Analyzing the GYROTONIC®
"Arch and Curl"

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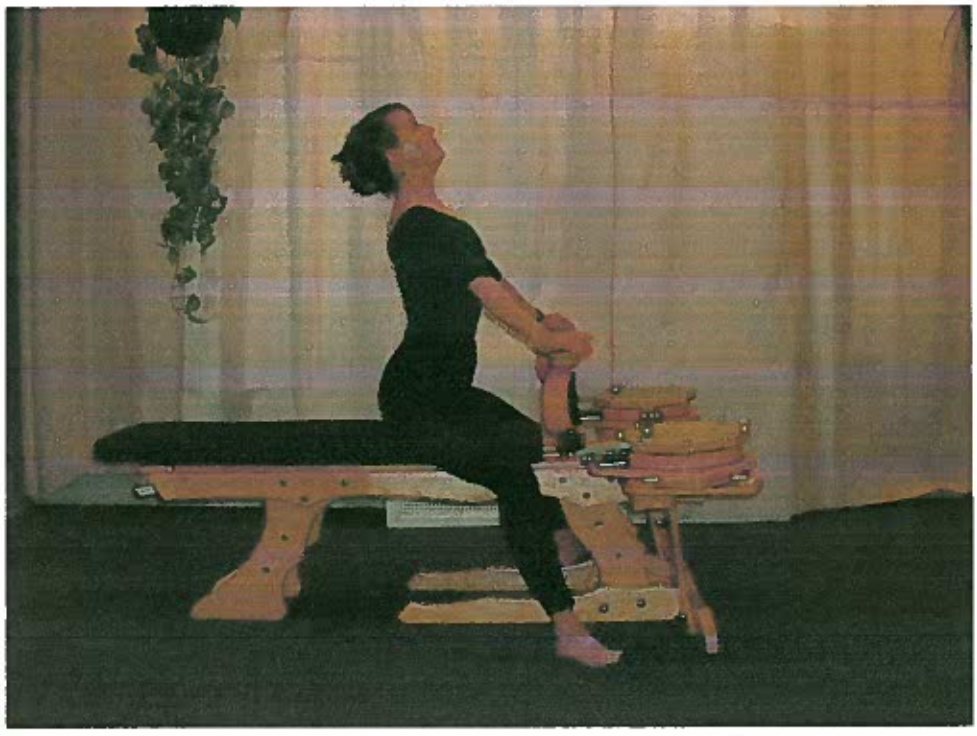

Note to the Gyrotonic® Community: The following paper is a preliminary look at Gyrotonic's favorite exercise, arch and curl. It was originally written as part of a graduate level course that one of the authors was taking, entitled 'Kinesiology and the Psychophysiology of Dance'. Matt Aversa showed it to Juliu Horvath, and it has now been adopted for use in the Gyrotonic promotional materials; you may already have seen it if you were at the Body/Mind/Spirit conference in California. Please feel free to make copies for your own use or to distribute to Gyrotonic colleagues or clients. We'd love to share ideas about arch and curl, so if anyone has feedback, questions, comments, or new thoughts regarding arch and curl, please email Joyce at JvcCmphll@aol.com or Warren at biomech@rcn.com. Of course, please do not use for publication without permission of the authors.

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Introduction

The exercise known as "Arch and Curl" (A&C) is a foundation movement in the **Gyrotonic Expansion System®**. Arch and Curl is a full-body movement that includes within it all of the basic principles of Gyrotonic training; there is an entire series of exercises in the system that are based on it, and all Gyrotonic exercises include some aspect of A&C. The basic idea of A&C is a familiar one to most dancers: the 'curl' is similar to a Graham modern dance "contraction", while the 'arch' resembles the "high lift" in Graham technique. However, 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.

