

# C-I Training:

## The Merger of Conditioning and Imagery as an Alternative Training Methodology for Dance

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Dance educators and researchers are currently in the process of reexamining and redefining what is essential for the dancer's training, particularly in the various forms of western theatrical dance. It is becoming common for dancers to engage in methods, such as somatic practices and conditioning programs, outside the traditional dance class setting to enhance dance performance and reduce injury incidence. The somatic practices, also known as body therapies or body work, are having an increasing influence on professional and postsecondary dance programs.<sup>1-5</sup> At the same time, dancers and dance programs are incorporating various conditioning systems into their curricula, including weight training, flexibility training, cardiovascular exercise, and specialized systems such as Pilates-based work.<sup>6-10</sup> Both types of methodologies, that is, somatic practices and conditioning programs, have clear benefits, but address different goals and body systems. Somatic practices tend to emphasize neuromuscular repatterning to alter alignment or movement habits, while conditioning generally addresses muscular/structural alterations to effect change. For example, the body therapies attempt to alter the way muscles pattern themselves, stressing whole-body activity, connections, and awareness, not exercises for specific muscles.<sup>4</sup> Conditioning programs, on the other hand, do engage particular muscles and physical structures, in order to make gains in muscular strength, cardiovascular endurance, and physical range of motion.

The purpose of this article is to discuss the potential benefits of integrating imagery directly into conditioning exer-

cises, thereby combining the two types of practices. It is proposed that there are advantages to combining conditioning and imagery that might not be addressed by practicing conditioning alone or imagery alone. For the past 15 years, the author has been developing and teaching a training method called C-I Training (conditioning-with-imagery training), with the goal of simultaneously addressing neuromuscular repatterning and improved muscular strength and flexibility. This article uses C-I Training as an example of a system designed for dancers that integrates imagery into conditioning work. Further, the principles and objectives of C-I Training are discussed as a means of exploring the potential benefits of merging conditioning and imagery.

### DANCE INJURY INCIDENCE

One of the major reasons that dancers turn to alternative methodologies for training is the high rate of injury in the dance population, and the tendency by many dancers is to seek methods of intervention and rehabilitation outside the medical profession.<sup>11-15</sup> As dancers are being required to perform more and more physically demanding choreography, they are seeking ways to correct muscle imbalances, to improve alignment, to increase strength and flexibility, and to perfect technical skills, all areas that are believed to impact on the incidence of dance injury.<sup>16-20</sup> Perhaps the most efficient methods that deal with injury prevention address both the repatterning work done in the somatic context, and the musculoskeletal alterations achieved in conditioning work. The systems approach to the study of motor control suggests that it is imperative to consider both the mechanical and the neurophysiologic perspectives in altering or training balance and locomotion mechanisms, and that it is the interaction of these systems that determines the efficiency of resulting patterns.<sup>21,22</sup> It is with this goal of addressing multiple systems that C-I Training has been developed as an alternative training system for dancers.

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## PRINCIPLES OF C-I TRAINING

The following 5 principles, developed by the author from the source material discussed below, were incorporated into the C-I Training design:

*Integration principle:* The whole body is integrated into each activity, even the most minimal movement. While the body might be relaxed in a given minimal movement, awareness of the interconnectedness of all the body segments is crucial. This principle also includes the idea of mind/body integration, and suggests that the mind is focused on how the task is being performed, not just on the form or sequencing of the exercise.

*Increasing principle:* Low levels of contractile activity develop to higher levels of muscular work, and small range of motion develops to greater range of motion. This principle applies to the progression of the system over time, as well as within a given session. Additionally, there is development during the sessions from simple tasks to compound and complex activities.

*Alternating principle:* The sequence of exercises alternates work in muscular strength, muscular endurance, and flexibility. It alternates work in antagonist muscle groups, and it alternates upper- and lower-body work, and left/right body work. This principle reinforces the concept of balanced muscle function, ensuring that attention is given to each area of conditioning, and to antagonist muscle groups to promote balanced and efficient function.

*Specificity principle:* The program incorporates tasks that relate as closely as possible to dance practice. This principle is based on 2 hypotheses: (1) muscle patterns and balanced muscle function learned in a dance-specific context will more likely relate to muscle use required in dance performance, and (2) imagery that is dance-related will be more applicable with exercises that are also dance-related.

