

## The Lunge: Concepts in Function

### Part Two: Training



Variations of lunge training have always been an accepted part of training and conditioning. They have been seen as a powerful tool to develop lower limb strength and more recently seen favour as a component of lumbo-pelvic stability training. Research has helped verify this value. Jonhagen et al, 2009 took 32 soccer players through a simple 6 week lunge training protocol... half performed walking lunges and half jump lunges. The outcome was measured by the maximal hamstring and quadriceps strength tests and by functional tests with 1-leg hop tests and 30-m sprint runs. Whereas the walking lunge improved hamstring strength, the jumping lunge resulted in sprint running improvements. Research constraints rightly meant that the lunge form used in this study was simplistic. This article aims to illustrate that the lunge can also be developed into a much more expansive training tool.

Part one of this series took a look at the lunge from a screening perspective and sought to expand upon this in order to help us understand and evaluate our client's general movement competence. We also introduced the concept of 3 tiers of movement and applied these to lunge form.

**Tier 1:** a uni-planar lunge in its most simplistic form with almost enforced alignment.

**Tier 2:** more expansive tri-plane lunges but performed along predictable vectors and maintaining alignment criteria and trunk "centring".

**Tier 3:** tri-plane foot drives combined with trunk displacement and upper limb reaches, challenged via variables such as range and speed.

The tier system is simply a representation of functional progression, and the illustration of the fencer seen above is a classic example of an expansive and dynamic tier 3 lunge being performed in real time function.

So if we are to consider a functionally progressive approach to our movement screening of the lunge, then should we also take this approach into using the lunge as a training tool?

What will be our strategy with people who show us dysfunction and a lack of competence with our lunge based movement investigations? An effective sliding scale of functional progression will be paramount in

our exercise interventions. Understanding what can be achieved by both progression and regression of lunge training will help identify techniques that improve motor competence. Understanding what can be “done” with variations of lunge training will help us select techniques that target and facilitate the motor qualities and skills that we are aiming to influence and improve.

The above represents how we could use the lunge in our functional training. Many times in practice and study you will come across statements like this;

*“On screening you have problems with that lunge pattern, so we are going to clean that lunge up.”*

This can be a successful strategy; a faulty individual movement pattern is identified and the corrective strategy revolves around this movement. But it can be approached from a different perspective. What if the way the client is performing a lunge is actually demonstrating that they have issues with a wider core component of movement? In a way we are suggesting here that it is not the lunges fault, a more “body-global” issue shows up best in the way we use a lunge for our assessment. The trainers reasoning process may now sound like;

*“This client is demonstrating a lack of dynamic stability here, particularly in that frontal plane. I’m seeing it throughout my movement assessment but it shows up best when we do those test lunges, that pelvis drops and they shift heavily to the lead leg side. I can use some adapted lunge variations as one part of my programming to help this client develop their stability skills”.*

One approach may see the primal movement pattern of the lunge itself as the primary dysfunction, the other focuses on an essential “bio-motor” component of successful movement being both exposed and improved via the lunge. With both interpretations, if you apply a sound pathway of functional progression in your exercise interventions to both, then you will most likely see good results with your client, and in many cases the same results.

## **So what is functional progression and what does it look like with a lunge?**

There are many ways to progress exercises, from the reliable and proven manipulation of loads and reps, to the physiological challenges of intensity and duration, or the musical influences of beats and rhythms. It is not within the scope of this article to review all these. All have their benefits and disadvantages, and most will have a role to play in the training or rehab of clients. At the heart of functional progression is an understanding of the *functional constants* (review article one) or what are often termed “the components of function”, providing us with a language and framework that we are becoming more familiar with:

Force production, force reduction.

Controlling and working with gravity and ground reaction.

Capturing and re-directing momentum.

Expansively using and re-girding the kinetic chain via its sling systems and its design for movement.

Supporting and extending threshold movement.

And doing all this in 3 planes of motion, within a proprioceptively and reflexively enhanced environment, and following appropriate motor timing and positional relationships.

It would be fair to credit certain educators with developing our understanding of this language of movement including the late Vladimir Janda, Gary Gray, Vern Gambetta and Mike Clark.