Before looking at the kinesiology of A&C, it would be helpful to have some background information about the Gyrotonic Expansion System. Founder Juliu Horvath is Hungarian, born and raised in Romania, and, according to information on the Gyrotonic website (2000-02), considers himself a "universal being". 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. He then turned to a deep study 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 the 1980s, he opened the White Cloud Studio in New York City. Since that time, the Gyrotonic Expansion System has expanded around the world. Juliu continues to teach and develop the work; it is truly a living system.

The first step in the evolution of Gyrotonic training was a series of movements performed without any equipment. Originally known as "Yoga for Dancers", these exercises are now called **Gyrokinesis®**, and are the basis of the Gyrotonic exercises. All of the Gyrokinesis exercises are built around the principle of Arch and Curl. During the process of attempting to teach people how to use their bodies to do the Gyrokinesis movements correctly, Juliu began to develop the beautiful and unusual equipment used in Gyrotonic exercise.

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. Beloved by dancers, Gyrotonic training also attracts athletes, bodyworkers, individuals needing rehabilitation, the elderly, and ordinary people seeking a new approach to health and fitness.

In his paper containing notes on basic principles (Horvath, 2002), Juliu 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, according to Horvath (2002), "GYROTONIC® Training increases the functional capacity of the entire organism in a harmonious way" (1).

Basic Principles

Knowledge of a few basic principles (Horvath, 2002) of Gyrotonic work will help make the following descriptions of Arch and Curl clearer. The first principle is the idea of creating stabilization through contrast. In other words, 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). 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 counterbalance of opposing forces.

A 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 exercises require 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 ninety-degree 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.

A 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. As the Gyrotonic student becomes more advanced, various different qualities of breathing are utilized, similar in some ways to the pranayama exercises of yoga. Representative breathing patterns, among others, include the Expelling Breath, a slow, "whoosh' of 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 internal abdominal muscles.

Finally, and perhaps most importantly, is the principle that "intention is the driving force that moves the body"(Horvath, 2002). Dancers may be familiar with this concept from Irmgard Bartenieff's Fundamentals®: the idea of "spatial intent". If you

do not know in what direction you want to move, you will never arrive there. If you want to drive from New York City to Chicago, but you set out towards Atlanta, obviously you are in trouble! The same is true in body movement. Often in Gyrotonic exercises, 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 (arms and legs) 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, even down to the interface between the muscle and the bone: the periosteum. Freeing the periosteum will allow the bones to slide through this sheath of tissue 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, through which one can visualize that the energy directed through the fifth line exits the body. 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 feels as you suck on a lemon. Transfer that 'puckering up' feeling to deep inside the pelvis, and feel the narrowing occur.

Arch and Curl

Arch and Curl 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. Like pliés for the ballet dancer, or contraction-and-release for the modern dancer, 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, for making new discoveries about muscles or bones or energy flow, or a myriad of other details of movement.

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: frontal (coronal or vertical), sagittal and horizontal (transverse). In the analysis below, direction of movement in the planes is indicated to help emphasize this aspect of the movement. Because different parts of the body are moving through diverse planes simultaneously during A&C, the directions noted only indicate the major spatial pulls, and are not comprehensive.

Arch and Curl can be performed in two ways: extroverted and introverted. These terms refer to the direction of the circle made by the arms, and are similar to the ballet terms en dehors and en dedans. 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. Arch and Curl is taught in four steps, and this paper looks at them in order. Later, when the client is comfortable with the four steps, the movement becomes a smooth, unbroken flow.

Starting Position

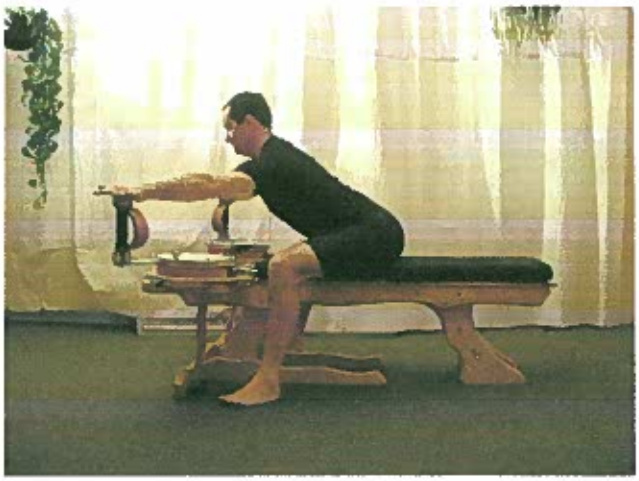
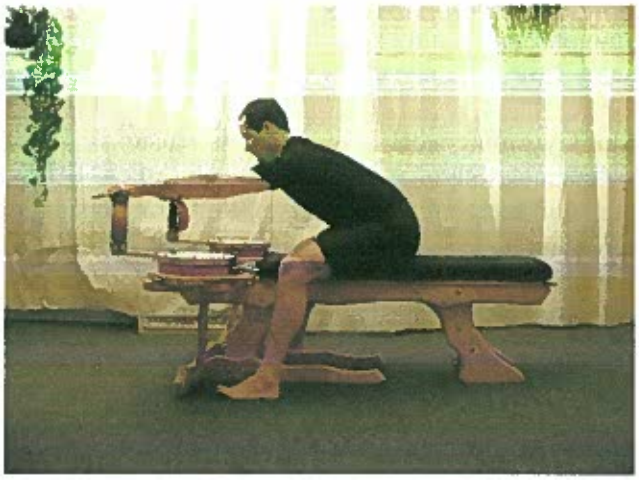


Illustration 1: Starting Position

To begin Arch and Curl, the mover sits straddling the bench facing the handle-pole unit. 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 tibialis posterior muscle deep in the calf, and causes the toes to stretch upwards slightly (see the section on Common Problems). The mover places one hand on each knob of the circular discs, and, flexing at the hip sockets, takes the handles out to the 'high V' position (see below). The abdominal muscles are active to support the spine, so there is no sense of collapse in the

spine. 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.

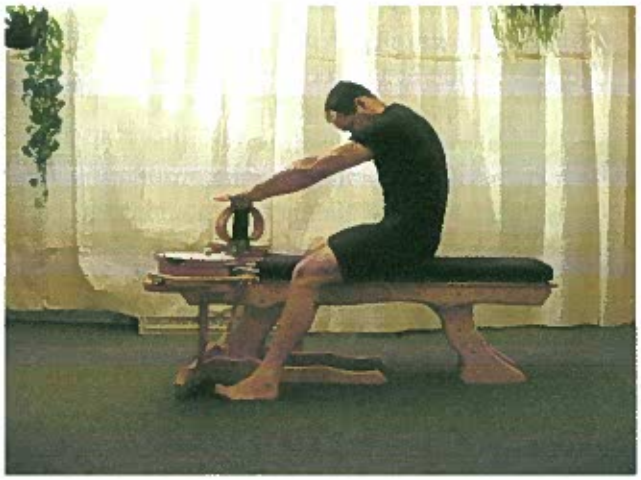
Step 1: Curl



View 1: Beginning of curl, with opposition

From the position of hip flexion in the high V, the iliopsoas muscle begins an eccentric (lengthening) contraction to extend the hip joint. The deep transversus abdominus muscle is active here to help 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, as the mover continues to send energy down through the fifth line of the legs. The curl is complete when the mover reaches a point of balance, with the arms extended long in front. The spine is in flexion, except for 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. The primary direction of movement during the curl is the sagittal forward to back movement of the spine in the curling action. Concurrently, the arms are moving in the horizontal plane.

Illustration 2, View 2: Full curl



Step 2: Transition to Arch

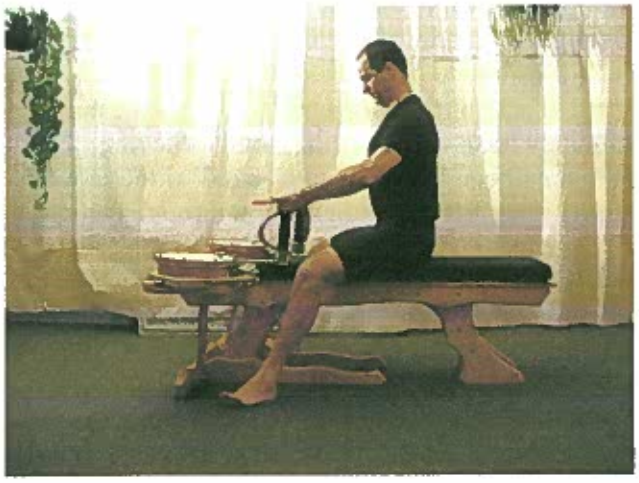


Illustration 3: Transition to Arch

At this point the mover rolls up through the spine, extending the lumbar spine, lengthening to the tip of the diaphragm; the upper thoracic and cervical spines round forward slightly. The arms come in toward the body and then abduct as the elbows and the upper back widen, maintaining the downward pressure into the power point of the hands. As the arms abduct, the legs outwardly rotate, using primarily the quadratis femoris (deep rotator) and the iliotibial band along the outside of the 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. Again the arms move in the horizontal plane. There is some sagittal movement here as well, as the spine continues to curl backward, but the primary action in the transition is the unfolding of the spine upward in the frontal plane.

Step 3: Narrow and Lift

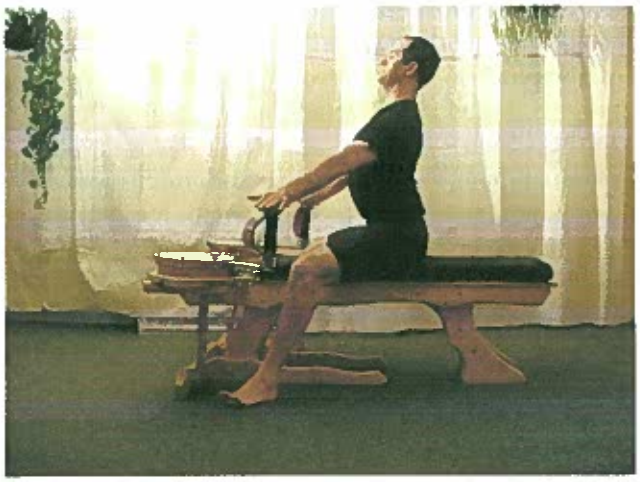


Illustration 4: Narrow and Lift

During the third phase of A&C, several important movements take place. The **narrowing of the pelvis**, discussed in the section on Definitions, is a subtle and complex anatomical maneuver. 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 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 & Wells, 1989). Such is

the case with the obturators. When the femur is flexed, obterator internus provides some abduction of the thigh in addition to lateral rotation, while obterator externus provides some adduction. The actions of the obturators are reinforced by the gemelli, small rotators located adjacent to the obturators. According to physiotherapist and author Blandine Calais-Germain (1993), 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. 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.

Although the piriformis, the largest rotator, is also an abductor of the femur when the thigh is flexed, it's mechanical advantage on the sacrum combined with the sciatic nerve just deep and sometimes running directly through the piriformis muscle, demand caution when teaching the narrowing to beginners, or anyone with a history of sciatica or pelvic torsion. A prerequisite to cueing piriformis should be a strong connection with both obturator internii, which, along with both gemelli lie deep to the sciatic nerve and are thus less likely to aggravate such problems.

The obturator internus shares a fascial connection at the base of the pelvis with the deep transversus abdominus muscle. 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.