*Attentiveness principle:* Attention is directed to aspects that affect the quality of work with exercises, such as movement process, breath, timing, and transitions. This principle is derived from the goal of wanting to affect the qualitative and experiential aspects of dance and everyday movement, as well as modify the musculoskeletal structure for improved efficiency and injury prevention.

## SOURCES FOR C-I TRAINING MATERIAL

C-I Training is a system that is performed in various positions on the floor, primarily supine, prone, and side-lying. As with ballet floor barre systems, there are advantages to working on the floor, rather than in stance.<sup>23,24</sup> These advantages include the following: to develop a kinesthetic sense of movement through the absence of mirror- and teacher-oriented visual images; to experience gravity-assisted movement, especially in new alignment patterns; to

encourage lumbopelvic stability, especially to support lower-limb gestures; to encourage appropriate use and development of turnout from external rotation of the hip, rather than from the use of foot traction on the floor; and to avoid excessive muscular overuse in dancers with poor habitual patterns.

The sources for the conditioning work in C-I Training include the following: exercises from chapter 19 of Fitt,<sup>8</sup> Pilates-based floor exercises from Friedman and Eisen,<sup>25</sup> floor barre work developed by Rommett,<sup>24</sup> exercises from the videotape by Solomon<sup>26</sup> and from classes taken with Solomon at the University of California at Santa Cruz. These exercises have, in most instances, been modified by the author, to enhance continuity throughout the process, and to emphasize the 5 principles of the system. Additional source materials include postures and breath work from hatha yoga classes, and exercises learned from physiotherapists during injury rehabilitation sessions.

The sources for the imagery work include the following: the work of Bartenieff<sup>27</sup> and classes in Bartenieff Fundamentals at the University of Oregon, the work of Dowd<sup>28</sup> as well as classes and private sessions with her in New York, and part four, Sweigard.<sup>29</sup> Additional developments were added by the author.

## PURPOSES OF C-I TRAINING

There are several purposes of the C-I Training system. It provides an excellent way to introduce young and/or beginning dancers to the proper execution of dance-related movement, and it has been taught successfully to children as young as 10 years old. For dancers at any level, it can provide an excellent warm-up prior to dance activity, as it increases the heart and breath rates, as well as gradually increasing strength and flexibility demands. Additionally, as with the Pilates-based work, the system has been used by dancers who are injured and cannot fully participate in classes and rehearsals, but who are able to do conditioning work lying on the floor.

Further, there are 3 primary purposes to C-I Training and its focus on merging imagery with conditioning: improving balanced muscle function, addressing neuromuscular retraining, and assisting in transfer of training. The potential benefits of combining imagery and conditioning to fulfill these purposes are discussed below.

### Balanced Muscle Function

The supporters of imagery work and the proponents of dance-specialized exercise programs use the phrases “muscle balance” or “muscle balancing” in a variety of contexts. The term “balanced muscle function” is used in this article to describe 3 of the many ideas referred to in the literature pertaining to muscle balance. The first refers to the balance of muscular strength and flexibility within individual muscle groups.<sup>8,20,29–32</sup> The second component refers to the balanced, or efficient, function of antagonist muscles around joints, in-

cluding their relative lengths, strengths, and tones.<sup>8,28,33,34</sup> The third component refers to the pattern and intensity of motor recruitment. This includes higher-order motor commands and the coordination of neuromuscular pathways and motor units responsible for muscular activation and movement patterns. It also includes mental or cognitive concepts necessary to direct muscle function, and any supporting neurologic responses such as proprioception.<sup>8,28,29,35-37</sup>

Movement theorists who use imagery and repatterning work to assist in improving dance performance discuss the importance of balanced muscle function for improved alignment, and subsequently better biomechanical efficiency, fewer injuries, and greater movement range.<sup>27,29,37</sup> They claim that changes to the balance of antagonist muscles must happen at the neurologic level, not only at the muscle tissue level. It is imagery operating subcortically, not voluntary muscle action, that creates neuromuscular responses necessary to alter alignment and to carry out movement in efficient ways.<sup>28,29,37</sup> To date, few of these imagery systems have been tested under controlled conditions involving dancers. However, this theoretical perspective is supported by the motor control research that suggests that the coordination of posture and voluntary movement is regulated by the nervous system, and that upright stance is regulated by "pre-structured postural synergies" that are organized and directed at a subcortical level of the nervous system.<sup>38</sup>

