. Think of a seed planted in the ground. As it begins to grow, it sends energy in two directions: downward into the roots, and up into the stem, leaves or flowers. This energy is perfectly balanced to secure the grounding of the plant into the earth while allowing it to reach up toward the nourishment of light and air. In the body, think of the axial skeleton (spine to head) as the stem and flower, and the appendicular skeleton (limbs, pelvis, ribcage) as the roots. During A&C energy travels down through the legs and feet, and through the arms and hands into the handles, grounding the mover to the earth in a closed kinetic chain. At the same time, energy travels up and out through the freely moving spine and head in an open kinetic chain.

As the energy travels through the limbs, it travels most efficiently through the *fifth line*. Imagine that there are four vertical lines drawn on your leg: one runs along the front of the leg, one along the back, and one on each side. But imagine also a fifth line that runs straight through the center of the leg, passing through the central axis of the bones: the femur and the tibia. This is the fifth line, or bone line. Directing energy along the fifth line of the arms or legs will help to activate the deepest layer of muscles in a balanced and harmonious way. When the fifth line is activated, it should feel almost as if the bones could slide through the periosteum like an arm slipping through the sleeve of a silk jacket.

Related to the fifth line is the *power point* or *exit point* of the hand or foot. This is an imaginary spot at approximately the center of the palm of the hand or the sole of the foot. The exit point can also be an entrance point, and the fifth line is a two-way street: energy can flow outwards through the extremities and return to the seed center along the same pathway. Actively intending the energy through the power point helps to maximize the lengthening effects through the entire limb.

The term *narrowing the pelvis* will be dealt with on an anatomical level later on. However, a couple of images may help bring the term to life. Visualize a soccer ball sitting inside your pelvis. As you use deep internal muscles to squeeze the soccer ball, its shape alters to become a football standing on end. Thus, the pelvis actually becomes narrower.

For a more kinesthetic response, imagine how your mouth puckers up as you suck on a lemon. Transfer that feeling to deep inside the pelvis, and feel the narrowing occur.

Biomechanics

A&C is often the first movement performed during a Gyrotonic session. It also recurs frequently as a central aspect of other movements or exercises during the session. Usually it is one of the first movements that a new Gyrotonic client learns. A&C is a continuous journey of discovery. It is a tool for warming up the body, for checking in to the current state of one's body, for tuning and fine-tuning movement, or for making new discoveries about muscles or bones or energy flow.

One of the distinguishing features of Gyrotonic work is the three-dimensional quality of the movement. Most Gyrotonic exercises involve movement in all three planes: coronal, sagittal and transverse. During A&C the spine primarily undulates in the sagittal plane, while the arms move simultaneously in the transverse plane, connected to the rotating discs via the hands. Coronal plane movement is less evident in this basic version of A&C, but becomes more visible in some of its variations.

A&C can be performed in two ways: extroverted and introverted. These terms refer to the direction of the circle made by the arms. From the High V position, in an extroverted A&C the arms circle outward, away from the body. In an introverted A&C the arms circle inward, towards the body. The introverted A&C is considered easier to do, and it is the version that will be dealt with here. A&C is taught in four steps. Later, when the client is comfortable with the four steps, the movement becomes a smooth, unbroken flow.

Start: High V position

To begin A&C, the mover sits straddling the bench facing the handle-pole unit (see Fig. 1). With the head erect on a long, neutral spine, the legs are outwardly rotated at the hips with the feet firmly planted on the ground. Already, the mover should be actively engaging the fifth line through each leg and out the exit point of the feet. This activates the deep intrinsic muscles of the lower leg and foot. The mover places one hand on each knob of the circular discs, and initiates the narrowing action at the pelvis (see Step 3). The narrowing assists the torso in excursions around the femoral joints as the mover takes the handles out to the High V position. This excursions or 'scooping' action around the joints (described above in Basic



Figure 1 High V position.

Principles), differentiates this movement from a simple flexion at the hip sockets. The abdominal muscles are active to support the spine, so there is no sense of collapse in the torso. This support is also aided by downward pressure through the bone line of the arms and into the hands, with the feeling of about three pounds of pressure on each handle. This is where the four steps of A&C begin.

Step 1: Curl

From the position of hip flexion in the High V, the iliopsoas muscle begins an eccentric contraction to extend the hip joint (see Fig. 2a). The deep transversus abdominus muscle actively helps hollow the abdominal cavity into the spine for a deep curl. At the same time the curl is initiated, the adductors rotate the legs inward at the hip socket engaging the tensor fascia lata in eccentric contraction. The mover continues to send energy down through the fifth line of the legs, activating the rectus femoris in eccentric contraction as well. The curl is complete when the mover reaches a point of balance, with the arms extended long in front (see Fig. 2b). The spine is in flexion, including the cervical and upper thoracic spines that lengthen and extend outward through the top of the head, creating an oppositional pull to the curling action of the lower spine. By reaching through the fifth line of the arms, the mover creates additional oppositional action through the appendicular skeleton.

