

# FUNdamentals of Climbing

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# 1. Long Term Participant development (LTPD)

A presentation will be given to provide the context of FUNdamentals within Long Term Participant Development. When a young climber starts the sport, develops and grows, there are specific Windows of Opportunity that can be taken advantage of to get the best out of a person's genetic potential. An understanding of this is necessary as a coach in order to:

- Get the best out of someone's potential
- Avoid injury
- Know limitations as a coach and signpost for further development

Key areas covered are:

- Where FUNdamentals sits within LTPD
- Difference between early/late specialisation sports
- Windows of opportunity for training at key stages of a child's growth
- Injury avoidance

## 1.1 LTPD Theory

A Long Term Participant Development 4-stage model was first described by Istvan Balyi (an internationally recognised coach educator based at the National Coaching Institute of British Columbia) in 1999. His model has since been refined to take account of differences in different sports and has now gained acceptance across the UK, with most sports being recommended to adopt it as part of the UKCC.

The theory of LTPD is that it is necessary to adopt a longer term approach to coaching and training for elite performance rather than aiming to win in the short term. This optimises elite performance as well as increasing the likelihood of continued performance for longer in a participant's life. It is also hoped this will motivate participants who do not reach elite performance to remain in the sport.

## 1.2 Not all sports are the same

Sports have been classified as either '*Early Specialisation*' or '*Late Specialisation*' (Balyi and Hamilton, 1999). This refers to the point in a participant's progression when it is necessary to acquire sport-specific skills.

### What About Climbing?

Work by British Team Coach Dave Binney has identified climbing as a *Late Specialisation* sport similar to athletics, cycling, ball sports and combat sports. This means that coaching young people in climbing should not specialise too early, nor concentrate on the development of strength and power at an early stage. The emphasis of early training should be on the development of general motor and technical skills.

The LTPD progression model for *Late Specialisation* sports such as climbing is:

1. FUNdamental stage

2. Learning to train stage
3. Training to compete stage
4. Training to win stage
5. Retirement & Retainment

Within this model, identifying and developing talent must not be undertaken at the expense of their physical or psychological development as people and participants; no matter how keen the young participant, there is a risk to their overall development if forced too soon or too quickly. As the first stage, it is important that FUNdamentals has an emphasis on fun to develop basic fitness and general movement skills.

### **1.3 Calendar Age & Training Age Transitions**

It is important coaches recognise the difference between 'Training Age' and 'Chronological Age' and one responsibility of a coach is to advise children and parents on what is appropriate training at what age and at what stage in the process. Basic fitness and movement skills should be the main focus in coaching any child for the first 3 years of training and ideally anywhere between the chronological ages of 6yr and 13yr. The workshop delivers basic information that will help coaches make such decisions.

### **1.4 Windows of opportunity: Boys & Girls Physical and Emotional Development**

The application of the Key principles of FUNdamentals as outlined above must be delivered with an understanding of physical, emotional and cognitive development phases in children:

- The characteristics of the body's growth patterns
- The limitations on the body's performance
- The implications these issues have for delivery by the coach at this stage

The physical and psychological development of young climbers varies considerably with calendar age and gender:

- Growth spurts are times when the risk of injury is greatest and young climbers adapt at different stages of maturity: get this wrong and climbers will incur long term injuries or lose the sense of fun which they have previously enjoyed and burn out.
- Maturation and development of strength differs between boys and girls. An understanding of these differences and how they relate to the acquisition of skills such as 'ABC', motor control, speed, aerobic capacity and strength is important.
- Knowledge of critical and sensitive periods in a child's physical, cognitive and emotional development is the key to responsible coaching.

## **2. The FUNdamentals of Climbing 1 : Movement**

The main objectives of the FUNdamentals of Climbing are to develop the basic physical skills of climbing– the Key Principles. These should be delivered through FUN (Foundation, Understanding and Nurturing) activities involving active, not passive, participation. These skills are not confined to climbing (sport specific), but can be developed from being involved in a range of sports such as, athletics, swimming etc. and children should be encouraged to participate in other relevant sports at this age.

### **2.1 Key Principles**

1. Warming Up
2. Agility, Balance and Coordination
3. Centre of Gravity
4. Weight Transfer
5. Economy of Movement
6. Footholds and footwork
7. Handholds

### **2.2 Warming up**

Warming up is an essential precursor to any climbing session. It is important for avoiding injury, prolonging a climbing session, and maximise performance. There are three key elements to a warm up:

- i. Aerobic activity to raise the body's temperature
- ii. Joint rotation
- iii. Easy climbing

Attention is given to warm-ups for different age groups. A different warm up would be delivered to 8 year olds compared to 14 year olds, for example, or for group that had been climbing for one month compared to one that had been climbing for much longer.

