

Physical Training

How should we train?

The starting point of all training is a thorough analysis of the sport, its demands, and our capabilities. When we have analysed these, it is much easier to plan the content of our training. Our competition goals should always be at the centre of our training. By that we mean that we train in order to be well prepared for competition and perform as well as we can. This is why it is so important to remember that we “become good at the things we train.”

It has been claimed before that orienteers “run too much and train too little.” This has probably improved during the last few years thanks to better coaching work, at least at national team level. All success is built on a lot of work and simple ideas, or put another way, a lot of perspiration and little inspiration. There are no short cuts to the top. The way there is training, and training again, backed up with a healthy lifestyle. It is therefore sensible to think a little bit before starting on your training. Every orienteer must decide for him or herself, or together with a coach, what his or her optimal training solution is. Everyone has a different starting point, strengths and weaknesses and other factors which may influence training.

All-round training

”You cannot be stronger than your weakest link.” You need to train the whole body if you want to be able to do specific training. Your coordination, motor skills, awareness of your body and strength are an important base for intensive and frequent training. In addition, all-round training helps prevent injury, as stress on each separate part of the body is less if training is varied. The terms central and local or general and specific are useful when talking about training. The question is which capacity or capacities you want to improve or maintain and which training methods you can use to do so.

Focus on quality in training

If you have a plan or goal for your training, it is easier to get more out of each training session. A plan helps you to improve your weaknesses, and at the same time maintain or even improve your strengths. To be a good runner in the forest, to run faster and further in forested terrain, you should prioritise the following types of training:

- General strength training such as circuit training or callisthenics.
- Long runs in terrain.
- Fast runs in varying terrain.
- Intervals - different types in varying terrain.
- Specific strength training and running against resistance, such as hill running.
- Flexibility and coordination training.

Map and compass should be part of training as often as possible.

Aerobic endurance - central and local

Orienteering is essentially an aerobic sport, which means that oxygen is the rate-determining step in energy turnover. When we train endurance aerobically the body is able to eliminate lactic acid. If we begin to accumulate lactic acid when we are training aerobically our speed is

either too high or external factors such as steepness or underfoot conditions are making us work harder.

Our so-called central aerobic endurance can be trained effectively through other sports. The important factor in making the heart, lungs and circulation work is using large muscle groups. Cross-country skiing is often quoted as the best sport for this type of training, but in a British context lack of snow probably rules this out! Cycling, especially mountain biking, is also good training, as are swimming, rowing, kayaking, and of course running. If you train using other sports, you also have the benefit of variety in your training, less wear and tear on the “orienteeing muscles” and it will be easier to increase your total training volume.

When training local aerobic endurance capacity it is important that we train in the forest in a way that is as similar to competition as possible. Local aerobic endurance is often the decisive link in our ability to perform. For example a cross-country skier who trained only skiing would have a high central capacity and a high local capacity in his own sport. But the same skier, if running were not included in his training, would not be able to take advantage of his central capacity using the running muscles. Once again, we become good at the things we train.

The table below gives a systematic overview of different types of training:

	Percent of max heart frequency	Borg	Lactate (mmol/l)	Time
Aerobic training				
Continuous low intensity	60-75	10-13	2-3	90+ minutes
Continuous moderate intensity	75-85	12-15	2-3	1-2 hours
Continuous fast running	85-95	15-17	3-4	30-60 minutes
Long intervals	85-95	15-17	3-4	20-60 minutes
Short intervals	85-95	15-17	3-4	10-45 minutes
Natural intervals	75-95	13-17	2-4	20-60 minutes
Fartlek	60-95	10-17	2-4	20-60 minutes
Anaerobic training				
Hill sprints	95-100	17-19	4+	20-45 minutes
Fast intervals	90-100	17-19	4+	20-45 minutes

Continuous training

Continuous training involves moving from A to B at a more or less steady speed. The speed or intensity of the training can vary, depending on the aim of the session. For example, the aim of low or moderate intensity continuous training is to adapt the body to working for long periods of time, by improving the central and local endurance capacities. If we carry out technique training in the forest at this intensity we will make improvements in both central and local capacity for orienteeing. Training through cycling, cross-country skiing or canoeing will also increase the orienteer’s central capacity. Variation is the key, and a combination of running in the forest and other training such as cycling, swimming and paddling is ideal. Combining different types of training in a single session, for example running-cycling-swimming, allows a greater training volume which has a positive effect on the central capacity while placing less stress and strain on the different muscles and joints. A two hour combination session like this is indeed better training than a comparable session which only includes running.