Many specialists who recommend systems comprising exercise or conditioning programs for dancers also address the issues of alignment and balanced muscle function.<sup>31-33,35</sup> The literature contains numerous suggestions of exercises to enhance muscular strength and endurance, flexibility, and proprioception.<sup>7,8,10,30,36,39</sup> Certain questions arise in the examination of these specialized conditioning systems: (1) If it is indeed necessary to alter patterns on the neurologic level to effectively change balanced muscle function, as the imagery proponents claim, how do these conditioning systems address the neurologic system?; and (2) what role does imagery play in the efficacy of conditioning programs, and in the improvement of motor performance in general?

The following are a few examples that illustrate how C-I Training addresses the 3 components of balanced muscle function, and uses both conditioning work and imagery to fulfill this goal. Regarding the first component concerning strength and flexibility within a given muscle or muscle group, there are exercises in the system to develop increased strength in the hamstrings. Similarly, there is work done on the hip flexor muscles to increase flexibility. These exercises attempt to create a balance in the relative strength and flexibility within each of these muscle groups. Regarding the second component concerning balanced, or efficient, function of antagonist muscles around joints, C-I Training includes various exercises to increase abdominal strength and to enhance flexibility and release in the lumbar spinal extensors and in the hip flexors. (Imagery work is included to facilitate correct alignment of the pelvis, and to encourage this alignment without excessive and unnecessary tension in the gluteal and quadriceps muscles.) Regarding the third component of balanced muscle function, efficient motor re-

ruitment, several exercises involve extending the hip and knee joints while plantar-flexing the ankles. The imagery used in these instances involves reaching the feet out in the space (directed spatial intention), while visualizing the inner thighs "gathering" or being drawn together as 2 magnets, thereby encouraging hip adductor use and inhibiting quadriceps overuse. A second example involves a hip flexion series that works on both hip flexor strength and use of the outward rotators. The imagery includes visualizing the sacrum weighted and heavy on the floor as the flexion occurs, and then visualizing the spine elongating along the floor as the abdominals hollow during the return of the limb to extension. The imagery is designed to encourage appropriate pelvic stabilization, as a component of core support, for standing hip flexion movements.

### Neuromuscular Repatterning

The use of imagery in dance is certainly not new. For several decades, dancers have been participating in a wide range of body therapies, including the work of Alexander,<sup>40</sup> Barteneiff and Lewis,<sup>27</sup> Feldenkrais,<sup>41</sup> and Sweigard.<sup>29</sup> All of these systems use imagery in some manner, and all are concerned with aligning the body and developing patterns of movement that encourage muscular efficiency and body awareness.<sup>4,28,42,43</sup> It has become increasingly common to find somatic practices integrated directly into dance technique classes.

Additionally, imagery is often employed in dance training to influence movement quality and execution, dynamic range, and artistic expression, as well as to affect neuromuscular patterning.<sup>44-55</sup> Whether the imagery employed is visual or kinesthetic, direct or indirect, internal or external, metaphoric or anatomic, it has the potential to influence many aspects of a dancer's movement from technical skills to dramatic nuance.

The use of imagery during specific conditioning exercises is less common than its use in somatic practices or in dance classes and rehearsals. It might seem that conditioning is, by its nature, mechanistic and therefore inaccessible to imagery. However, imagery can provide an ideal method for neuromuscular repatterning while strength and flexibility are being enhanced. Many teachers have witnessed the dance student who does hours of abdominal strength work, hip flexor stretching, and lumbar extensor stretching, yet comes to dance class still having lordotic posture. Imagery can offer a method, during the conditioning exercises, to "inform" these muscles groups at the subcortical level about how they work as an integrated whole to align the pelvis in relation to the spine and legs.