#### **i. Aerobic or pulse raiser**

To maximise performance and minimise injury the body requires warming up. However the ambient temperature outside does not by itself mean the body is warmed up. Just because it is a warm day does not mean that the body is ready for action. An aerobic warm that will raise the body's temperature will help to achieve this. This is especially important on cold days, which is most of them during the winter at a climbing wall!

Part one of the warm up is all about raising overall body temperature. This can be done by running, skipping, jumping on the spot, hacky sac, anything really that involves expending energy.

#### **ii. Loosening up**

Climbing involves putting arms and legs in totally different positions from other daily activities of living. During climbing muscles, tendons and joints are put under strain so it's important that they are warmed up properly. Joint mobility exercises like swinging the arms helps warm-up the shoulder joint. Similarly swinging the legs backwards and forwards at the hip and also in a circular motion will help warm-up the hip joint.

It is important to make the difference between joint rotation and light stretching for warming up and stretching to increase flexibility. They are completely different activities with different aims. Joint rotation and light stretching involves movements (e.g. circling arms) aiming to prepare body for activity. Stretching to increase flexibility involves static movements to increase the long term range of movement.

Joint rotation and light stretching for climbing needs to be:

- Appropriate to the movements in climbing, notably the shoulders, arms, hips and legs.
- Realistic. There is little point in doing half an hour's loosening up for a session, which only lasts an hour and a half. For young people doing many different movements will be hard for them to remember and is also unnecessary.
- Age specific. A session for 8 year olds will be different to one for 15 year olds. Self confidence and relevance to other aspects of their sporting or leisure lives is important to consider here.
- Experience specific. As a young person develops their climbing more and more, then their warm up need to reflect this. The coach must be prepared to move from a general warming up approach to a more specific warm up. This may affect the actual activities done or promote ownership of the warming up process. For example a member of the group can begin to lead the warm up.

### iii. Climbing

Not only does your body need to warm up physically, it needs to warm up mentally. Efficient climbing requires fluid movement, and this requires warming up both muscles and mind. An effective way to create fluidity in your climbing is to begin your session way below your limit. This continues stage two with continued gentle mobilisation and stretching, but also gets your mind and muscles working together.

Climbing is an essential element of you warm up which will start off easy and become progressively more difficult. Easy climbing consists of big holds, low angle and little stress on the body. Easy means easy for the climber.

## 2.3 Agility, Balance and Coordination

**Agility:** is the ability to change body position efficiently;

**Balance:** is the ability to control the body's position, while either stationary or moving;

**Coordination:** is the ability to integrate agility, balance, flexibility, ( + strength, power and endurance) so that effective movements are achieved.

AND:

**Flexibility:** is the ability to perform a range of motions.

Within the Long Term Participant Development model, agility, balance, coordination and flexibility should be developed at the FUNdamental stage of physical development. Strength, power and endurance are developed at a later stage.

During the workshop the concept of ABC runs throughout. Developing ABC can be included in warm ups and a variety of climbing and non-climbing exercises. Importantly, these activities should be engaging and FUN!

The FUNdamentals course aims to encourage good technique and economy of movement at an early stage in a climber's development. Developing FUNdamental climbing skills at the outset should lead, in the long term, to economical movement skills being learned, refined and then performed instinctively.

More importantly, developing poor climbing technique at the beginning of a climbing career will eventually limit the climber's full potential and could make them more prone to injury.

Economy of movement is not simply about being efficient, as it brings together agility, balance, coordination, centre of gravity and weight transfer. As the name suggests, it is about understanding how each climbing move can be performed as economically as possible.

Many of these skills can also be developed through other sports and activities such as dance, skateboarding or gymnastics. That is not to say that you should be skateboarding in your climbing sessions! But considering these other sports is important. ABC will be incorporated in the workshop in:

- Warm ups
- Working on centre of gravity (see section 4)
- Climbing games (see section 5)

During the workshop, a variety of climbing and non-climbing exercises that develop FUNdamental skills will be shown.

## 2.4 Centre of Gravity

**Centre of gravity** (or centre of balance / centre of mass) is the point in a body where its weight can be thought to act. A pencil, for example, can be balanced at its midpoint, and a plate at its centre. Both these points mark each of those object's centre of gravity.

Humans have left / right symmetry and the upper and lower bodies each weigh about the same. The body's centre of gravity is therefore positioned a little way below the middle of an imaginary line running from the navel to the spine. Young children are more top heavy than adults but climbing movement techniques remain the same. Movement shifts the body's centre of balance, and so it is of relevance to all sports. A good example is the 'Fosbury Flop' which revolutionised the high jump as it allows the body's centre of gravity to pass under the bar!

Within the FUNdamentals of Climbing workshop, hip position is used as an approximate marker for the body's centre of gravity. By understanding where the body's centre of gravity is located, good balance and co-ordination whilst climbing can be taught.

The use of other markers, such as slings and fluorescent bands, will also be demonstrated, and the way in which their use can aid a coach will be explained.

## **2.5 Weight Transfer**

Here, the emphasis is on how the body moves from one balanced position to another in the most efficient and effective way. At the FUNdamentals stage easy climbs and bouldering are used, where the body is upright and the weight is over the feet.

Humans are bipedal, with the legs designed to support the body's weight. Transferring weight from one foot to another is one of climbing's most fundamental skills. At ground level, it is possible to see how moving the hips (centre of gravity) affects general movement and body position. Novice climbers commonly rely upon the arms far too much causing fatigue. This is the most instinctive thing to do as hands are in the normal sphere of vision and provide a sense of security. However, using the bigger muscles of the legs, releases the pressure from the arms to generate upward movement.

Using the arms, when the legs could be used instead, is both tiring and inefficient. More importantly, developing poor climbing technique at the beginning of a climbing career will eventually limit the climber's full potential and could make them more prone to incurring injuries.

Within the workshop, weight transfer from one leg to the other will be explored. This will include an appreciation of how the body's centre of gravity can be positioned to allow the legs to push when climbing, as opposed to relying upon the arms to pull. This issue is examined within a climbing context: focussing on weight transfer and foothold choice.

## **2.6 Economy of Movement**

Any single climbing move can be performed in a variety of ways. Performing move efficiently involves using the fewest, strongest muscles appropriate for the move. Economy of movement is not simply about being efficient; as it brings together agility, balance, coordination, centre of gravity and weight transfer. As the name suggests, it is about understanding how each climbing move can be performed as economically as possible.

Developing FUNdamental climbing skills at the outset should lead, in the long term, to economical movement skills being learnt, refined and then performed instinctively.

Developing ways in which climbers can be taught to move as economically as possible is one of the underlying themes running through the FUNdamentals of Climbing Workshop.

### **Basic twisting**

The pros and cons of using different hip and ankle positions which result in differing degrees of body twist are considered.



There are no set ways to transfer weight as all climbers are different shapes and sizes. It is up to the coach and climber to explore different methods suited to different climbers and different situations.

## **2.7 Footholds and footwork**

There are two aspects to having good footwork, firstly which footholds to choose (covered in FUNda 1 and also later in F2) and secondly how to actually place and use feet effectively. In this section we look at the latter.

The ability to use foot holds in an efficient manner is vital to good climbing technique.

As well as being aware of the different types of foothold available, the climber needs an understanding of how these holds are used and how best to use different parts of the foot (inside, outside edge and toe). In addition the climber needs to understand how using a foothold in a particular way will influence climbing movement.

Climbing footwear is designed to optimise power and precision into the big toe area. Participants will consider factors adding to poor choices of climbing footwear, which will affect footwork performance.

Beginners often lack precision and accuracy in placing the foot and even climbers at an advanced level often demonstrate poor footwork. Through drills and practice explored in this workshop the climber can learn to improve footwork skills.

The understanding of friction is crucial in order to enable a climber to efficiently use a foothold. Poor footholds may appear either too poor or even unusable to a beginner. However understanding pressure and friction will increase the range of footholds available and a range of possible climbing movement.

Foot swapping is an area which covers choice and use of foothold as well as the ability to be accurate and precise. This will be covered on this workshop too.

## **2.8 Hand holds**

As with footholds the climber needs to be aware of the different types of handholds used in climbing and the best way to use them. Whilst some holds will seem obvious, many can be used in a variety of ways. As with foot swapping, the ability to swap hands on a hold helps the climbers to re-adjust their body position, setting themselves up for the next move.

Being able to quickly judge how to use a handhold correctly will enable the climber to:

- Devote more time to accurate route reading, especially in strenuous situations.
- Use a hold in a way that causes the least fatigue
- Attain the best body position to execute the move.

### **3. Climbing Games**

The concepts of the agility, balance, coordination and centre of gravity will be applied to practical coaching and climbing situations. The course covers a variety of fun games, which can be used to coach particular skills.