The main aim of continuous running in the forest with low or moderate intensity is to improve the ability of the muscles to use oxygen. The effects of continuous training are increased mitochondrial density, through increased number and size, an increased number of capillaries and an increased capacity to use fat as a fuel for exercise. At low intensity slow twitch fibres (Type I) are primarily recruited and fat burning is dominant. The skeletal structure, joints and tendons become stronger and abrasion of the skin improves resistance to blisters and similar problems.

Gentle to moderate undulation is ideal for low intensity training but steeply undulating terrain can be suitable for moderate intensity training. Our own subjective rating of effort is often the best way to set the speed during a session. The Borg Scale can be a useful tool for this job. Low intensity training can also be described as “conversation pace” whereas at moderate intensity we can only manage 4-6 words per breath. Heart rate can also be a good way of judging the right pace so long as we also consider how a particular effort level feels as well. A heart rate monitor can be a good learning tool and give feedback about our training. But for an orienteer it is a less useful tool for guiding and control training pace.

Continuous training improves aerobic fitness and provides a base for more intensive training.

- Continuous training should be present all year.
- Continuous training dominates during winter and summer – the basic training periods.
- Continuous training can beneficially be carried out in other sports or through combination sessions where both running and other activities are mixed together.

Continuous fast training

Fast training for orienteers means running at speeds approaching competition speed. The athlete might run for 30-60 minutes at a higher speed, but so that her running style still feels controlled and coordinated. The body should feel light and the athlete floats over the ground. Arms and legs are coordinated and move powerfully together in the right rhythm. The body manages to eliminate any lactic acid that is produced, that is the athlete is running at her threshold or slightly under. Flat or moderately undulating terrain is ideal for this type of training, and is steeper runnable terrain can also be suitable.

The aim of the training is to develop both central and local aerobic capacity and neuromuscular function for orienteering running. By having a steady high speed during the session we also improve running economy. This type of training can be included now and then during the build-up period but should mainly be included in the specific training and competition periods.

Continuous fast training can also be carried out as a type of long interval to allow a slightly higher speed. The distance can be split up into a number of natural sections, for example 2-4 km with about 5 minutes of active recovery such as jogging. The speed can then be raised slightly so that you feel lactate accumulating in the last half-minute or so. As the effort is followed by active rest for about 5 minutes, the body has a chance to recover relatively quickly for the next section of fast running. This type of training is best carried out in the specific training and competition training periods.

The important factor with these types of training, is that you let your subjective rating of effort guide your speed. You should feel that your breathing effort is “hard to very hard”, 15-

17 on the Borg Scale, and the effort in the legs should feel “moderate to hard”, 10-15 on the Borg Scale. At this level there is a considerable load on the body, but lactic acid is still eliminated.

Long interval training

There are several advantages to splitting a high-intensity session into several sections of work and rest. Through this type of interval training the athlete can work near their maximal oxygen uptake capacity for a long total time without building up lactic acid. The training is carried out, as with continuous fast running at competition speed. The aim of interval training is to improve central aerobic capacity, heart and lungs, and local aerobic capacity in the orienteering muscles for running in the forest.

The speed is high in each interval, the heart works at 10-15 beats under maximum pulse, and producing more lactate that the body can eliminate is inevitable in the later section of each interval. The rest period between each interval is therefore very important. As heart rate will reach the planned level during each interval anyway the actual length of each rest period is not especially important. The guiding principal should be that you must rest long enough to allow you to carry out the next interval at the same speed as the earlier ones.

Long interval training typically involves 2-10 minutes work alternated with half as much rest. A common interval is 4 minutes running and 2 minutes active rest. The number of repetitions depends on previous training levels. A normal number of repetitions might be 3-6 but some elite athletes will train many more. Each interval should be carried out for the same amount of time and at the same speed.

Long interval training is included mainly in basic training, but can also be adapted to the specific training and competition periods.

The important thing with this training form is again that your own rating of effort determines your speed. You should find the training “hard to very hard”, 15-17 on the Borg Scale with respect to your breathing and your legs should be working “fairly hard to very hard”, 13-17 on the Borg Scale. At this level the body is working very hard during each interval but has a chance to neutralise lactic acid during each rest period.

Interval training is especially suitable for orienteers in the later years of puberty and into young adulthood, around 20-22 years old. During this time the central capacity is most receptive to this type of training. It is during this time that we can work to develop the aerobic capacity for the longer term.

Short Interval Training

Interval training can also be carried out with short rest periods. The most common work-rest times are “90-30”, “70-20”, “45-15” or “15-15”. The last interval type can also be called a short-short interval. As each interval in itself does not give a high heart frequency, it is important that the rest period is kept short. After a few intervals the pulse will reach the right level. The aim of short interval training is as with long intervals, to raise the central capacity, that is, to increase the heart’s pumping capacity.

As the rest periods are frequent the muscles manage to eliminate lactic acid to a greater or lesser extent. During the rest the muscles can also store some oxygen for the next work

period. This means that despite the fast pace relatively little lactic acid is accumulated, if the work period is not too long.

These intervals can be beneficially carried out in the forest, but even indoors on an obstacle course or as part of a circuits session. If the intervals are carried out in the forest both slow and fast twitch muscle fibres are used. This means that more muscle fibres are involved in running and local capacity in the orienteering muscles is improved. The speed during each interval should be competition speed or faster and this high speed has a particularly beneficial effect on running technique. Sometimes this type of training can feel tough and should therefore mainly be used when you are trying to achieve a performance peak. Short intervals should mainly be carried out during the specific training and competition period.

The important point with this training type is that subjective effort level determines the speed. Your breathing effort should be “hard to very hard”, 15-17, while the effort level in your legs should be “somewhat hard to hard”, 13-15. At this level the body is working hard, but still manages to eliminate any lactic acid formation during the rest period.

Including short interval running on an obstacle course, circuit training or in general strength training is an excellent training method. Each exercise is carried out several times, and the rest between each exercise is short. After each rest you move onto a new exercise. Each exercise is carried out intensively during the work periods – read more under “General Strength”. This type of training is best carried out during the build-up period.

Natural Intervals

During the above types of training the work period is controlled by time, whereas the terrain determines the effort level and length of each effort in natural interval training. By choosing terrain which is steeply undulating or soft ground, such as marshy or heather-covered areas the load placed on the heart and lungs varies naturally during the session. Changing runnability and steepness also mean that your stride is continually varying. The idea with natural interval training is to increase your effort and speed on for example hills, or tough sections, and then to reduce it again in the runnable or downhill sections. The terrain guides your speed and the length of each interval. It is also possible to carry this type of training out in “reverse” so that you take it easy uphill then increase your speed on the downhill sections.

A so-called Murder Loop is a good example of how one can train natural intervals, continuous fast running and competition like forest running. Such a course can be planned in varied terrain to include for example short steep hills, long gentle hills, marshy ground, tough areas of felling and runnable terrain. It can be in the form of an easy orienteering course, or line orienteering. The course can be divided into sections and perhaps marked to show where to run intervals and where the easier rest sections are.

Fartlek

Fartlek is a Swedish work which literally means “speed-play”. The aim of fartlek is mainly to improve running technique for orienteering. At the same time both central and local aerobic capacity are trained. By “running technique” we mean moving over the obstacles that rough terrain presents as quickly as possibly and with the minimum possible energy expenditure. The aim is to be able to run in a relaxed way even in rough terrain. The more efficiently the right muscles work together to give a strong stride the easier it is to run quickly. If running feels like a “battle” against the terrain, then it is very likely that the wrong muscles,

antagonists, are also being used. It is therefore important for the orienteer to train at competition speed and even faster during fartlek in varied terrain so that the right running style for forest terrain is learnt and maintained.

Orienteers should run fartlek training in the type of terrain that we compete in. The unique factor running with orienteering running is that no one stride is like another. Stony ground, thick forest are steep descents are some of the areas that require “relaxed strength” from the runner. If you dare to run fast in tough, demanding terrain you give yourself the opportunity to develop your running technique. A series of running technique loops would be a good way to concentrate on high speed with a relaxed running style.

Anaerobic endurance

The aim with anaerobic training is to accustom the body to running with accumulated lactic acid, at the same time as maintaining running technique and encouraging the development of the chemical processes which deal with an “acid environment” in the muscles. By this we mean that teaching ourselves to tolerate lactate, increase our capacity to buffer or neutralise lactate and improve our capacity to transport lactic acid away from the muscles.

Studies from recent years show that anaerobic capacity can be influenced positively by short training periods at high altitude. In the so-called Kenya study, carried out by the Swedish Athletics Federation, it was shown that the muscles developed an increased buffer capacity, meaning that the muscle cells can neutralise lactic acid more effectively and also regulate the acidity (pH value) for a longer time. There was also found to be a reduction in lactic acid forming enzymes and an increase in enzymes which broke down lactic acid. Heart rate and the subjective effort reported in a treadmill test reduced on return to sea level. This points to an increased anaerobic capacity. Similar results were experienced in an altitude-training project undertaken by the Swedish Orienteering Federation. Both short periods at altitude and high-intensity lactate training probably have the same effect on the anaerobic capacity. The difference lies in the method.

Lactate training must be carried out in a sport specific way. The training effect gained is very specific and only affects the muscle fibres which are involved in the particular training action. So for orienteers the best method involves running in the forest with resistance such as hills or rough, marshy ground.

Hill sprints

The simplest form of lactate training is running up a slope at maximum speed for 30-90 seconds. At the end of each effort you should feel tired and heavy in your legs. A long rest is required before starting the next effort – at least 3-4 minutes. If you jog easily during the rest period it is much easier to clear the lactate. Each series should contain 3-5 repetitions and you can carry out 1-2 series.

The training should feel “very hard to extremely hard”, 17-19 on the Borg Scale, both in your breathing and in your legs. At this effort level there is a very high load on the body, and lactic acid will be partially transported away during the rest period.

This type of training should only be used in the last 4-8 weeks before important competitions where you want to be in form. If you have a break from lactate training any effect it has had will reduce quickly. Aerobic capacity has a short lifetime and within a month the effect of

lactate training will have totally disappeared. It is however possible to maintain anaerobic capacity through competition and occasional lactate sessions. The training is carried out mainly when trying to peak and as maintenance training during the competition period.

Lactate interval

Another form of lactate training is to reverse the short interval idea, so that you have a longer rest and shorter work period: “30-90”, “20-70” and “15-45” are some possible ideas, which can either be carried out on their own or mixed. Short hill sprints are also a possible lactate training method, with for example a 20 second sprint uphill followed by 70 seconds easy jogging back down. The easiest form is perhaps to spontaneously vary the length of each effort, let the terrain determine how long each interval is. In this case, one idea could be to run a Murder Loop as hard as possible on the hills and then jog on the downhill and easier sections. As with the hill sprints above, the training should feel “very hard to extremely hard”, 17-19 on the Borg Scale both in your breathing and your legs. At this level of effort the body is working very hard and manages to clear some lactate in each rest period.

Lactate training is an extreme type of training. You need to prepare yourself very well mentally and physically before a session of this type. The training is demanding and requires a much longer rest period afterwards than aerobic training. The injury risk is also greater and you are working with maximum muscle power. Muscle strains or twisted ankles are common injuries associated with lactate training. The reasons can be increase in training load, poor basic training, too little recovery time between sessions or inadequate warming up.

Running Technique

In all the descriptions of different types of training above we have pointed out again and again that we only become good at the things we train. Orienteering running technique is very specific as the terrain and load on the body vary during the competition and from competition to competition. When we run in terrain our knees and hips are slightly bent and work to keep our centre of gravity low and help us maintain balance. The ability to run fast on rough ground without looking where you are putting your feet is probably not just dependant on strong ankles.

When we study the progress of elite runners in the forest, it appears that the runner can smooth out the uneven ground, by shifting their centre of balance and coordinating their movements with active upper body work. The signals for the rapid and subtle movements of centre of gravity probably come from the actual foot strike with each stride.