Chatfield and Barr<sup>56</sup> discuss the relationship between postural synergies and voluntary synergies, where the term "synergy" is used in the more general sense to describe muscles acting together for a desired result. A postural synergy involves muscles that activate through unconscious mechanisms, often as a preparation or response to equilibrium disturbances. A voluntary synergy involves muscles that activate due to intention, or directed action. Chatfield and Barr suggest that patterns of activation in both types of synergies may be mod-

ifiable, and further, that possibly the coordination between the two may also be modified through training. They discuss tai chi, the work of Sweigard,<sup>29</sup> and the work of Bartenieff<sup>27</sup> as systems that employ mental processes to affect neuromuscular patterning. Additionally, Chatfield and Barr cite studies suggesting that training practices based on principles common to tai chi, Sweigard's Ideokinesis, and Bartenieff's Fundamentals "could effect changes in the temporal organization within as well as between unconscious postural and intentional voluntary synergies."<sup>56</sup> The use of imagery during conditioning practices may have this effect of modifying the organization and relationship of the postural and voluntary synergies in dance movement, thereby altering the neuromuscular patterning in these movements.

The following example demonstrates how the C-I Training system uses imagery to affect neuromuscular patterning during conditioning exercises. One of the concerns in teaching abdominal strength work is to assist the dancer in engaging the deeper abdominals, including the internal and external obliques and the transverse abdominals, for better core support during dancing. While doing pelvic tilts, as well as a variety of other strength exercises for abdominals, the dancer visualizes a row of elastics or rubber bands that attach to the pubic bone at their lower ends. The upper ends are gathered to a point so that the elastics form a triangle. This upper point is then attached to the lower back directly behind the naval. As the dancer exhales, the elastics shorten, drawing the pubic bone toward the low back, or "hollowing" the anterior pelvis. This image can be extended to work on proper execution of eccentric abdominal use. The dancer can move from the pelvic tilt to an overcurve, or hyperextension of the spine. Rather than simply relaxing the abdominals, the elastics can be visualized as remaining taut and elongating, thus giving resistance through eccentric abdominal work to the contraction of the spine extensors. (This cocontraction is important for protection of the low back in movements such as arabesque, and grand jeté in which the back leg is required to lift during the landing.) Finally, the same image can be applied to core support during stance when no pelvic movement is desired. By visualizing this row of elastics maintaining a connection between the pubic bone and the lumbar spine, the dancer can effectively stabilize the pelvis during dance movements such as pliés, relevés, and leg gestures.

### Transfer of Training

The concern with transfer of training arises from motor control and motor learning theories. A study by Winstein<sup>57</sup> demonstrates the complexities of transfer problems in the area of physical therapy rehabilitation, and raises questions about the assumptions made in dance training practices.

Winstein focuses on the principles of retraining used in physical therapy, and the assumptions about how actions such as locomotion and balance are learned, or relearned, and controlled. She questions 2 assumptions that are inherent in most physical therapy programs. The first, called part-to-whole task transfer, states that the practice of a component part of a particular action will improve the subsequent

performance of that action. For example, practicing knee flexion and hip extension will improve the swing phase of walking. The second assumption is called transfer of training and its suggests that ". . . practice of a motor skill from the 'lower' end of our imaginary skill continuum will enhance performance of a motor skill from the 'higher' end of the continuum."<sup>57</sup> For example, doing weight-shifting exercises will improve locomotor skills.

Winstein conducted a study to determine quantitatively the effectiveness of a balance retraining program called SFT (standing feedback trainer) training on the balance and the locomotor skills of brain-injured adults. She also compared the effects of SFT training with those of conventional therapy programs. Pretest and posttest sessions included both stance and locomotor measurements. Both experimental and control groups received many similar therapies, such as coordination training and strengthening activities. In addition, the experimental group received SFT training, while the control group received routine balance and weight-shifting training. The results showed that the SFT-trained adults achieved stability in a more symmetrical posture than did the control subjects. However, locomotor performance was not significantly improved for the SFT-trained subjects. Hence, the results do not provide support for the theory that improved standing balance transfers to locomotor skills.

Many dance educators are also aware of the problem of transfer of training, that is, the transfer of material from exercises to dance practice, and transfer from one setting or context to another. For example, it is a common belief that enhanced strength or flexibility in a conditioning program will transfer to improved skills, such as jumping or leg extensions. It is also sometimes assumed that realignment work done in body therapy or physiotherapy sessions will have significant impact on the dancer's alignment habits when he or she returns to class or rehearsal. Yet many educators have witnessed the transfer problems that dancers encounter. The dancers improve in strength or flexibility levels, or evidence noted changes in alignment during a body therapy session, but show little change in either skills or alignment habits during dance classes or rehearsals. If dancers are going to be encouraged to do increased training outside dance classes and rehearsals, whether weight training, yoga, or body therapy work, then how can educators and researchers ensure that the results of these practices can be accessed during complex dancing? The theory behind the development of C-I Training proposes that combining the conditioning work with specific images that can be used during complex dance movements might assist in the transfer process.