A final muscle to consider in the action of the narrowing is the psoas major. It also demonstrates some unique features when the femur is fixed. Usually, contraction of the psoas muscle is thought to cause flexion of the lumbar spine. However, Calais-Germain (1993) points out that electromyographic records suggest something rather different: "The psoas, in combination with the posterior transversospinalis muscles.... contracting together....can act to erect (straighten) the lumbar spine, rather than increasing lordosis" (62).

So coordinated action of the obturators/gemelli, the transversus abdominus and the psoas is necessary to achieve the barely visible but nonetheless extremely important narrowing of the pelvis. Above the lumbars, the **lift** continues: an equal extension of all the vertebrae from T8 and below, and hyperextension from T8 through the whole cervical spine in an *even* arch. (See the section on Common Problems, below, for a more detailed discussion of this arch.)

At the same time the narrowing and lift occur, the elbows extend and the arms spiral outward. To achieve this spiral, the shoulder blades must make three actions in sequence (T. McMinn, personal communication, January 31, 2003). The first is scapular depression, which is actually occurring throughout A&C. Next, the scapulae retract, pulling towards each other in opposition to the reach and spiral of the arms outward. Finally, the scapulae rotate upward to assist the arch in the heart space as the torso moves anterior in the sagittal plane initiating Step 4. The mover must be sure to close or knit the lowest ribs together to counteract the actions of the shoulder blades in order to create an "honest" arch (see Common Problems section).

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. During Step 3 the mover

inhales, sniffing the breath in through the nose. The direction of movement in the lift is cranial, with a small amount of sagittal movement as the arch extends posterior through the upper spine.

Step 4: Arch

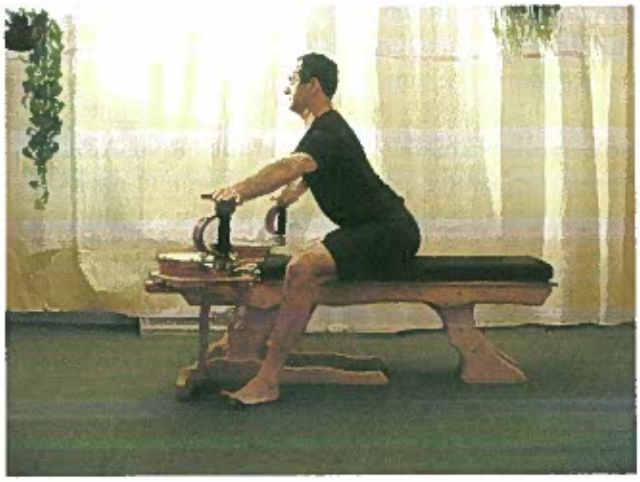


Illustration 5: Arch

Exhaling through the mouth with an Expelling Breath, the mover completes the circle of the arms back to the high V. 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. Upon reaching the high V, the mover has completed the full arch and curl. All three planes are clearly visible during the arch phase: sagittal as the spine moves forward, movement of the arms in the horizontal plane, and movement in the frontal plane as the level of the spine lowers as a result of the hip flexion.

Movement Quality

The preceding description of A&C has been a rather dry description of anatomical realities. 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 one 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. A&C can be done rather slowly or quite quickly; timing can vary, depending on the needs of the individual.

Common Problems

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 Gyrotonic client's movement patterns. For a look at some problems frequently encountered during A&C, a personal interview with Gyrotonic teacher Warren Miles (Jan. 4, 2003) provides some perspective. As a Rolfer and movement educator in Rolf Movement and Pilates as well as Gyrotonic exercise, Warren brings an acute eye and an extensive background in kinesiology to his work. In his view, 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.

Returning to the image of the seed center for a moment, Warren stresses the primary importance of the roots. If a seed has not firmly established some roots first, strong and healthy growth of the green leafy material above will be impossible. Thus, in A&C it is likewise important to first assess the vitality of the roots from the seed center in the pelvis down through the fifth line of the legs and feet. One of the first movements performed in Gyrokinesis, the basis of the Gyrotonic system, is a simple forward and backward, anterior-posterior rocking of the pelvis in the lumbosacral area, the second chakra area in Yoga. This rocking motion is really a smaller version of the larger A&C. Is the movement free, fluid and smooth at the seed center? If not, this movement needs to be worked on first, via this simple rocking motion, perhaps assisted by some of the exercises in the Gyrotonic 'Rocking' series.