The feet probably work like “sensors” responding to the uneven ground under the runner. The more used you are to running in forest terrain the more relaxed you can be as you run in terrain with varying underfoot conditions.

In a final year project at the Sports High School in Stockholm, carried out in 1989 by Kurt Svensson, Erik Svensson and Jan Sundbue, it was shown that running in the forest had very few similarities to running on the road (see figure). The only similarity in technique was the link: “Tilt of the upper body when running downhill in forest terrain”. This table underlines very clearly the importance of analysing the actual requirements of the sport when thinking about how training should be carried out.

	Forest terrain	Forest uphill	Forest downhill	Felled ground	Marshy ground	Stony ground
Stride length (cm)	-	---	-	--	---	--
Stride frequency (double strides/min)	-	---	-	--	---	+
Foot plant (contact time)	+	++	--	++	+++	++
Arm (difference from a symmetric pattern)	+	+++	+++	++	+++	++
Knee lift	+	++	--	++	+++	+
Hip (flexion)	+	+++	--	+	+++	+++
Upper body (forward lean)	+	+++	0	+	++	+

The table shows the results of research which analysed many runners in the forest, using a video camera. The biomechanical measurements compare running in a variety of forest terrain to running at a steady pace on a flat surfaced road. The symbols show the range of differences: --- = much less than 0 = the same as +++ = much greater than.

Cross Training

Cross training means training in a sport other than your main sport. The aim of cross training or combination sessions is all round fitness and strength and to train the central aerobic capacity. As orienteering is an aerobic sport, requiring a lot of aerobic training, it is ideal to be able to vary training as much as possible when training the central capacity. The benefit of combination training is that you work your heart and lungs for a long time but are able to use different parts of your body in the session. Another benefit is that you “empty” one muscle group at a time, and that tendons, joints and ligaments are stressed less as the training is varied.

Triathlon (swimming, cycling and running) is a variety of cross training. The athlete uses her upper body in swimming, thigh and hip muscles when cycling and the calf muscles when running. This shows that it is possible to keep going for a very long time with a high speed.

The following combination sessions are possible variations for an orienteer, depending on the time of year, and where you live:

XC skiing – running – swimming
XC skiing – running – general strength
XC skiing – general strength - swimming
XC skiing – ice-skating – swimming
Running – cycling – swimming

XC skiing – running
XC skiing - cycling
XC skiing – aerobics - swimming
XC skiing – cycling - swimming
Running – general strength - swimming

Running – aerobics
Cycling – running – cycling – swimming
General strength – running in water - swimming

Running – aerobics - swimming
Cycling – general strength - swimming

The possible combinations are endless – the limiting factor is your own imagination. Inline skating, a rowing machine or climbing for strength are possible alternatives for snow and ice free climates! Cross training is a form of training which is used more and more by today's elite runners and the advantages are summarised below:

- The whole body can be trained
- The aerobic central capacity can be trained for long periods of time
- Over use injuries are rare
- It is varied and fun

Warming Up

The aim of warming up is to prepare the body for hard exertion. Warming up should take 15 – 20 minutes and raise the muscle temperature during this time. The increased temperature means that oxygen is transported to the muscle cells more easily, metabolism increases and that nerve impulses from the brain reach the muscle cells more quickly. Muscles sense position and react to impulses more quickly, which makes it easier to correct small stumbles.

Example of a warm-up routine:

- Jogging for 5-10 minutes
- Stretching 5 minutes, mainly for leg muscles
- Movements to raise the pulse: high knee raises, kicking your backside, ankle work, skipping and bounding or similar, 3-5 minutes
- Finish by running 50-60 meters at a steadily increasing pace 3-4 times
- Rest and collect your thoughts for a few minutes before the start of the training session or competition

Warming up improves performance and prevents injuries.

Warming down

A warm down jog is the first part of the next training session. When the body has undertaken hard physical work, there will be waste products left in the muscles. Warming down is especially important after competitions, when the muscles have produced lot of lactic acid. Lactic acid remains in the muscles for a longer time and recovery is slower if you do not include light activity after the session. By warming down lactic acid and other waste products are processed more quickly and transported away by blood circulation.

