The demands of orienteering

Psychological demands

Thoughts turn into actions. All the thoughts that we think daily have reactions in our bodies. These reactions can be the physical feelings associated with an emotion or nerve impulses to a specific muscle. Hormones and nerves react to signals from the brain and carry messages through the body. It is therefore natural that both brain and body are involved in our studies, solving problems at work, relationships, or in the case of sport – how we succeed in out event.

To train optimally we have to know what is required of an orienteer in the competition situation. We know that when things go right and we run a whole course cleanly, all the controls just seem to appear in front of us. When we "spike" all the controls, there is a flowing feeling, as if we are running on "autopilot". For all this to happen, something has to come first – a thought. It is that thought or series of thoughts that are of interest if we want to build up a psychological profile of a good run. What are the psychological factors that lie behind a successful performance in a competition?

A decisive factor in our ability to perform is personality. Roughly speaking, personality is partly the result of inheritance and partly the result of the environmental influences we have experienced. Together, these factors make up a personality. As far as orienteering performance is concerned the essential mental qualities are self-confidence, motivation and the ability to concentrate. In addition the ability to tolerate stress, control nerves, focus on a task and maintain a positive attitude are important.

Profile of psychological requirements

Together with your coach, a leader or someone else who you have a good relationship with, you could attempt to fill in the profile below. It rates both psychological requirements and your personal strengths and weaknesses. It could be used as the basis of a discussion between you and your coach about strengths and weaknesses, the way you think, and the way you carry out different tasks. This process can help both to give a better picture of how you react in a competition situation and also how you can develop and change your training and behaviour.

Quality	**Importance (1-5)**	**My own capacity (1-5)**	**How can I train this?**
Self-confidence			
Motivation			
Concentration			
Attitude			
Being positive			
Stress tolerance			
Controlling nerves			
Focus			

Being systematic			
Vision			
Setting goals			
Taking responsibility			
Commitment			
Enthusiasm			
Harmony			
Original thinking			
Being a team player			
Seeing the whole			

Questionnaires

Tests such as the TOPS (Test of Performance Strategies) or the Psychological Strategies in Orienteering questionnaire can be a useful way to get more concrete information on strengths and weaknesses. These questionnaires consist of a list of questions which the athlete answers spontaneously. By analysing the answers it is possible to gain information on different psychological skills and strategies. It is important that the athlete answers honestly and without considering the questions for too long – the best answer is usually the one which comes to mind first.

The aim of these questionnaires is to encourage awareness of the factors which are important for performance in competition. The results can be the basis for individual discussions with a coach afterwards and give the athlete confirmation of strengths and a better understanding of weaknesses.

When working with psychological skills the inform-accept-change model is the most appropriate. The athlete first fills in the questionnaire and then discusses the results with a coach to try to understand what sort of strategies they have currently. This process demands that the athlete analyses and accepts the current situation. When these first two stages have been carried out it is relatively simple to think of creative, constructive solutions for change that can improve training and performance.

When working with individual development the inform-accept-change model is the most appropriate way to work. Psychological questionnaires such as the two above can be a good starting point for the athlete to begin to understand how they perfo

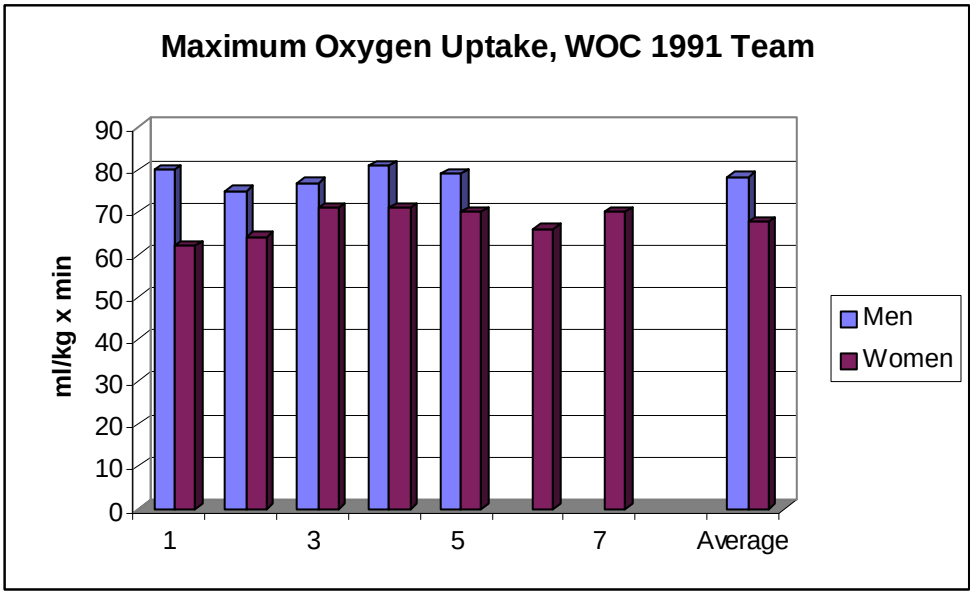
Physiological profile

Orienteering is a highly demanding sport. Reaching the top of the sport and competing at international level requires very high levels of fitness and physical form.