Next, the seed center needs to connect through the roots of the legs and feet, coordinating the rocking motion with the larger A&C. Can the client coordinate the internal rotation of the hips and legs with the curl, and an external rotation with the arch? Can the client find a good curl and posterior tilt in the pelvis while staying connected through the legs and feet? Warren connects the curl, developmentally, with the coiled position of the fetus in utero. Finding a good curl includes coordinated action of the muscles that Thomas Myers (2001) identifies as part of the 'Deep Front Line' of the body: 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. If a client cannot find this engagement through the pelvis, feet and legs, there will be no foundation for the structures higher up, no support for the emergence of 'leaves and flowers'. Organize this first, before moving on to the upper body.

Interestingly, in A&C, the arms function as roots, too. In anatomical terms, we could say that in A&C, the appendicular skeleton (limbs, pelvis and ribcage) provides the roots, while the axial skeleton (spinal column and head) is the stem and flower. Lack of engagement through the roots of the arms will often manifest as the mover begins to come out of the curl and transition to the arch. The key here is whether the mover can maintain the downward pressure through the fifth line of the arms into the hands continuously throughout the movement. Sometimes the arms will show some slack, and the mover needs to be reminded to keep energy flowing through the arms into the hands.

The transition phase is a key step in A&C; a number of revealing problems occur at this point (Illustration 6). Coordination problems often appear as the mover begins to open the elbows. Typically, elbows may drop and shoulders often rise at this point. According to Warren Miles, the shoulder girdle has high mobility, but low awareness. The human shoulder girdle is very adaptable, and can function adequately even when movement patterns are not optimal. Bringing the arms into a closed kinetic chain, as in A&C, will often bring to light previously unsuspected movement problems in the arms and shoulders.

Illustration 5: Overuse of erectors in the transition

As the mover transitions from curl to arch, 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. What often happens at this point is that as the mover unfolds the spine upward out of the curl, he will over engage the erector spinae muscles, throwing the spine into a slight hyperextension. This pattern is inefficient: the erectors do not have a direct connection with the arms, contributing to a lack of continuity between the arms and shoulders, and the rest of the body. Also, the front of the spine tightens in response to the erectors, which is detrimental to the performance of the next step of A&C: the arch.

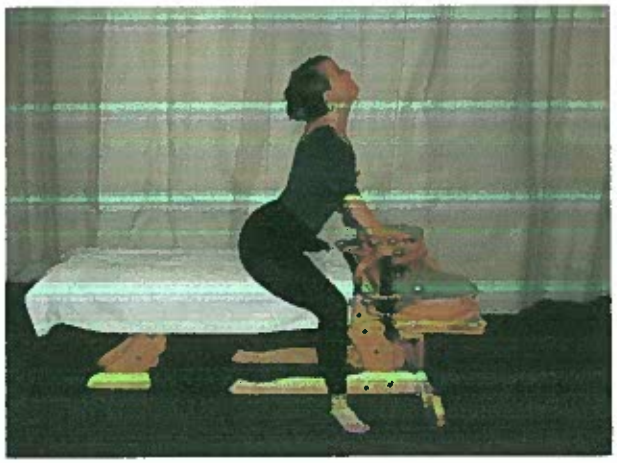


Illustration 7: Unbalanced Arch

The arch is one of the most challenging moments of A&C. The difficulty lies in obtaining what Warren terms an 'honest arch': an even, balanced arch that opens equally along the upper spine from the heart space through the throat chakra to the top of the head. It is the *front* of the spine that needs to open, but often the musculature along the front has tightened in response to the overuse of the erectors.