The rest of this article is going to use the functional constants above, and other progression tactics, in a mainly pictorial collage dedicated to developing and progressing the lunge. We are not going to put the emphasis on documenting repetitions, sets and loads, but rather look at the movements themselves and

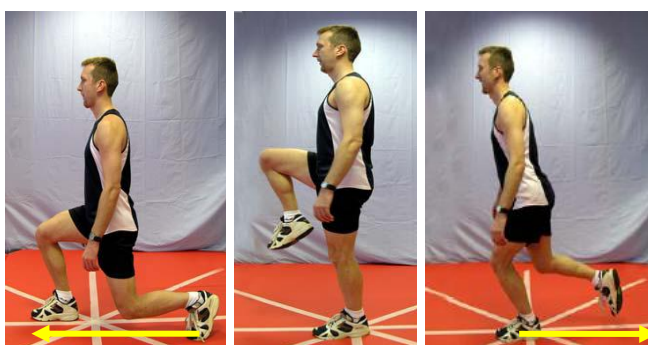
highlight a few “whys”. We will steadily progress through the 3 tiers but not necessarily in a strictly linear fashion. True functional progression will never be about having only one option next, but understanding and selecting the right option.

The starting point will essentially be determined by our screening observations. For example, if our client is showing us fantastic form, symmetry and reliability with the basic tier 1 screens then we can justify not placing too much emphasis on “baseline” lunge activities within our programming. For some clients it will be appropriate to push further along the functional progression to find an appropriate starting point, always remaining aware that we have options to regress to less advanced lunge variations client progress stalls.

## The Baseline



The absolute baseline is to pre-position the feet to start in split stance... therefore no forward step or recover, but just a simple lower and recover. Assistance may even be necessary, such as a pole, but once form has been established and can be repeated some minimal loading can be added, range increased, or even an extension to using an unstable surface to start to reactively challenge this most basic pattern.



Next comes the classic anterior lunge and recover. Progress to recovery via a stork stance, and then add a posterior lunge. A stick down the spine may help posture, and ranges and speeds can be built upon. Going wide or going “in-line” with the lead foot is an option



At this early stage it is important to correct alignment faults and be aware of signs of instability such as loss of pelvis levels, excessive trunk flexion or collapse and over-pronation of the stance leg. A regression is to assist the deceleration with strong band attached high and around the chest, de-loading the lunge and allowing the client to progressively develop stability competence.

Progression to “tier 2” type lunge activities can now be justified.



frontal aligned



frontal rotated



anterior oblique



posterior rotated



front cross



rear cross

Skills developed with the raw three dimensionality of the lunge will provide a more dynamic foundation to build upon. At this stage do not accept second best when it comes to the timing, foot positions and recovery. Get it right now in order to carry it forward. Challenge further with speed, range and repetition.

### Intervention



With some clients there may be a need for techniques that will allow them to feel and correct their movement weaknesses, with the “reactive” techniques being appropriate options at this stage. These exercises may appear to accentuate a dysfunction but are set up in a way that the client can successfully and automatically recruit the desired muscle groups and strategies that overcome it. Lunge based options are illustrated above and it is recommended reviewing Gray Cooks interpretations of Reactive Neuro-muscular Training, “Athletic Body in Balance”, “Movement” 2010, Human Kinetics.

## Incorporating the Upper Body

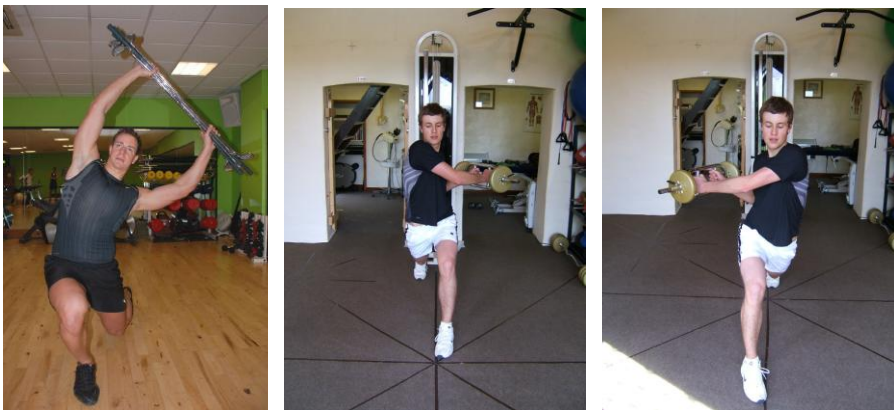


With the lower limb patterns and lumbo-pelvic foundation developed a logical progression option is to incorporate tri-plane trunk motion and control. These are lunge and recover movements, where the athlete is asked to control the displacement and momentum of a full range trunk “drives” in all 3 planes of motion.

Gary Gray describes 3 dimensional footwork with 3 dimensional trunk and arm drives in a system that he calls the “Matrix”, *Functional Video Digest Series, 2000*.



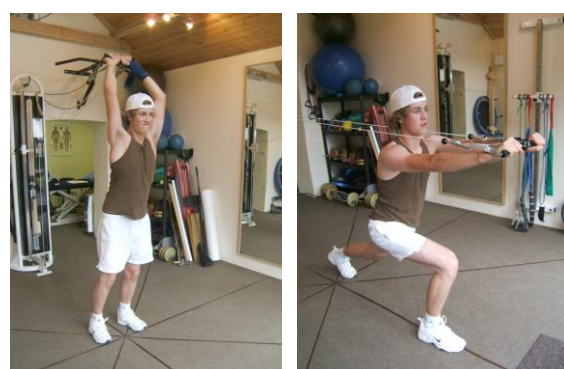
Controlling bodyweight is progressed to also controlling a load, be that a stack of golf clubs, a med. ball or weights etc. In the second example below a step through and return (anterior to posterior) lunge is employed with the left leg remaining fixed and planted and the trunk and arms driving into rotation.



The lunge is still the primary movement pattern, but can now be subjected to “incorporation”. Think of the lunge as being a mobile and adaptable foundation that these further upper body progressions are built upon.



Step-through cycle lunge with full range pulley punch



A simple anterior lunge with bilateral pull down



A cross to lateral lunge with horizontal push



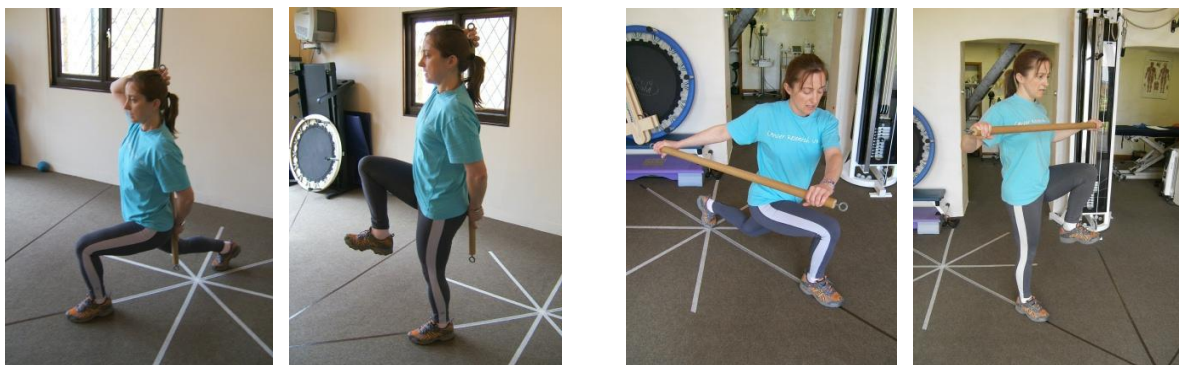
A step through lunge with elastic chop down action

The pulley and elastic patterns offer many potential options, and at this stage of the progression we are asking our “developed” lunge pattern to be strong and stable enough to support being inventive and expansive with our choices. This can only be implemented if our client is showing us the appropriate competence with the initial stage exercises. This initial caution progression process allows us to develop the lunge options in order to reflect “real time” function where we can think of the lunge as being the “delivery system” that takes the body to a point where it can perform a hit, strike, punch or blow. Our exercises are designed to develop and support the delivery and recovery of this total body movement.



At this stage the lunge can be developed into total body strength patterns incorporating higher levels of resistance. The patterns selected being performed into full range positions, and at speed, as the athlete’s skills and competence improves. Be aware it is not wise to extend strength patterns into the end range variations shown above unless the athlete has progressively developed their lunge training as outlined previously.

