Basic Functional Assessment

Section 1. Static Balance

Although it is rarely the nature of sport to stand still, the static balance test looks at some fundamental foundations for movement control. Performance in this test examines:

- The sensory communication between your foot and your central nervous system
- Control of the CLA over each leg.
- The ability of the body to make small adjustments without rigidity so that you can easily move your limbs without affecting your trunk position or balance.

Test 1: Eyes Open

Stand on one leg with both arms above your head. Maintain a ‘soft’ knee.

Move one arm down to your side and back up. Move the other arm down and back up.

Move both arms out in front of you. Take one arm out to the side and back to the front. Repeat with the other arm.

Lift your arms to a horizontal position and bend your elbows. Keeping your pelvis facing forward, turn your upper body to the left and to the right.

Move your free leg out in front of you as far as you can.

Take it back behind you as far as you can.
Take it out to the side as far as you can. Take it across your body to the front. Take it across your body to the back.

**Observation notes**

- Does your trunk tend to tip to one side more consistently than the other? This is a loss of the central axis into the coronal plane.
- Has your foot become rigid in response to this challenge or is it relaxed and adapting well to your movement to help you to balance?

**Scoring**

For both of the balance tests, score only for the worst error that you see. For example, if you wobble, but then touch the floor for support, you will score three points.

| Relaxed accurate performance | 0 |
| Wobbles but does not touch the floor | 1 |
| Violent wobbling or shifting of stance foot to regain balance | 2 |
| Needs to touch the floor at any time | 3 |
| Facial fixing | add 1 point |
| Rigid foot | add 1 point |
| **Total:** | |

**What should I do to improve my performance?**

A training athlete should not test poorly on eyes open balance testing. If your balance is poor at this stage of testing, focus on pelvic stability work and establishing a listening foot.

**Key exercises**

- Basic Balance, Eyes Open and Eyes Closed (Chapter 5).
- Progressions for Balance Training (Chapter 6).
- Listening Foot exercises (Chapter 3).
- Bridge, Clam, Standing Knee Press (Chapter 5) and Progressions for pelvic stability.
Observation notes
The ideal response would be to see the arms move through a 180-degree arc, with the pelvis maintaining its position. The central axis is maintained in the sagittal plane. There are several possible movement dysfunctions, which may interrupt an ideal shoulder-trunk relationship.

Scoring

<table>
<thead>
<tr>
<th></th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pelvis level</td>
<td>0</td>
</tr>
<tr>
<td>Pelvis rotated forward-spinal curve deepened</td>
<td>1</td>
</tr>
<tr>
<td>Pelvis-weight shifted forward</td>
<td>1</td>
</tr>
<tr>
<td>Shoulders less than 180 degrees</td>
<td>1</td>
</tr>
</tbody>
</table>

Total:

Further testing:
If you find that the performance is poor, investigate the Double Arm Shoulder Press to confirm your findings.

What should I do to improve my performance?
- Floor Presses (Chapter 5).
- Greyhound (Chapter 5).
- Wall Press (Chapter 5).

Test 2: Seated Hamstring Test: Hamstring-Trunk Relationship in Sitting
Hamstring tightness is often blamed for lower back pain, and in many sports is thought to impact on performance. However, it is not only hamstring length but the proprioceptive awareness of lumbar position and the stability to control it which also play a part. This test was originally developed for sprint kayak and martial arts but has become a useful marker for any sport as it demonstrates available hamstring length against a neutral spinal position as well as proprioceptive problems in the lumbar spine. Performance in this test examines:

- Active hamstring length.
- Trunk proprioception and control.
- The relationship between hamstring lengthening and lumbo-pelvic control.

Sit with your foot on the front of a Swiss Ball. Sit up onto your seat bones so that your spine is in neutral. Maintain this spinal position and push the ball out away from you until you feel the limit imposed by your hamstrings.
Observation notes

An ideal performance will show an athlete who can maintain a neutral spine with their leg straight and hip at 90 degrees. The problems associated with this movement will be:

1. Your pelvis slips into backward pelvic rotation before the hamstrings reach a tension point. This indicates poor proprioception and stability around the spine.

2. You cannot straighten your knee. This indicates hamstring length restriction.

3. You slip into backward pelvic rotation once the hamstrings are under tension. This indicates greater relative flexibility in the spine than in the hamstrings.

4. You tip your pelvis sideways to relieve the pressure on your hamstrings.

Scoring

<table>
<thead>
<tr>
<th>Condition</th>
<th>Y =1</th>
<th>N=0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spinal position is lost at any time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knee fully straightens</td>
<td>Y =0</td>
<td>N=1</td>
</tr>
</tbody>
</table>

Total:

What should I do to improve my performance?

- Straight Up Hamstring Mobility (Chapter 5).
- Standing Leg Swing (Chapter 5).
- Tail Up (Chapter 8).
- Any trunk stability exercise in an unsupported neutral spine position, e.g. Wall Press and Ball Bouncing (Chapter 5) or at a more advanced level, Over the Top (Chapter 6).
Test 3: Total Body Rotation

This movement looks at the total available rotation from the foot to the top of the spine. There are few sports that require only one body part to rotate. Usually rotation occurs as a result of many parts contributing to the total motion. One of the best examples of total body rotation is the golf swing. In the more comprehensive functional mobility assessment section, tests to examine each component are available. Performance in this test examines:

- Total joint rotation availability from foot to head.
- Correct foot pressure changes in response to rotation.