Climbing Games are useful tools for a coach to work on specific climbing techniques in a fun and safe manner. They can be used with children and adults, novice or experienced. They allow a coach to introduce a skill, see it performed in action and then be able to help hone that skill using a variety of normal coaching techniques (see Coaching Process below). Climbing Games are particularly useful for working with children who respond better to this teaching method.

There are hundreds of potential Climbing Games and designing new ones is only limited by the imagination of the coach. Each game should concentrate on developing only one skill, although this may not always be possible and several skills will be involved in performing the game. However, the coach should be able to identify the movements associated with each individual skill and focus on them. Games can be used specifically for the following:

- Warm-up Games
- Balance Games
- Body Awareness Games
- Footwork Games
- Traversing Games

And many more...

The workshop introduces a few games that can be used as part of the session, but many more can be found in the Resource Pack and References.

The workshop also includes advice on the equipment required for delivery and their safe use – items covered in the process of the practical elements of the course.

### **4. The FUNdamentals of Climbing 2 : Technique**

The main objective of the second part of this course (day 2) is to equip coaches and instructors with ways to teach climbing technique. Where FUNdamentals 1 focussed on the broader agility, balance and co-ordination skills for climbing, here we look at the sport specific requirements of a range of climbing techniques. The techniques that are covered are constrained by easy level of climbing maintained at this FUNdamental level. We are climbing on easy angles (slabs and vertical walls and only very slightly overhanging) and big holds, ensuring we stay with basic techniques and not advanced techniques associated with harder levels of climbing.

#### **4.1 Key Principles**

- a) Centre of gravity, creating a stable base and basic body positioning principles

- b) Opposing forces techniques
- c) Steep rock techniques
- d) Using straight arms

#### **4.2 Centre of gravity, creating a stable base and body positioning**

In FUNdamentals 1 we considered weight transfer and balance on slabby rock: basic body positioning. In FUNdamentals 2 we look at the progression onto vertical rock. Clearly on vertical rock we must use our arms more than on slabby rock, hence the relationship between our arms and feet is even more important for maximising economy of movement.

It is this relationship between the surface that we climb on (the wall or rock), our hands and feet that determine our base of support. We need to understand this and how this interacts with our centre of gravity in order to create optimal body positioning for economy of movement.

Outdoors we can use any footholds and as a result it is easier to apply our individual technique to any given move. Indoors routes are 'set' by routesetters encouraging interesting moves but not always the best technique. It is often the lack of footholds rather than handholds, which leads us to move in more strenuous ways indoors.

By allowing climbers to use any feet but a set colour handhold, we can explore better body positions in vertical climbing. Positive body positioning and use of the feet enables the climber to:

- Create a stable base.
- Move their centre of gravity efficiently.
- Optimise their range of movement.
- Create stable resting positions.
- Make best use of the holds available.
- Enable the climber to push with the feet as well as pull with the arms.

#### **4.3 Opposing forces**

We will look at the specific techniques that use the theme of opposing forces. There are many advanced techniques, but the basic ones we will look into are bridging, arêtes and laybacking. Which ones we work on will depend on what is best offered at the climbing wall where the course is held.

Opposing forces are characterised by a pushing and/or pulling action with hands and/or feet. Sometimes we need to push against the wall with our hands and feet in bridging for example. Other times the action of pulling against the wall or hold and pushing with our feet such as in laybacking will ensure success. We will explore how these techniques work and participants will be able to break down, demonstrate and explain these techniques.

#### **4.4 Steep rock**

Efficient movement on steep rock requires the use of all the techniques covered so far. As the angle increases any weaknesses in the climber's techniques are quickly exposed and

whilst it is impossible to climb overhanging rock without using a certain degree of arm strength, good technique allows the climber to:

- Use the fewest strongest muscles to execute a move.
- Make best use of the strength & endurance the climber possesses.
- Create a stable base.
- Maintain balance.
- Use the legs.

Many climbers would achieve significant gains in performance through using 2 Fundamental techniques:

- Straight arms
- Upper and lower body twisting

By applying these techniques the climber can use their skeletal strength as well as bringing into use the larger shoulder and back muscles. These techniques are now more exaggerated and pronounced. Hip rotation allows the climber to bring the centre of gravity close to the wall and more over the feet. In order to maintain balance in this twisted position a climber can use the “flagging” technique. By using the non-pushing leg as a counter balance this allows the climber to bring their centre of gravity closer to the pushing leg. This can easily be demonstrated by standing straight attempting to reach as far out to the side as possible without falling over, the opposite leg to the reaching arm will instinctively be raised to prevent the person falling over.

Another method, where the climber still twists the hips to bring in the centre of gravity closer to the wall, is the “drop knee” or “egyptian”. By twisting and dropping the rear leg/knee on a steep wall the hips are brought closer to the wall. It may also increase the climbers’ reach and allow the legs to generate more push.

#### **4.5 Using straight arms**

When climbing on vertical or slightly steeper rock efficiency is paramount, and the ability to use straight arms as much as possible makes a huge difference as the strain is on the skeleton rather than the muscles. Using straight arms to rest or clip is important as is the use of straight arms whilst actually climbing.

Clearly many moves require arms to bend but it is possible to climb finding bend in the legs to generate upward movement by subtle twisting of the torso and hips. In this workshop we will explore different tools to teach climbing in this way.

Using straight arms is not possible in every climbing situation. However there are situations where it will make a big difference to success or failure on a climb and overall economy of movement:

- For clipping, resting points
- When there is a good handhold available
- When there is a good selection of feet available to support the hand position

Like steep rock techniques success at using straight arms will depend on many of the techniques already covered in the day:

- Good stable base
- Centre of gravity close in to the wall or rock
- Twisting of the lower body

## **5. FUNDamentals 3 : Advanced Technique**

This workshop is a big step on in terms of technique. An understanding of all basic techniques is now assumed. The terrain will now more difficult involving poorer hand and footholds than in F1 and F2 and at times much steeper ground, meaning more complex techniques are required. At this stage participants are expected to have a deep understanding of centre of gravity and be familiar with tracking it in climbing movement. Since dynamic movement is now covered, the ability use advanced observation techniques is also required in order to track what is happening when the movement is at speed.

### **5.1 Key Principles:**

- a) Centre of gravity and base of support in 3D climbing
- b) Advanced hands and feet
- c) Dynamic movement
- d) Advanced techniques: roofs, volumes, heels and toes

### **5.2 Centre of gravity and base of support**

Where centre of gravity was covered in a one dimensional sense in FUNDamentals 1 and 2, we are now concerned with what is happening from the side too and when the climbing becomes very steep. Since the base of support becomes harder to work with on steep ground, we now look at the most efficient body positions to enable economy of movement. Observing and analysing body positions from the side and different angles (in a 3D context) will enable us to see how best to position hands, feet and centre of gravity in conjunction for optimal positioning.

### **5.3 Advanced hands and feet**

When hands and feet become worse, the body has to work harder to stay on the wall. This may come down to specific finger strength or body tension but we are concerned with the body positioning that enables poor hands and feet to be used. A bad smear for the foot on a slab will require perfect balance as the centre of gravity drives down the leg into the foot or if on a vertical wall a poor smear will require the foot to push at a very specific angle, whilst also ensuring the centre of gravity is not pushing the body off.

Similarly a very slopey hand hold will require very specific body positioning to allow the body to hang at the perfect angle in order to still remain in contact with the wall. We will be

examining how good body positioning i.e. centre of gravity and base of support working together, will enable climbers to use bad hands and feet in awkward places.

#### **5.4 Dynamic movement**

Sometimes specific movements required climbers to be very dynamic. This maybe because a hold is out of reach or at other times, the current one is so bad you must move fast to stay on the wall. Other times climbers have a choice whether to climb dynamically or statically. We will explore how climbers can make those choices and also if they do have to climb dynamically, the techniques required to do this.

Dynamic movement covers anything from a small udge or bounce to a dramatic dyno. Regardless, momentum has to be created somewhere in the body. We will look at the chain of movement throughout the body and how correct movement initiation can end in success and how poor movement initiation ends in failure.

Dynamic movement requires advanced observation skills and we will look into how we can do this, using video and non-climbing exercises.

#### **5.5 Advanced techniques: roofs, volumes, heals and toes**

Advanced technique is defined as highly specialised, complex, co-ordinated movements of climbing. Where a rock over on a slab in FUNdamentals 1 concerns mainly the lower body (where the upper body is just used for balance), a more complex set of moves must be employed to climb on a roof.

On a roof there are specific foot positions that will be important, and then furthermore, ways to place the feet, such as clamping. Through the body, body tension is necessary, the placement of centre of gravity crucial and the positioning of hands to make all this work becomes even more complicated. Even once the above is established, dynamic movement may be necessary to complete the next movement. It is clear that this movement is much more complex than the rockover in FUNdamentals 1.

In the workshop we will explore complex techniques, breaking down the movements, as we have done in the previous courses but now looking at specific aspects of centre of gravity, base of support and dynamic movement and all the elements that make these techniques successful.