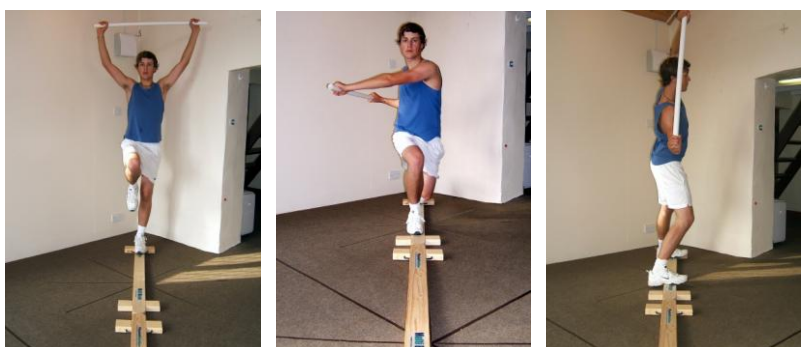
*Note: Throughout a functional progression such as this it is always relevant to introduce free-weight strength and conditioning, or lifting patterns where appropriate. Strength is the fuel that underpins function and split-stance and lunge based free-weight lifting protocols provide an effective and quantifiable strength enhancement system that runs parallel with a functional approach.*



With a solid foundation in place our choices become greater, the progression becomes less linear, but the focus is still on moving lunge based movement skills forwards. Above is an example of a walking line lunge incorporating posture drives and tri-plane trunk control. When successful with bodyweight progressions resistance equipment is added with weight vests and body bars being an ideal and adaptable combination.



Proprioceptive enhancement plays a role, with this example showing an athlete controlling tri-plane trunk drives with the in-line stability pad foot positions further challenging frontal plane stability.



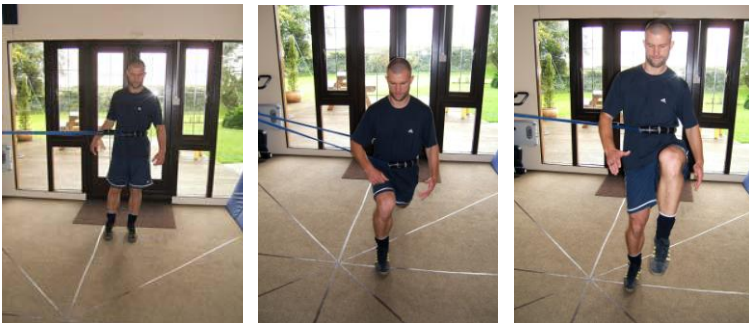
A natural progression is to combine the above two choices with tri-plane lunges and trunk drives down a long beam.



Beam work options as illustrated above offers an opportunity to challenge and develop the in-line lunge with pulls, lifts, throws and pairs activities. It cannot be understated how effective in-line training is in terms of functional carryover. As mentioned in part one of this series, we are a uniquely bi-pedal animal with a design for function that sees a close linear proximity during our various gait cycles. This requires great lumbo-pelvic and hip stability and can often be found to be an area of weakness or poor competence in our athletes and rehab clients. Put simply, high performance requires high bio-motor skill levels with this essential "in-line" pattern.



We can now add to natural momentum and bodyweight forces by asking our athletes to control and recover from an “accelerated” lunge. The band is now attached in front of the athlete and provides this extra propulsive force forwards as they stride into the lunge... the complete opposite to when we had the band attached posteriorly where it de-loaded the lunge.



The momentum and destabilisation can come from a frontal plane vector, and in this case the athlete lunges and recovers to stork standing with band attached laterally. This creates a strong hip and pelvic stability challenge once again along “reactive” principles.



An option is to introduce of elevation of one foot within the lunge pattern. The first example being an example of a heavy ball roll with the trail leg, highlighting a “pillar” of stability through the lead leg as the athlete lowers into the modified lunge. The second example reflects our progression to a more advance stage now with speed twist lunges onto an elevated front foot, in this case including a heavy weight vest.