Stand with feet hip-width apart. Turn and look behind you, noting a spot that you can comfortably see. Do not strain yourself. The test seeks to determine what movement is naturally available to you. Turn back around the other way, noting a spot that you can comfortably see.

Once you have noted how much motion is available, turn your attention to your feet. Note the pressure changes in your feet as you turn. It should follow the same pattern: as you turn to the left, the left foot pressure moves towards the outer part of the foot, and the right foot pressure moves to the inner part of the foot. In other words, the pressure moves in the direction of the turn.

Observation notes
1. Note whether the feet alter their pressure in the correct pattern.
2. Note whether rotation is markedly restricted in one direction.

Scoring

If you are standing at the top of the circle and can turn all the way around, you score 0. If you have poor rotation and only make it into the first third of the movement, you score 2. If your feet do not alter their pressure in the correct direction, add 1.

What should I do to improve my performance?

- Total Body Rotation (Chapter 5).
- Pelvic Rotation Over a Fixed Foot (Chapter 5).
- Listening Foot (Chapter 3).
Section 3. The Lower and Central Control Zones: Pelvic and Trunk Stability Relationship

Test 1: Static Lunge

The Static Lunge is the least complex of the lunge group of exercises and is therefore suitable as a baseline assessment. It is alternatively known as the Split Squat, but considering it as a Static Lunge establishes it as the start point for a clear path of progression.

- Pelvic stability.
- Eccentric GMax activation.
- Loaded functional hip mobility.
- Control of the leg from the hip to the foot.
- Central axis control for the trunk.
- Basic balance.

Stand with one foot in front of the other, hip-width apart. Raise your back heel. Put your arms straight out to the side. Keeping a vertical trunk, take your body straight to the floor.

Note: your body weight should not be moving forward. Your back knee should move straight to the floor.
**Observation notes**

1. The knee moves inwards. If this is the case, it is unlikely that GMax and GMed are functioning correctly.

2. Pelvis tips sideways. This demonstrates loss of control in the coronal plane for the pelvis, and indicates a GMed dysfunction.

3. Hips move backwards. This may be visible as the lumbar spine deepening its curve when observing from the side, and indicates that GMax is either not functioning well eccentrically (as it lengthens), or functions poorly in outer range (when it is longest). Instead of the hip moving downwards, you move it backwards where it is easier to access the back extensors and hamstrings to help you.

4. Trunk tips sideways. This demonstrates a loss of the central axis control.

5. One arm drops lower. This may indicate a dependance on latissimus dorsi on that side.

**Scoring**

- Knee moves inwards: 1
- Pelvis tips sideways: 1
- Hips move backwards (lumbar curve deepens): 1
- Trunk tips sideways: 1
- One arm drops lower than the other: 1
- Lip biting or facial fixing: 1
- Rigid front foot: 1

**Total:** 5
Each lunge variation examines a slightly different combination of elements. It is useful to look at each of them for this reason. However, if the static lunge is performed poorly and you are short of time, the following variations can be skipped until the static lunge improves sufficiently to be tested at a higher level.

![Athlete performing a static lunge poorly. The pelvis has tipped downwards on the left, and the knee has moved inwards. Note that the left hand is lower than the right with the elbow bent. This athlete is trying to use her left latissimus dorsi to compensate for poor right gluteal activation.]

**Test 2: Eyes Closed Lunge**

To recap on the information provided in the balance testing section, in many sports, your eyes are moving, either to track a ball movement or the position of an opponent, or due to your own movement through space. Some athletes are over-dependent on their eyes for balance, and are weaker in their other two primary balance systems, the somatosensory (information coming from the receptors in your skin, muscles and joints) and vestibular (your inner ear). This means that they may test well when they are allowed to look at a fixed point, but this result does not reflect what their control might be like if their eyes must move.

It is useful to test both the Eyes Open and Eyes Closed Lunge. The Eyes Open version indicates whether the pelvic stabiliser muscles are capable of controlling the movement. The Eyes Closed version looks at the relationship between sensory feedback and pelvic control. The procedure is exactly as above only with the eyes closed.

**Scoring**

- Knee moves inwards 1
- Pelvis tips sideways 1
- Hips move backwards (lumbar curve deepens) 1
- Trunk tips sideways 1
- One arm drops lower than the other 1
- Lip biting or facial fixing 1
- Rigid front foot 1

**Total:**

_What should I do to improve my performance?_

- Bridge, Hip Pops, Hip Swivels (Chapter 5).
- Clam, Standing Knee Press (Chapter 5).
- Supported Lunge (Chapter 6).
- Lunge Progressions (Chapter 6).
**Test 3: Dynamic Lunge**

Performance in this test examines:

- Higher level trunk stability and proprioception.
- Ability of the athlete to push effectively from the leg instead of throwing their shoulders back to generate momentum.

