# Functional Anatomy in Dance Training: An Efficient Warm Up Emphasizing the Role of the Psoas

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## An Efficient Warm Up Emphasizing the Role of the Psoas

When we see movement performed in a way that evokes our admiration one of the things we frequently say about it is that it was "effortless." More accurately, what we mean is that it *appeared* effortless because the dancer was able to find the means within his/her body to generate it efficiently. It is the search for the source of this efficiency of movement that has shaped my approach to teaching.

Early in my career, at the point where teaching assumed equal status with performing and choreographing, I was so fortunate as to be exposed to the work of Mabel Ellsworth Todd,[1] Lulu Sweigard,[2] and my then dear colleague Andre Bernard.[3] What these people had in common was a focus on exactly the questions I was asking, and a mutual conviction that the answers we sought lay in an understanding of human anatomy. I readily perceived that the study of anatomy had the potential not only to explain to me how efficient movement is produced, but also that it provided a very precise and universally accepted language with which to pass that knowledge on to my students.

## The Roles of the Psoas

The most important thing I learned from the study of anatomy, one of the basic tenets on which my approach to teaching technique rests, is that efficient movement originates in muscles that are located deep in the body, most notably the psoas system. The significance of the roles played by the psoas (we call it that for the sake of convenience, although "iliopsoas" is the more accurate term, as the muscle complex is composed of two parts) can be easily visualized by glancing at Figure 1, a drawing by Dr. Elly Trepman. As Dr. Trepman points out, the psoas is one of the longest and most powerful muscles in the body, and it "is the only muscle that attaches to the spine, pelvis and femur. The two components of the iliopsoas are the iliacus, which originates from the inside of the iliac crest [and fossa], and the psoas, which takes its origin from the vertebrae between the twelfth thoracic (T12) and fifth lumbar (L5) vertebrae. The iliacus and psoas are joined in the common iliopsoas tendon, which inserts on the lesser trochanter of the femur." Clearly a potentially powerful source of energy of that sort, located right in the center of the body and attached to three of the anatomical units that are most crucial to dance movement—the lower spine, pelvis, and hip joint—has to be respected. (By now this observation seems somewhat commonplace, as many people speak to the need of dancers to move "from the center," although there remains a good deal of ambiguity as to exactly what they mean by that).

In order to appreciate the roles played by the psoas in dance movement it is important to understand what might be called the "paradox of the psoas." The psoas is capable of stabilization and activation simultaneously. The importance of the stabilization aspect of the psoas cannot be overem-

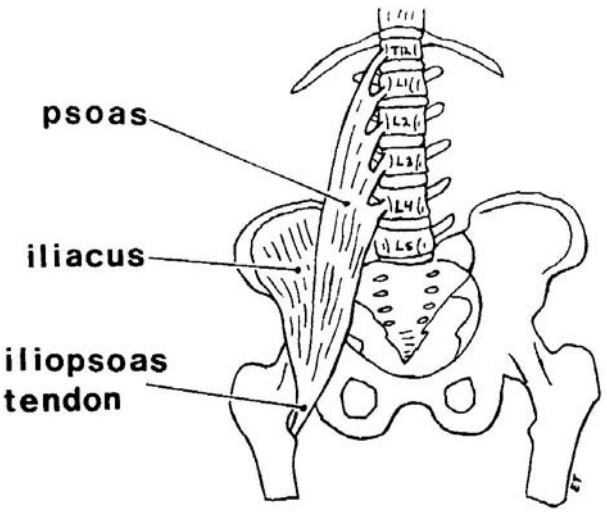


**Figure 1** The iliopsoas consists of the iliacus and psoas muscles. The iliopsoas tendon inserts on the lesser trochanter of the femur. (Reprinted with permission from: Trepman E: Spinal problems in dancers. *In:* Solomn R, Solomon J, Minton SC (eds): *Preventing Dance Injuries* (2nd ed). Champaign, IL: Human Kinetics, 2005, p. 84.)



**Figure 2** Développé à la seconde. **A**, Incorrect execution with the hip lifted; **B**, more correct position, with the greater trochanter of the femur coming closer to the ischial tuberosity. (Reprinted with permission from: Clippinger K: Biomechanical considerations in turnout. *In:* Solomn R, Solomon J, Minton SC (eds): *Preventing Dance Injuries* (2nd ed). Champaign, IL: Human Kinetics, 2005, p. 145. Maurya Kerr, model.)

**Figure 3** Incorrect "extension" in second position; the gluteus maximus is engaged, causing internal rotation of the extended leg. (Reprinted with permission from: Solomn R, Solomon J, Minton SC (eds): *Preventing Dance Injuries* (2nd ed). Champaign, IL: Human Kinetics, 2005, p. 114.)

phasized. If a dancer can stabilize the dorsal aspect of the muscle (the portion attached to T12-L2) while activating the contraction of the proximal portion (e.g., to bring the thigh up toward the torso) the body will remain in good alignment and produce an efficient movement. On the other hand, movement is *inefficient* specifically when it is initiated by the peripheral muscles that lie near the surface of the body, as can be seen all too commonly in students at all levels and in all genres of dance.

Of the many available examples of this principle let us consider just one. Think of the student who is having trouble achieving full leg extension in second position ("extension," as used here, is how dancers refer to what is actually *flexion* of the femur, drawing it up and toward the body, either to the front or side). The leg comes up to 90° easily enough, but beyond that whatever extension can be managed is accompanied by obvious tension. Further, if this problem has persisted long enough there may be popping sounds at the front of the hip socket and snapping or grinding sensations that can become painful enough in themselves to inhibit the student's ability (or willingness) to raise the leg.

This can easily be identified as a positioning problem: the extended or "gesturing" leg is not moving in the proper vertical plane relative to the position of the pelvis. Normally this problem can be addressed by simply taking hold of the leg and gently searching out the place where it can be raised without constriction. This is fine as far as it goes; a high, graceful, stress-free extension requires proper positioning, and in this respect all the teacher can do is try to help the student experience where that is (I would only add the caveat that as the bony construction of the hip socket and the angle of femoral insertion in the acetabulum differ for every individual, the "proper" position for extension will vary, however minutely, from one dancer to another). Ultimately the dancer must *feel* right when performing the extension rather than satisfying some externally imposed image of what *is* right.

However, there is another whole aspect of this problem that tends to get short shrift, if it is considered at all. When the gesturing leg of the student who is experiencing an inability to achieve full range of motion in extension is viewed closely it will often be seen that as the leg passes 90° the quadriceps muscles along the top of the thigh are strongly contracted (see Figure 2). In effect, what the student is trying to do is lift the leg by using the muscles of the leg itself. Unfortunately, this effort not only contracts the quadriceps but also tightens the tendons that surround the hip socket, such as the rectus femoris and sartorius (these tendons are not visible, but they can be palpated). Far from promoting the desired elevation of the leg, this tightening of the tendons seems to restrict the ability to raise the leg higher, and actually pulls the leg *down*. It may also be observed that the gluteus maximus is engaged, causing internal rotation of

**Figure 4**. Teacher helping student to experience release of the tendons around the hip socket in seated second position. (Reprinted with permission from: Solomn R, Solomon J, Minton SC (eds): *Preventing Dance Injuries* (2nd ed). Champaign, IL: Human Kinetics, 2005, p. 114. Maurya Kerr, model.)

the extended leg (see Figure 3). These are classic examples of how the body can work against itself when inappropriate anatomical means are utilized to accomplish a task.

The quadriceps are, of course, engaged in extension, but their role is secondary to that of the "hip flexor," a lay term for the psoas. Through its proximal attachments to the spine and distal attachment to the lesser trochanter at the posteromedial neck of the femur, the psoas provides the primary impetus for raising the leg. The muscles of the leg itself simply respond to this impulse from deeper in the body—as is commonly said, "from the pelvis." Therefore, another correction that should help the student who is having problems with inhibited extension achieve better results (in addition to placing the leg in the proper position) is to encourage him/her to *release* the tendons of the hip socket and the quadriceps muscles, especially at initiation of the movement (see Figure 4).