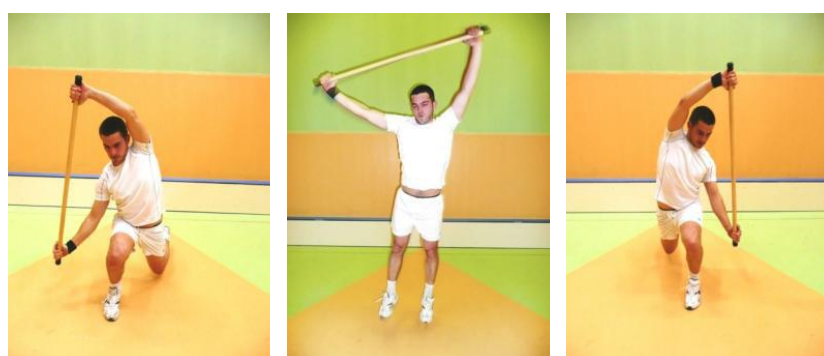
*Weight vests are an ideal tool to accompany lunge based training. The nature of a well designed weight vest means it feels like an intrinsic load to the athlete, disturbing their centre of gravity less and allowing the arms to be free and incorporated into the exercise pattern as above. However as a word of caution you are still introducing an overload principle by using them and repetitions and box heights should stay at or beneath unloaded levels until progression is seen fit.*





The advanced stage will see us teaching and constructing lunge based patterns that contain multiple but relevant progressions. In this case the athlete is taking on a full range anterior lunge with a cross body diagonal pulley bar lift, eventually performing this on a destabilised front foot. The exercise is developed in stages from kneeling lunge, to hover, to de-stabilised as the athlete's competence with the pattern increases. Note how this athlete maintains front leg aligned stability with no pelvic collapse whilst performing this

Speed and power production will always be a potential target for our end stage progressions. Static and stride lunge medicine ball throws will offer the athlete an opportunity to express their lunge bio-motor skills in terms of power production.



Within this advanced stage, if good static and stride-lunge form is demonstrated then selection of a plyometric option is possible. In this case a jump "flying change" lunge with a medicine ball or weighted bar being driven over head from outside one leg to the other. Note this athlete's symmetry, alignment and stability.

Finally comes one of the most challenging parts of functional progression, which is taking this now highly developed and carefully trained lunge pattern into 3<sup>rd</sup> Tier movement activities. In this stage we want to see an element of unpredictability and spontaneous response from our athletes. The drills and exercises are extended to end range, and are increased in speed. They are designed to reflect and support the more "chaotic" nature of competition and real-time athletic activity.



This takes us full circle back to the sport of badminton discussed in article one of this series. Illustrated is a drill where one player throws a bean bag to the other and calls out the colour of a hoop whilst the bag is in the air. This player has to catch, re-adjust and perform a lunge and deliver the bag through the designated hoop... hopefully in a smooth, powerful, quick and balanced move... and then recover back to the step at speed ready to repeat. Of course a progressive overload option is to add a weight vest.

Tier 3 drills should be adapted to support the dynamics associated with the sport that the athlete you are training or rehabilitating is involved in.

## Conclusion

This pictorial article has hopefully helped the reader visualise a comprehensive exercise progression. We established form, adjusted sequencing, developed stability, extended ranges, added resistance, destabilised, manipulated momentum and gravity, went after strength and power, and did all this on a lunge built with a focus on upper and lower body three-dimensionality. Simple form came before complexity, assisted stabilisation before destabilisation, controlling intrinsic body momentum before adding significant extrinsic loads... and mastering all of these before moving onto power and speed. This is an example of responsible and effective exercise progression.

In part one we argued that a single primary movement can become a tool that reveals much about an athlete's global movement competence. In this article we have effectively progressed an athlete's global bio-motor ability by applying a sound knowledge of function to the same single movement pattern. Please do not think that this implies that the best way to train/rehab an athlete is to go off and do a 12 week functional "lunge-only" progression with every client that walks through the door... far from it. True functional training should be as expansive as movement itself.

If an identified training goal is to optimise a client's lunge ability then use your knowledge of function to break it down, work in many positions and use varied techniques in order to construct and facilitate improved lunge competence... even after pages of pictures it is almost certainly unwise to do this via lunge work alone! That is not what these articles are about. Rather than that, these articles have clarified how the "rules of movement" in general can be applied to just one single movement itself. Or conversely we could say we have used just one single movement to be a tool to investigate these rules.

What on first impression could have been a very blinkered approach based around one movement has hopefully been enlightening as regards observation of a client's total movement competence, and equally expansive as regards understanding progression and the options for enhancing their movement performance.

Finally, try and worry a little less about whether a knee is sitting directly over the second toe... it's only a small part of a very big picture.

Bob Wood

Physical Solutions

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