Krasnow et al.<sup>58</sup> conducted a study that used motion analysis equipment to assess the alignment of dancers in 3 training groups (conditioning only, imagery only, and C-I Training) and a control group. The results suggest that the dancers using the C-I Training system were faster and more efficient than were the other 3 groups at finding vertical alignment during movement sequences involving dynamic, off-center torso movements. It is interesting to note that no difference between the groups existed in testing done in static stance. It was in dynamic movement that the C-I Train-

ing group showed significant improvements posttraining in finding vertical alignment. These results have important implications for the transference of training systems to dance practice, and for the potential value of integrating both conditioning and imagery work into dance training methods.

It is not fully understood at this time why the combination of conditioning with imagery in the C-I Training might assist in transfer of training. Perhaps it is the fact that both the mechanical and the neurophysiologic perspectives are addressed, as suggested by Schenkman<sup>21</sup> and Woollacott and Shumway-Cook.<sup>22</sup> It is also possibly due to the direct applicability of the various imagery used in the C-I Training to actual dance practice. For example, images are introduced while performing developpés and ronde de jambes while lying on the floor, that encourage core support for the leg gestures. The use of the floor along with the imagery encourages lumbopelvic stability during full range of motion at the hip. In using these images during stance, the dancer can reexperience that central stability to support the gesture, and the conditioning work has provided the appropriate strength and range of motion to achieve the task. A third possibility is that the conditioning work is done in a manner that focuses on whole-body connections, not isolating one muscle group from the rest of the system, and that this full integration allows for transferability to a movement context. Finally, it may be due to the modification of postural and voluntary synergies, as suggested by Chatfield and Barr,<sup>56</sup> that allows for fuller transfer from conditioning work to dance practice. If this type of training can improve the underlying, unconscious mechanisms that regulate alignment and responses to equilibrium disturbances, then support for voluntary action during dancing may well be enhanced.

## CONCLUSION

This article raises 2 important questions about dance training, and alternative methodologies. (1) How can alternative training methods address multiple systems, e.g., physical and neurophysiologic, especially for the purposes of neuromuscular repatterning? (2) How can dance educators ensure transfer of training from various training contexts to dance practice? The benefits of both somatic practices and conditioning programs are being recognized by educators and researchers alike, in medical and educational facilities. C-I Training offers a method of combining the benefits of these 2 types of systems, as well as offering a simple and complete preparatory warm-up for dance. Hopefully, future research into alternative training methodologies can provide clearer concepts about how these systems influence dancers, and suggest to educators how most effectively to incorporate alternative training into the dancer's life.

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## In Memoriam Raya Garbousova

Raya Garbousova, a renowned cellist and extraordinary human being, died on January 28, 1997, at the age of 87. Although in failing health for the past several years and of an age where lesser spirits would have lost interest in the world around them, Raya retained her zest for living until the end. In fact, her appreciation of and love for music and musicians and her concern and care for other people, especially young people, seemed to keep her young in spirit. Her integrity in all matters, musical and otherwise, was absolute and uncompromising, as was her disdain of superficiality and sham. She did not simply serve as a figurehead artistic advisor to MPPA but made spontaneous insightful criticisms of its contents, always wanting to know what was new in the field of performing arts medicine and supportive of the journal's mission in general as well as of my specific career. Raya, with her dynamic and warm personality, made a difference in the lives of a large and diverse circle of friends, including a virtual "who's who" of classical music. However, her devotion to her students was equally intense, as it was to her friends in many walks of life throughout the world. To have known and loved Raya was a rare privilege for which we must be enormously thankful. If we can communicate to others only a fraction of what she gave to us and attempt to uphold her high standards for human achievement, it will serve as a legacy to her. Our heartfelt sympathy goes to her devoted husband, Dr. Kurt Biss, her sons Gregory and Paul, and her grandchildren.

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