Example of a warm down routine:

- Light jogging 5-15 mins, straight after the competition or training session
- Stretching approx. 5 mins, mainly for the leg muscles
- Relaxation, sitting or lying, tense and relax the main muscle groups from head to toe.

Warming down improves performance and prevents injuries.

Strength

To be efficient in the forest we need to be strong without being “muscle bound”. The orienteer should be strong but light. In our sport we propel ourselves over the different obstacles presented by the terrain. Strength for an orienteer is therefore related to body weight. This means that an orienteer should have good strength endurance and be able to support his own weight. Orienteers also need to be especially strong in the feet, calves, thighs and hips as these parts of the body do most of the work when running in the forest. There is no point trying to develop bulging muscles, as these will only be like a heavy rucksack when you run.

The aim of strength training is to develop the muscles so that they can work longer and have better endurance or produce more power and thereby be stronger.

The training effect of strength training is often rapid, but in the beginning this usually to do with improved neuromuscular coordination and the muscles actually become stronger later. The strength of tendons, ligaments and cartilage develops more slowly than muscle strength, which can lead to injuries if training is too intensive in the beginning.

It is very important that movements in strength training are carried out with good form and in a controlled way from the beginning. In the beginning it is also wise to carry exercises out slowly. As training progresses the load can be increased.

The training effect depends on the type of load that is chosen. If a high load is chosen, in the form of a heavier weight perhaps, fewer repetitions can be carried out. If the load is reduced it is possible to continue working at the same exercise for a longer time. Training with heavy weights and few repetitions gives increased muscle strength.

The training effect of strength training with few repetitions and heavy weights is very noticeable. The muscles will increase in volume. Each individual muscle fibre will be thicker, but no new muscle fibres will develop. During endurance training on the other hand, with many repetitions and less weight, local blood supply increases and the muscles' ability to work at higher lactate concentrations is improved.

Muscles can either work statically or dynamically. Dynamic strength means that power is developed while the muscle length is changing. If the muscle is shortened we refer to this as concentric work, for example the quadriceps on the front side of the thigh or the calf when running uphill. Static strength means that the muscle works without any change in length for example the abdominal muscles when lifting the knee.

General strength training

In the 1970s in Sweden many of the best elite orienteers got a lot of strength training “for free” through their work. Many worked in the forest or with another similar physical job. They would carry out many repetitions with low weight naturally during the course of the day. The body became strong through this physical work. Today there are very few elite orienteers who have manual jobs. Most have a more or less sedentary job which means that general strength training is a very important part of a training programme.

In orienteering, as in all sports, we need good general strength to ensure balance between the different muscle groups in the body. It is particularly important to build up the strength of muscles around the torso and back. In orienteering, all our movements come from the hip, which means that we must have excellent stability so that the legs and to some extent the arms have a strong base to work from. Forest running places specially high demands on this core stability as the hip flexors work intensively with each stride. The more knee lift required the more important core stability is. If the muscles around the torso are weak, the runner will soon slip into a “sitting” running position and loses form and speed.

The aim with strength training for orienteers is to work all the muscles in the body with lighter strength exercises that can be repeated often. The orienteers own body weight is enough load for most exercises. However, light free weights can also be used and fixed weights can also be used occasionally.

Aerobics is a very suitable type of strength training for orienteering. Circuit training, where different exercise “stations” are planned out to provide a varied strength workout is also suitable for general strength training.

General strength should be carried out throughout the year, but is especially important in the build up period and as maintenance training in the competition period.

Note: Different examples of general strength training can be found at the back of the book.

Specific Strength Training

For most of the year training should be coupled to the individual and reflect what they will face in competition. If an orienteer plans to carry out specific strength training, the movements must be relevant to the “orienteering stride” that he needs in the forest. Specific strength training can be divided into two - muscle specific training and movement specific training.

Muscle specific training can be included in the form of maximum strength training, with few repetitions and heavy load. It is not certain that orienteers gain any benefit from this type of strength training if the body already has good muscle balance. But after injury, when certain muscles have been forced to rest, for example after a broken leg this type of training can be very useful. It can also help when there is imbalance between the left and right sides or other opposing muscle groups. This type of training can be beneficially carried out with the help of fixed equipment. The aim with the training is to build up muscle mass in a particular muscle.