Two common problems manifest here (Illustration 7). The first is excessive hyperextension at the lumbodorsal hinge. The lowest ribs lift and open in an attempt to create an arch. Instead, the mover needs to find a connection between the lower body and upper body by closing or 'knitting' the lowest ribs together and pulling them gently downward. The second problem occurs at the throat chakra. Most people will tip the head back, compressing the cervical vertebrae, rather than allowing length through the cervical spine. Overuse of the occipitals is a response ingrained from infancy, when the baby attempts to lift the head from a stomach-lying position. This problem is addressed by several body therapies, including Bonnie Bainbridge Cohen's Developmental Movement (1993) and the Alexander Technique (Gelb, 1981). Illustration 8 shows an

exercise with the 'Arches Back Arch', which may help encourage balanced opening of the front of the spine.

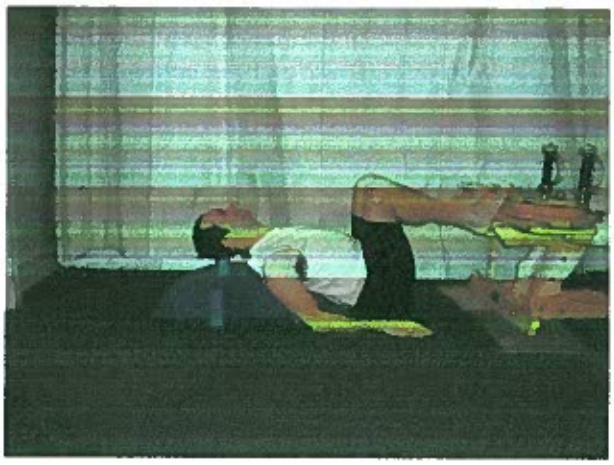


Illustration 8: Exercise with the 'Arches Back Arch'

Before leaving this section, we must return once again to the roots, and look at a curious phenomenon with the feet. Gyrotonic exercise encourages the mover to direct energy strongly down through the fifth line of the legs and out through the power point on the sole of the foot. When this happens strongly and clearly, the downward pressure creates a sense of suction at the center of the longitudinal arch, much like the suction created by a plunger. From here, the flow of energy divides at the bottom of the foot to flow outward through the heel via the calcaneus, and to spread out across the metatarsals and phalanges, resulting in a slight stretching upwards through the toes when done correctly. A problem frequently arises when people attempt to mimic the correct result and simply lift the toes, overusing the extensor muscles on the top of the foot. This often happens because there is a lack of length in the musculature on both the top and the bottom of the foot. Dancers, in particular, often have overworked toe flexor and extensor muscles, as have women who wear high heels.

Addressing the various problems with A&C requires patience, a good eye, and an understanding of sequencing through the body. Warren Miles mentions that mobility precedes position: the mover needs to be able to move through places in the body that are stuck, before she can arrive at a more functional position. A&C is very helpful in this regard, because it involves continuous movement combined with the feedback of a closed kinetic chain.

Psychophysiology

How does Arch and Curl relate to psychophysiology, the study of the psychological aspects of physiology? The preceding discussion of the kinesiology of A&C focused primarily on the skeletal and muscular systems; looking beyond these can give us some clues. Bonnie Bainbridge Cohen, director of the School for Body-Mind Centering in Amherst, Massachusetts, is the researcher who has really provided a map

and a language for understanding the physiology and the psychology of the body's several systems (Cohen, 1993). The following section draws on her work and that of yoga instructor and researcher, Donna Farhi (2000), who relates Bonnie Cohen's insights to the study of yoga.

Much of what is written in ancient yogic texts regarding the subtle forces and energies of the human being is esoteric and often obscure, difficult for modern Westerners to understand and incorporate on a practical level. Donna Farhi (2000) points out areas of overlap between yogic tradition and Bonnie Cohen's mapping of the body's systems. These systems include the musculoskeletal system, the organs, the neuroendocrine system, the nervous system, the fluids, and the cellular system. Each system has what Cohen refers to as a 'mind': an intelligence and an expressive quality related to its function. For example, the musculoskeletal system tends toward the expression of support and power, directed action, and specificity and clarity of intention.