Step 2: Transition to arch

At this point the mover rolls up through the spine, extending the lumbar spine, lengthening to the tip of the diaphragm (see Fig. 3). The upper thoracic and cervical spine rounds forward slightly. Following the circular action of the handles, the forearms and hands move closer to the body resulting in elbow flexion as the humerus abducts. The upper back widens, the scapulae depress and



Figure 2 (a) Beginning of curl with opposition. (b) Full curl.

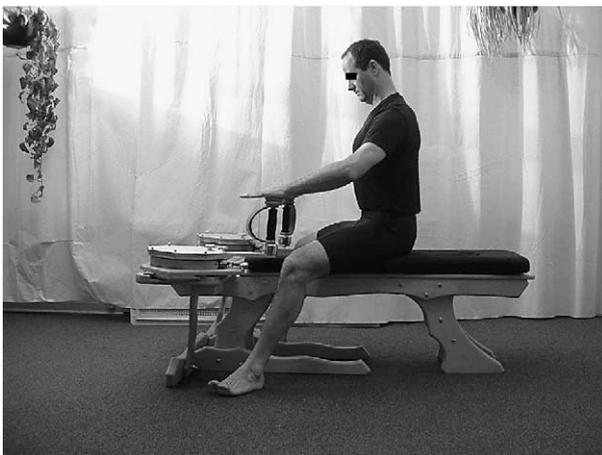


Figure 3 Transition to arch.

the mover maintains downward pressure through the power point in the palms of the hands. At the same time, the legs outwardly rotate, using primarily the quadratus femoris (deep rotator) and the iliotibial band along the outside of the



Figure 4 Narrow and lift.

leg, while keeping continuous pressure down into the feet. The mover should be balanced directly on top of the sit-bones by the time the spine has completely lengthened.

Step 3: Narrow and lift

The narrowing of the pelvis, discussed in the section on Definitions, is a subtle and complex anatomical maneuver (see Fig. 4). The narrowing aids in reinforcing and concentrating the body's energy inward toward the central axis, and also assists in lengthening the spine both cranially (toward the head), and caudally (toward the tail). Remember the image of the soccer ball squeezing into a football shape, or the lemon puckering up inside the pelvis. This can only occur by selectively activating some very deep musculature in the pelvis and pelvic floor. In paradoxical fashion, the pelvic floor actually opens and widens during the narrowing.

The first muscles to consider in the action of narrowing are the obturator internus and externus, two of the six deep rotators. It is important to understand that some of the rotators have a secondary function of ab- or adduction (Luttgens and Wells, 1989). Such is the case with the obturators. When the femur is flexed, obturator internus provides some abduction of the thigh in addition to lateral rotation, while obturator externus provides some adduction. The actions of the obturators are reinforced by the gemelli, small rotators located adjacent to the obturators. The combined action of these muscles will lift the pelvis in relation to the (fixed) femur and will minutely pull apart the hip joint, relieving compression on the joint (Calais-Germain, 1993). During A&C, the femur can be considered fixed if the mover is able to sufficiently stabilize the thigh via a strong fifth line connection through the legs and feet.

Intending a slight adduction of the proximal femur simultaneously with a distal abduction near the knee will help the mover gain a clearer kinesthetic sense of this narrowing effect.

The obturator internus shares a fascial connection at the base of the pelvis with the deep transversus abdominus muscle (Luttgens and Wells, 1989). The transversus fascia also forms a thin layer within the pelvic basin, in effect lining the seed center. Thus, there is a synergistic effect created by the obturator/gemelli opening the pelvic floor and lifting the pelvis off the leg, continuing up into the action of the transversus abdominus narrowing inward toward the spine.

Coordinated action of the obturators, gemelli, and the transversus abdominus are necessary to achieve the barely visible but nonetheless extremely important narrowing of the pelvis. Above the lumbar, the lift continues: an equal extension of all the vertebrae from T8 and below and hyper-extension from T8 through the whole cervical spine in a balanced arch.

The upward motion of the lift must be balanced by renewed commitment to the grounding of the legs and feet downward through the fifth line. At the same time the narrowing and lift occur, the elbows extend and the arms spiral outward. During Step 3 the mover inhales, sniffing the breath in through the nose.

Step 4: Arch

Exhaling through the mouth with an Expelling Breath, the mover completes the circle of the arms back to the High V (see Fig. 5). The lift and arching of the spine attained in Step 3 is maintained as the body moves forward again in hip flexion, excursioning around the femoral heads. The legs will want to rotate internally here, so the mover must actively engage the external rotators to resist that impulse.