Start standing straight with feet together and arms straight above your head. Step forward into a lunge while maintaining an upright trunk, and push back to the start position again. When moving back to the start position, check that the motion is initiated from the foot, not from driving the shoulders back to generate momentum.

**Scoring**

<table>
<thead>
<tr>
<th>Description</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knee moves inwards</td>
<td>1</td>
</tr>
<tr>
<td>Pelvis tips sideways</td>
<td>1</td>
</tr>
<tr>
<td>Hips move backwards-lumbar curve deepens</td>
<td>1</td>
</tr>
<tr>
<td>Trunk tips sideways</td>
<td>1</td>
</tr>
<tr>
<td>Trunk collapses forward</td>
<td>1</td>
</tr>
<tr>
<td>Moving shoulders back initiates return to start position</td>
<td>1</td>
</tr>
<tr>
<td>Lip biting or facial fixing</td>
<td>1</td>
</tr>
<tr>
<td>Rigid front foot</td>
<td></td>
</tr>
</tbody>
</table>

**Total:**

This test can also be performed with eyes closed, for the same reasons as mentioned for the Static Lunge.

**What should I do to improve my performance?**

- Bridge, Hip Pops, Hip Swivels (Chapter 5).
- Clam, Standing Knee Press (Chapter 5).
- Wall Press (Chapter 5).
- Supported Lunge with arms up above head (Chapter 6).
Test 4: Standing Knee Lift

Performance in this test examines:

- The ability to easily position the CLA over each stance leg.
- Symmetry.
- Lateral pelvic stability.
- The foot-hip connection.
- Hip flexion pattern.

Stand with feet together and arms out to side at shoulder height. Lift one knee to hip height. Replace the foot and swap sides.

Note: It is most useful to alternate sides on each repetition. This exposes any issues and makes them easier to see.

Observation notes

1. Hip hitching. This is a fault in the hip flexion pattern. Instead of the femur moving straight upwards in the sagittal plane with clean hip flexion, the pelvis tilts in the coronal plane, allowing you to stabilise your trunk by using the trunk side flexor, quadratus lumborum. This is not a pattern that you would want to see in anyone who needs to move quickly or efficiently in a forward direction as the movement has been diverted into the coronal plane.

2. Stance hip moves out to the side. The pelvis should remain straight and level throughout this movement; however if GMed is weak, it will not keep a firm control over the femur to pelvis relationship. If the weak muscle cannot pull into its shortest range and maintain this position, it will allow the pelvis to drop on the lifting side, or permit the hips to drift sideways. An athlete showing this response may find that driving sideways off this leg, landing on it or jumping off it is slower or less powerful than the other side.
3. One arm moves lower. This indicates possible use of latissimus dorsi to compensate for decreased trunk or pelvic stability.

4. Trunk tips sideways. This loss of the central axis is usually a compensatory response to loss of pelvic position, but can also indicate that the body is not well balanced over the stance side.

5. Leg does not lift straight. Weakness in iliopsoas may cause you to recruit other muscles to flex the hip.

**Scoring**

<table>
<thead>
<tr>
<th>Item</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hip hitches up on the lifting side-trunk</td>
<td>1</td>
</tr>
<tr>
<td>Stance hip moves out to side</td>
<td>1</td>
</tr>
<tr>
<td>One arm moves lower</td>
<td>1</td>
</tr>
<tr>
<td>Trunk tips sideways</td>
<td>1</td>
</tr>
<tr>
<td>Leg does not lift straight</td>
<td>1</td>
</tr>
<tr>
<td>Facial fixing</td>
<td>1</td>
</tr>
<tr>
<td>Foot fixing</td>
<td>1</td>
</tr>
</tbody>
</table>

**Total:**

**What should I do to improve my performance?**

- Clam, Standing Knee Press (Chapter 5).
- Bridge, Hip Pops, Hip Swivels (Chapter 5).
- Supported Lunge (Chapter 6).
- Lunge Progressions (Chapter 6) particularly with your arms stretched upwards to improve the CLA and minimise the effect of latissimus dorsi overuse.
Test 5: Seated Knee Lift on Ball

The seated knee lift on the ball is quite a sensitive test, which examines trunk stability and vertical alignment of the trunk on the pelvis. It will highlight any asymmetry in weight bearing between the left and right sides of the pelvis as well as control of the CLA. Performance in this test examines:

- Trunk stability.
- Vertical alignment of the trunk on the pelvis and control of the CLA.
- Symmetry of weight bearing through left and right sides of the pelvis.

Sit on a Swiss Ball with hips and knees at approximately 90 degrees and your feet together flat on the floor. Position your arms so that they are parallel to the floor. Maintaining an upright trunk, lift one knee so that your foot comes off the floor.

Scoring

- Hip hitched up on the lifting side-trunk shortens on that side - 1
- Pelvis moves out to side - 1
- One arm moves lower - 1
- Trunk tips sideways - 1
- Leg does not lift straight - 1
- Facial fixing - 1
- Foot fixing - 1

Total: