



## Developing Optimal Muscle Control to Help Establish Balance in the Dancer

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### Asymmetry principles

- Both structural and functional components
- Structural:
  - Left vs. right brain (L controls R side function and vice versa)
    - Right brain (spatial abilities, visual imagery, music)
      - Recognize relationships, synthesize information, intuitive insights
    - Left brain (language, math, logic)
      - Analytical, rational, logical, sequential
  - Heart on the left, liver on the right
    - Liver is the second heaviest organ in our body behind the skin
  - Left vs. right diaphragm (L controls R side function and vice versa)
    - Right is more superiorly orientated than the left
    - Right is structurally better supported by the liver
    - Right side has a larger, thicker and stronger central part of the muscle
    - Right has 3 tendon attachments to the lumbar spine (L1, L2, L3) while the left has 2 (L1, L2)
  - 3 lobes in the right lung, 2 in the left
    - Right lung is a little larger than the left
  - Nervous system
    - Vagal nerve is more posteriorly oriented on the right
    - Phrenic nerve (diaphragm) is shorter and more advantageously positioned on the right
- Functional:
  - Handedness
  - Dominant lower extremity
  - Turning preference
  - Methods of stabilization
- Anatomical and structural symmetry is impossible—that is one of the things that makes the human design so beautiful and perfect in its own way. Functional symmetry is achievable with specific focus, with some requiring

more effort than others. Neutrality of joints, muscles and tendons along with functional symmetry is our optimal goal whenever able.

#### Dominant vs. nondominant side or lateral bias

- As a society we are 90% right handed and 80% right footed
- Dancers turn preference: clockwise / to the right for most
- Teaching and demonstration preferences
  - Which foot behind when demonstrating 3<sup>rd</sup>-5<sup>th</sup> positions?
  - Preferable stance vs. gesture leg
  - Choreographically

#### Influences affecting dancing and learning preferences

- Structural and functional asymmetry
- Dominance (upper body, lower body, turning)
- Neuromuscular considerations
- Vision
- Hearing
- Motor imagery styles

#### Respiratory considerations

- Zone of Apposition
  - The area that the diaphragm displaces up and down in its piston-like movement during respiration.
  - As the diaphragm contracts and lowers during inspiration, its muscle fibers shorten and the pelvic floor descends. This is opposed by abdominal muscle resting tension or eccentric activity. This process increases the size of the chest cavity and reduces pressure within it.
  - During exhalation, the diaphragm ascends and returns to its domed shape while the pelvic floor contracts and ascends and the abdominals contract inward to help push into the viscera (organs) to expel air out of the lungs.
    - Although considered a passive process, many of us do not perform this process properly which leads to dysfunction.
  - Muscles between the ribs (intercostal muscles) aid in this process. If they are not properly positioned to do so, than other muscles take over (i.e. latissimus dorsi, pectoralis, upper traps).
- Respiratory rate (adult):
  - "Normal": 12-15 breaths / minute
  - Optimal: < 10 breaths / minute
- The lower 10% of the lungs transports more than 40ml of oxygen/minute while the upper 10% transports less than 6ml/minute. Thus, the lower part of the lungs is 6-7 times more effective in oxygen transport due to richer blood supply mostly caused by gravity.
- Double E's: Exhale with Effort
  - As a general rule, we are a society who function in a hyperinflated and overextended state with poor ability to effectively manage how we exert force as a result.
  - Force is generated through the use of our neuromuscular system, but pressure can also be created through intra-abdominal

pressure. We hold our breath in an inhaled state to create force. It's just not effective pressure for exertion.

- Exhalation considerations:
  - Through lightly pursed lips
  - Blow out cool air, not warm air
  - Exhale more air than you think you have
  - Feel your ribs lower, abdominals and pelvic floor contract and muscles between your shoulder blades

### Muscle activity

- Movers vs. positioners / stabilizers
  - Muscles have different structural make-up with some muscles having more fibers for movement and others having more for stability.
  - Many muscles will take on different roles depending on:
    - what position they are being asked to function in
    - activity of joints above and/or below
    - how they have been trained
- There are certain fairly predictable lower body muscle imbalances which have been identified due to our asymmetrical tendencies. Some of these muscles which have been identified are malpositioned and therefore functioning in either a weakened or overactive state.

### Positional influence

- Optimal to determine if the position of the pelvis and/or thorax (ribcage) is affecting how the muscle is working.
- Lumbar lordosis and extension bias
  - How much is okay?
    - Variability is part anatomical and part functional.
  - What positions produce more of it?
    - 3<sup>rd</sup>-5<sup>th</sup> positions significantly increase anterior pelvic tilt and therefore increased lumbar lordosis.
  - Can a more neutral position be maintained during movement?
    - In lowering, raising and leaping activities.
  - Concentrically and eccentrically able to stabilize?
    - Flexing (limbs moving forward) and extending (limbs moving behind).

### Turnout

*"When did you ever see an animal who was a jumper and had turnout?"* Alexei Ratmansky, Artistic Director, American Ballet Theatre

- Where is the turnout coming from?
  - Technically correct turnout
  - Functional turnout
  - Compensated turnout
- How much turnout is acceptable or expected?
  - 180° is considered optimal (seldom functional)
    - 70° of hip external rotation, 5° of tibia external rotation, and 15° of feet external rotation on each side.

- Studies have shown that mean true functional turnout is anywhere from 93.6° to 109.2°. Marked difference between these numbers and optimal 180°.
- Does compensated turnout lead to injuries?
  - Yes, especially with a higher degree of compensation.
- Can the degree of turnout be maintained during movement?
  - Both lowering and raising
  - Concentrically and eccentrically
  - Flexing (limbs moving forward) and extending (limbs moving behind)

### Training considerations

- Need to work in parallel (consider 6<sup>th</sup> position?! with varying widths) and establish frontal plane control before advancing to more complex transverse plane activities.
  - Work on progression in varying degrees into further turnout once the students have been better able to master the changes in position.
- Consider instructing the students to “set” their diaphragm, pelvic floor and “core” with a couple minutes of focused breathing work:
  - At the barre or center, arms in 1<sup>st</sup> position and consider a little lower on the left side than the right (“engage” left obliques).
  - Inhale smoothly through the nose feeling the lower ribs expand and the back open up.
  - Exhale fully through lightly pursed lips feeling the abdominal and shoulder blade muscles working together to aid in getting the air out.
- Training for more dynamic involvement of “core” and respiratory muscles
  - At the barre, with one hand for support, inhale through the nose, exhale through pursed lips while lowering into plie and maintain this exhalation while returning to starting position.
  - It is during this time that they will be able to feel the integration of the hips, pelvis and spine and better able to fine tune positions.
- Ask questions like:
  - “Where do you feel that working?”
  - “Do you feel your weight through the same places on each of your feet?”
  - “Are your abdominals working or just your low back?”
  - “Are you breathing fully?”
- Try to discourage dancers from functioning in the classic dancer’s position:
  - Walking with legs in turnout
  - Bending over at the hips only
  - Locking out their joints in static and dynamic positions
  - Overextending the back