Figure 5 Arch.

Upon reaching the High V, the mover has completed the full A&C.

Movement quality

The preceding description of A&C has been a rather dry description of anatomical reality. However, both the experience and the appearance of A&C are quite different! The movement quality one is aiming for in A&C is one of serene dignity. Rather than keeping a plethora of technical details in mind, it is best to let the movement guide the thoughts. Movement should not be too slow—it should flow freely enough that the mover notices what is happening in the body, and can then make changes on the next time around, rather than trying to think the movement through in advance. As in most Gyrotonic exercises, A&C contains an inherent rhythm. Timing may vary, depending on the needs of the individual.

Common problems: what to look for

Because A&C requires coordination throughout the entire body, and balanced flexibility along the whole spine, A&C can serve as a means of assessing a client's movement patterns. There are a number of challenges that emerge during the process of A&C, places where lack of awareness in the body and limitations to body movement reveal themselves. We note four such challenges here:

1. First, can the client initiate a curl from the seed center and coordinate it smoothly with the adduction of both legs, while maintaining the grounding action of the legs and feet? Finding a good curl requires coordinated action of the muscles that Tom Myers, originator of the Anatomy Trains concept, refers to as the Deep Front Line: the tibialis posterior, adductor magnus, pectineus, and iliopsoas among others, all the way up to the head of the psoas at the level of the diaphragm (Myers, 2001). If a client cannot find this engagement through the pelvis, feet and legs, there will be no foundation for the structures higher up.
2. Lack of engagement through the arms often manifests as the mover begins to come out of the curl and transition to the arch. This is a typical place for sleeve/core disharmony to manifest. The shoulder girdle often tends to slide up into the head and neck at this point. The key lies in maintaining downward pressure through the fifth line of the arms into the hands

continuously throughout the movement. The Gyrotonic apparatus provides a closed kinetic chain for the arms, allowing feedback regarding shoulder girdle position.

3. During the transition phase the challenge is to coordinate the separation of the axial from the appendicular skeleton. The lower body, pelvis and legs connect inward to the seed center as the upper body, spine and head extend outward into space. The client will often over-engage the erector spinae muscles, throwing the spine into a slight hyperextension, contributing to a lack of continuity between the arms and shoulders, and the rest of the body.
4. The arch is one of the most challenging moments of A&C. The difficulty lies in obtaining an even, balanced arch that opens equally along the upper spine from the mid-thorax to the top of the head. Two common problems manifest here. The first is excessive hyperextension at the lumbodorsal hinge. The second problem occurs in the cervical spine. Most people will tip the head back, compressing the cervical vertebrae, rather than allowing length throughout the cervical spine.

Addressing the various problems with A&C requires patience, a good eye, and an understanding of sequencing through the body. The continuous movement of A&C combined with the feedback of a closed kinetic chain will gradually help reeducate faulty movement patterns.

Applications for movement and bodywork

Practitioners of bodywork and myofascial release tend to make an assumption of deep work: that particular methodologies work on the deep core level of tissue, as opposed to the superficial or sleeve muscles that might be affected by a relaxing massage. But what happens when a client presents with sleeve tissue adhered to core structure? This common situation can impede the full potential of both core and sleeve.

A&C contains a fluid, central movement of the spine concurrent with different movements of the limbs, enabled by a natural, easy relationship with the apparatus. As a client performs A&C, the practitioner can observe the client's structure in relation to the equipment during this predictable

movement, and core/sleeve relations will be highlighted. Because A&C includes natural oppositions inherent within the movement, two things tend to happen:

1. Myofascial obstructions begin to release, and
2. Movement patterns are reeducated as the client begins to coordinate the axial and appendicular skeleton.

As the client continues to practice, A&C wears down old patterns like a river smoothing over rough stone. Structural and perceptual/neurological hindrances such as improper nerve firing sequences are replaced with more efficient patterns.

On a deeper level, as the client experiences more conscious harmony within the movement, the motion echoes unconscious physiological rhythms. These rhythms have in common balanced expansion and contraction of opposing forces. What is often missing in our current movement culture is this very balance between expansion and contraction, as evidenced by the common practice of seeking to strengthen joints solely through concentric contraction exercises.

What does all of this mean in practical terms for the client? First, *balance*: so many sports and professional or recreational activities are one-sided or repetitive. For example, think of racquet sports, computer use, or playing the violin. A&C can help balance asymmetries created by unbalanced movement activities. Also *rhythm*: the stress of modern life undoubtedly disrupts physiological rhythms such as those mentioned above; practicing A&C may help restore them. And finally, the smooth *coordination* which is developed in a dynamic way during A&C may lead to greater freedom of movement and overall vitality.

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