Movement specific strength training should be trained by running against resistance. The training is carried out with light resistance and as fast as the resistance allows. Carrying out movement specific strength training using fixed equipment would be pointless. Instead the orienteer should use hills, downhills, marshes or snow during the winter as the resistance for this type of training. These conditions act as a brake against which the orienteer works. It is also possible to work with a partner and run against the resistance of an elastic band or even drag a tyre or small parachute.

Movement specific strength training is very similar to anaerobic training and should be treated with the same respect as far as intensity and recovery are concerned.

In addition, orienteers are going to be faced with greater stretch-shortening demands if the sport begins to move out of the forest and becomes more park-like. Stretch-shortening means that the muscle and tendon are stretched and then make a quick, powerful contraction. An example of this is when we jump down from a platform, then bound up onto another platform immediately. Stretch-shortening can help us to run faster and improves elasticity so that we get more from each stride without expending more energy. If we look at modern middle distance and long distance runners it is no coincidence that they move very economically and quickly, running on their toes. For the orienteer the best way of including this type of training is probably uphill bounding, with different hops and jumps. This would increase the elasticity of the foot and calf. This type of training can also be included as a part of other training sessions such as fartlek or hill sprints.

Movement specific strength training can be included throughout the year, particularly in the specific training and competition periods. Muscle specific training should only be carried out the build up period or when it is required for a special reason such as after injury.

Flexibility

It is important to maintain the natural suppleness which we have as children. Most young people have adequate flexibility, but muscles soon become tighter when we train intensely. Some people are even born hyper-flexible, especially in the joints. This type of flexibility problem should not be tackled with more flexibility training, but strength training instead. There is an important difference between flexibility in a joint and flexibility in a muscle. In general, when we increase training volume muscles and other structures round the joints need to be stretched so that they do not become tight and stiff.

General flexibility training is required to improve the range of movement in many of the body's joints to ensure good general flexibility. Extreme flexibility is not the aim. Specific flexibility training involves improving flexibility in joints which can be limiting factors for performance in a specific sport, orienteering running. By carrying this type of training out we try to improve our forest running performance. In orienteering it is primarily the hip flexors, the deep calf muscle and the thigh muscles that are important for running technique.

All training shortens the muscles somewhat, especially intense specific training. In addition, age and increased muscle mass negatively influence flexibility. Women are naturally more flexible than men.

There are many reasons to make flexibility training an important part of your training programme all year round. Most importantly, good flexibility means that you will suffer fewer injuries. Good flexibility in the muscles that are important for running technique increases your performance capability. The connective tissues around the muscles become more flexible which can increase stride length and coordination. By improving this, your running speed will also increase.

Certain muscles easily become stiff or shortened when the muscle changes volume, which is a common effect of strength training. The connective tissues around the muscles are not flexible enough and the muscle becomes short and stiff. Sometimes this process can also lead to imbalance between different muscle groups, due to inactivity after injury or over use. Poor flexibility in certain joints can mean that other joints must work harder to compensate for the inflexible area, and this can lead to unnecessary wear and tear.

Different stretching methods

There are several different ways to stretch which can be included in flexibility training. Whatever way you are stretching, it should involve a slow and controlled movement without jerking.

- Gentle stretching involves taking a muscle or joint slowly through its full range of movement then back to the resting position. This type of stretching is ideal to include in a warm up routine and to maintain general flexibility.
- Stretch-hold stretching involves taking a muscle to the end of its range of movement then holding it in that position for 20-30 seconds. After a few seconds rest the stretch can be repeated 2-3 times.
- Tense-relax-stretch stretching is also a common stretching method. It involves tensing the muscle to be stretched before carrying out the actual stretch:
 1. Get into the stretch position
 2. Tense the muscle to be stretched for 5 seconds
 3. Release the tension and relax for 3 seconds
 4. Stretch the muscle so that it is at the end of its range of movement
 5. Hold the stretch for 15 seconds

Does everyone need flexibility training?

If we mean flexibility training in the form of stretching before or after competition or training, then everyone needs to stretch. This type of maintenance stretching helps prevent injuries and improves performance. However we only need to dramatically increase flexibility when we have shortened inflexible muscles.