## Some Exercises for the Psoas

So, granted that our students need to learn to use the psoas—to move "from the center"—how do we provide them with the means to both get in touch with and strengthen that muscle complex? I have devised a sequence of exercises that is intended to do just that. Approximately 30 minutes in length when each exercise is repeated 4-6 times, it constitutes the warm up with which my technique class normally begins. This is essentially floor work, that is, work done while sitting or lying on the floor, which I prefer because the support we derive from the floor helps to "unload" the bones and joints we want to articulate and to reduce tension in the muscles that support them. Further, work of this sort tends to minimize most students' concern with balance—and perhaps with the external shape of the movement generally—thus freeing them to concentrate on what is happening anatomically.

Actually, the warm up starts with an exercise that begins in standing, rolls down onto the floor, and returns to standing (see Figures 5a-e). This first exercise is useful for energizing the body, activating the psoas, and preventing the students from thinking that the floor work to follow is only meditative, rather than preparation for dancing.

Although this warm up does not entail movement through space (locomotion) it is performed in a vigorous fashion, thus fulfilling the need to raise the heart rate, increase blood flow throughout the muscles, and lubricate the joints. An efficient warm up should raise the body temperature about 1.5 or 2 degrees above normal. This has the effect of increasing elasticity in the muscles and decreasing friction in the joints. Further, it facilitates the transmission of nerve impulses into the muscle fibers; thus, the reflexes also improve.

Due to space limitations I will describe just one sequence of exercises from later in the warm up, selected because it can easily be equated with the problem of restricted extension discussed above. I should note first, however,

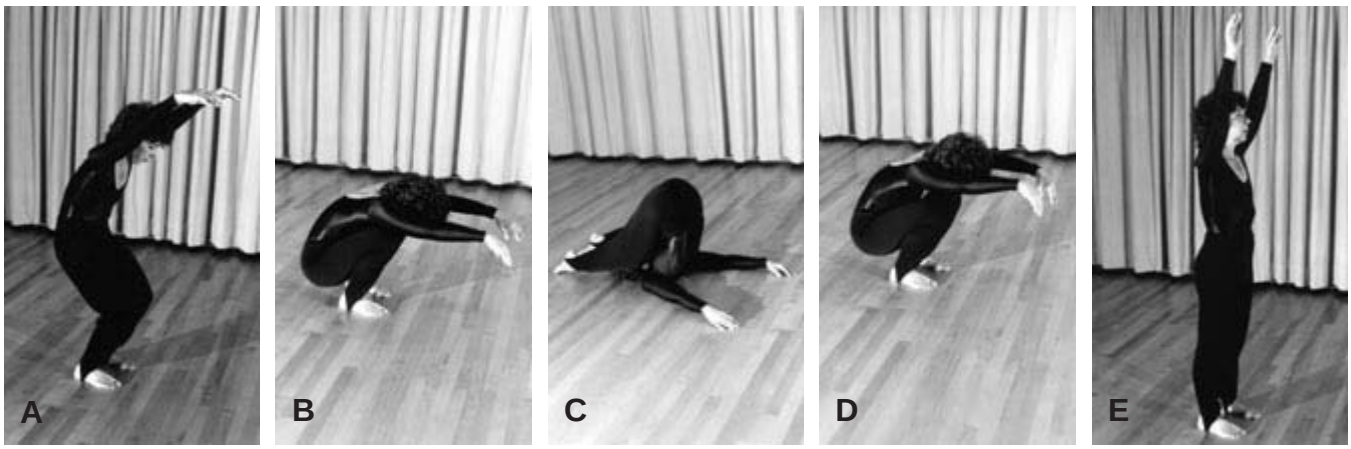


**Figure 5** (Reprinted with permission from: *In:* Solomn R, Solomon J, Minton SC (eds): *Preventing Dance Injuries* (2nd ed). Champaign, IL: Human Kinetics, 2005, p. 117. Bruce Berryhill, photographer.)

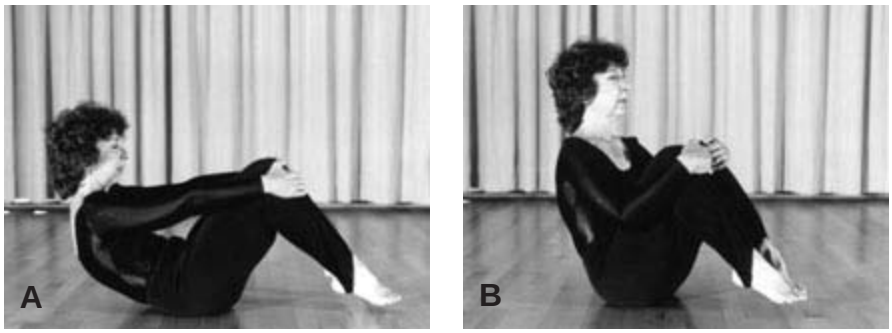


**Figure 6** (Reprinted with permission from: *In:* Solomn R, Solomon J, Minton SC (eds): *Preventing Dance Injuries* (2nd ed). Champaign, IL: Human Kinetics, 2005 p. 121. Bruce Berryhill, photographer.)


**Figure 7** (Reprinted with permission from: *In:* Solomn R, Solomon J, Minton SC (eds): *Preventing Dance Injuries* (2nd ed). Champaign, IL: Human Kinetics, 2005. pp. 124, 125. Bruce Berryhill, photographer.)

**Figure 8** (Reprinted with permission from: *In:* Solomn R, Solomon J, Minton SC (eds): *Preventing Dance Injuries* (2nd ed). Champaign, IL: Human Kinetics, 2005, p. 125. Bruce Berryhill, photographer.)

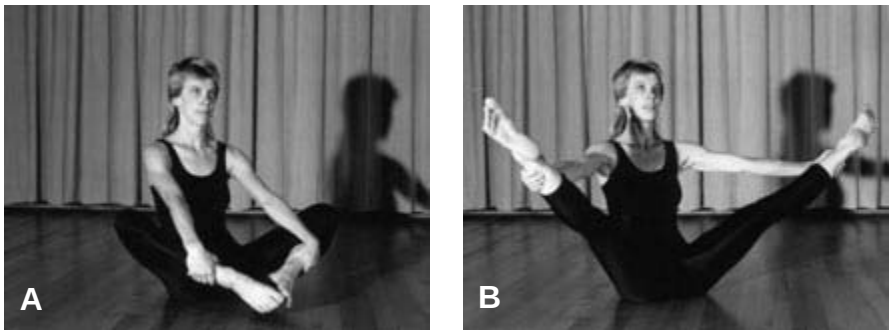


**Figure 9** (Reprinted with permission from: *In:* Solomn R, Solomon J, Minton SC (eds): *Preventing Dance Injuries* (2nd ed). Champaign, IL: Human Kinetics, 2005, p. 126. Bruce Berryhill, photographer.)

that the exercises preceding those I am about to show you are based on the concept of the lever, which I happily acknowledge having borrowed from Sweigard.[2] Levers are designed to produce movement in a desired direction by applying pressure in the opposite direction. Thus, in a movement sequence like that illustrated in Figures 6a & b, we bring the body up onto its "balance point" by pressing "down" through the "base of support," which in this case is the distal vertebral attachments of the psoas. We then return slowly to the starting position and repeat this lever action numerous times. Exercises of this sort are designed to promote the experience of initiating work in the psoas, and to strengthen the muscle through both concentric and eccentric activity.

The exercises related to extension are all performed on the balance point, which is located slightly behind the coccyx. The exact placement differs from one individual to another. While we are on the balance point the lumbar and dorsal spine must remain in an easy curve; one must not straighten the spine or come up into a V position, as that causes undue strain on the low back and contraction of the tendons of the hip socket, which in turn restricts the ability to extend the legs. While in this position the psoas, which is already engaged in sustaining the body on the balance point, works even harder as we do a variety of movements with the knees bent (see Figures 7 a-c). The same effect is heightened in the next exercise, where we add the extension of the legs to the work the psoas is doing, extending them while keeping the femurs as close to the chest as possible (see Figure 8). We then articulate the tibias to line up with the femurs. Then we alternately fold at the knees (see Figures 9a & b) and straighten the legs

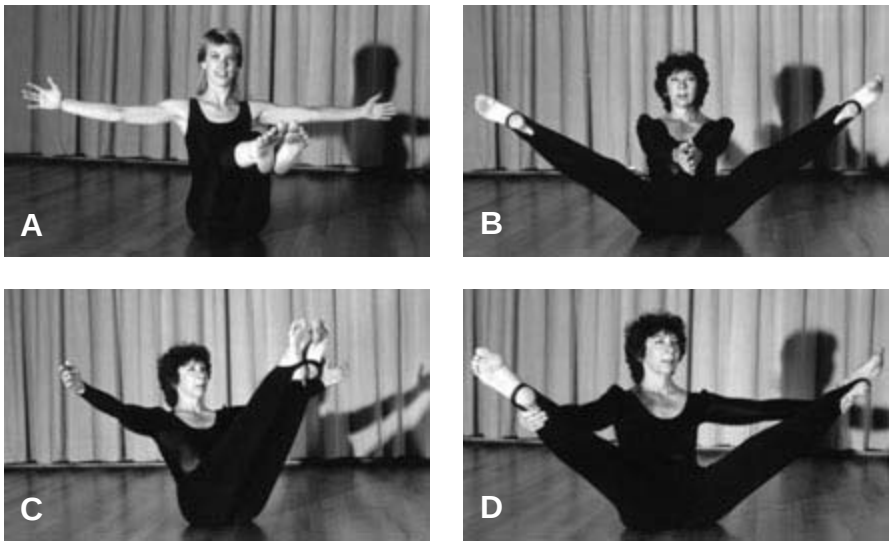


**Figure 10** (Reprinted with permission from: *In:* Solomn R, Solomon J, Minton SC (eds): *Preventing Dance Injuries* (2nd ed). Champaign, IL: Human Kinetics, 2005, p. 126. Bruce Berryhill, photographer.)

(this also starts to lubricate the knee and hip joints).

The final exercise in this series works on lubricating and warming up the hip joints and, of course, strengthening the psoas. From the starting position on the balance point, knees together in parallel and arms extended outside the legs (see Figure 10a), we open the knees to the side, bringing the arms inside the legs (see Figure 10b). Then we reverse the process—knees in, arms out (see Figure10c). After each set of four repetitions we catch the ankles and allow the weight of the legs to rest in the palms of the hands, releasing the hip sockets (see Figure 10d). The strength and facility developed throughout these balance-point exercises is exactly what we will use when, in standing position, we work on extension.

As these few exercises used to illustrate this work are performed on the floor they may automatically be associated with modern dance. It is important to understand, however, that the principles they embody can be adapted to and utilized in any other dance genre. Beyond such distinctions, I believe it is our primary responsibility as technique teachers to help our students find the most efficient way possible to use their bodies. I emphasize the roles of the psoas, the pelvis, and the spine because the study of anatomy has led me to believe that they are the prime motivators of movement. If the dancer is able to initiate action by the use of these components, all else should follow and the movement produced will be relatively stress free and efficient.

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This brief introduction draws heavily on material that is dealt with far more extensively in "An Efficient Warm Up Based on Anatomical Principles," in *Preventing Dance Injuries*, 2nd edition, Human Kinetics, 2005,[4] and the video/DVD "*Anatomy as a Master Image in Training Dancers*."[5]

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