People have individual preferences (largely unconscious) for which system they tend to express. An obvious example is the 'high strung' person who tends to favor the nervous system. A more easy-going individual, who adapts easily and has a smooth quality of movement, reveals an affinity for the fluids.

One of the key insights of Body-Mind Centering (Cohen, 1993) is that it is possible to move from a kinesthetic awareness of any of these systems. Changing the focus of awareness from, say, the organs to the neuroendocrine system changes both the quality of movement, and its effects on the bodymind. Therefore, A&C could be analyzed from the perspective of any or all of the body systems, but that is beyond the scope of this paper.

Instead, the focus will be on one system that Farhi (2000) relates to the yoga chakras: the neuroendocrine system. The chakras, in yoga theory, are considered to be centers of physical and psychophysical energy in the body. There are dozens of minor chakras located throughout the body, but the seven major chakras are located along the front of the spine, from the root chakra at the base of the spine to the crown chakra at the top of the head.

Similarly, the endocrine glands lie along the central channel of the body, closely paralleling the location of the seven main chakras. These glands have powerful connections with each other, with the nervous system, and with the entire body via the secretion of hormones into the bloodstream. Like the chakras, the glands also seem to mediate both physiological and psychological events. Farhi (2000) says, "While it would be incorrect to say that the glands of the body are the same as the chakras, there does appear to be a strong relationship between these two systems" (p. 72).

Beginning with the root chakra and its related endocrine gland, the coccygeal body, we can examine these psychophysical connections (Farhi, 2000). Although the function of the coccygeal body, a minute cluster of cells at the base of the tailbone, is unknown, the root chakra is associated with the earth element, and instinctual responses and drives. The second, or sacral chakra is located at the level of the reproductive organs in women. In both men and women, the second chakra is associated with sex hormone production, the water element, and sexual energy. The adrenal glands and the pancreas are both located at the level of the third chakra, producing steroid hormones and insulin/glucagon, respectively. This area is associated with the fire element, personal power, and the storage center for prana, or life energy. The fourth, or heart chakra is

associated with the air element, and the capacity for compassion and love. The endocrine connection here is the atrial heart muscle, which secretes hormones that regulate body fluids, and the thymus gland that mediates immunity.

The thyroid (metabolism) and parathyroid glands (calcium regulation) parallel the fifth, or throat chakra, associated with the ether element, self-expression, energy and endurance. At the sixth chakra we find the pituitary gland, nestled with the hypothalamus in the sphenoid bone just behind the top of the nasal cavity. The pituitary gland secretes hormones that affect growth and metabolism, and that regulate other glands. The pineal gland, located at the 'third eye', secretes melatonin and is connected with the regulation of light-mediated cycles in the body. The sixth chakra is associated with intuition, psychic abilities and meditation. The seventh chakra, located at the crown of the head, does not have a specific endocrine gland associated with it. The seventh chakra is related to the full integration of the body, mind, and spirit (Farhi, 2000).

Arch and Curl as a movement sequence allows the body to pass through the seven chakras, gradually opening them and stimulating the related endocrine glands. The emphasis in A&C is on a *balanced* opening of the chakras, as discussed above. The endocrine glands, too, need to function in balance; a tiny excess or deficiency of any hormone can disrupt physical or psychological function in a major way. As a mover flows repeatedly through the Arch and Curl, all seven chakras are stimulated, and the endocrine glands massaged from within, releasing subtle energies and balancing the chemistry of the body and mind. So it is perhaps here, at this point of subtle interplay between movement, spine, chakras and glands, that it is possible to glimpse the deeper effects of Arch and Curl.

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