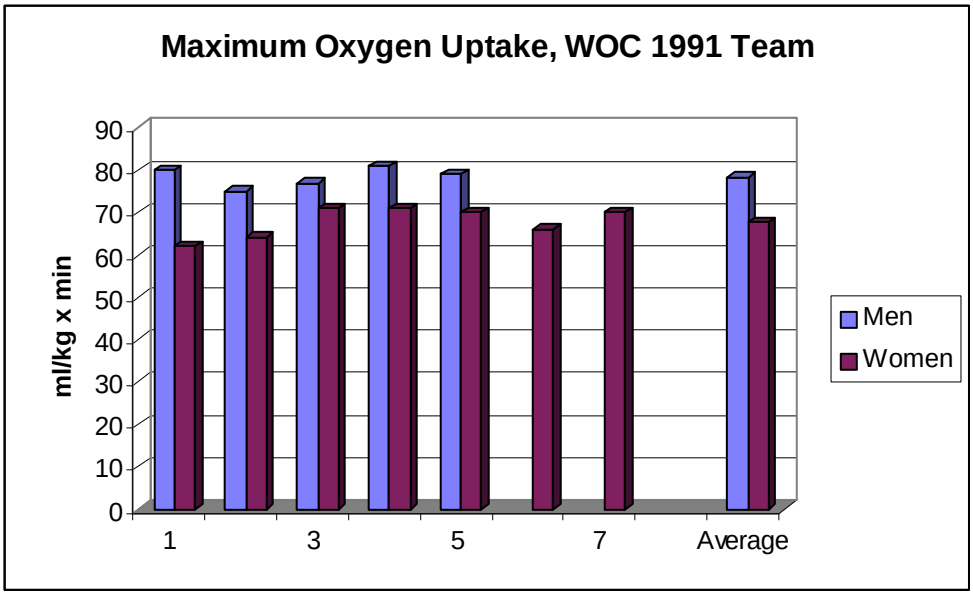
During recent years there has been increasing interest in how both fitness and strength can be trained at the same time. This is partly necessary because of the tougher and increasingly physically demanding courses runners face at major championships. In addition, course planners strive to plan courses with as much variety as possible. Often, the runner must tackle steep climbing, where lactic acid tolerance will be pushed to the limit, and flatter, faster terrain within one race.

Oxygen uptake and lactic acid

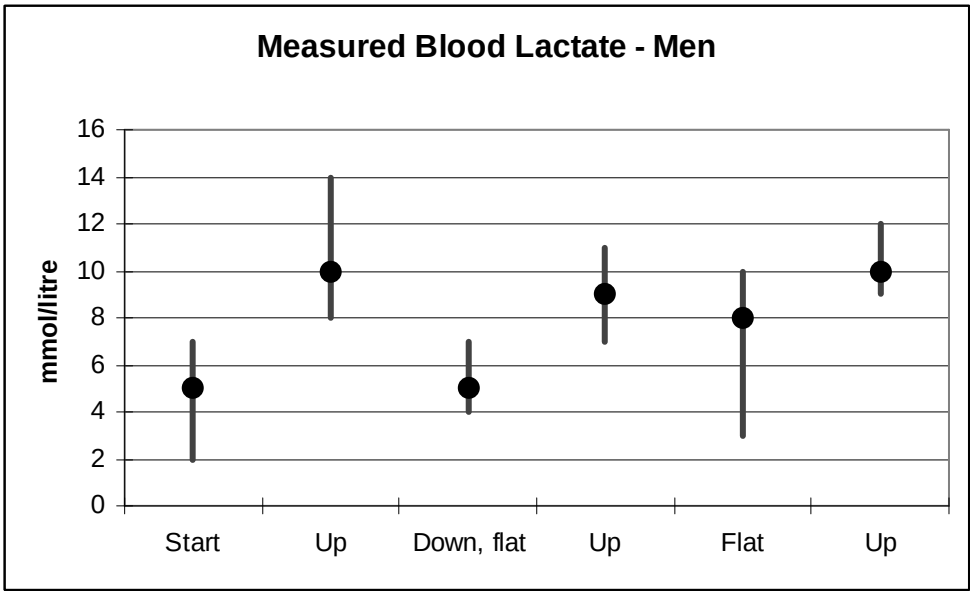
We know from previous studies on elite orienteers that a top orienteer today must have both a high aerobic and a high anaerobic capacity. A study carried out on the Swedish national team directly after the 1991 World Champs in Czechoslovakia showed that elite runners had very high values for both maximal oxygen uptake (VO_2 max) and maximal lactate level. Women in the team had an average VO_2 max value of 68 ml/kg x min with a range of 62-71 ml/kg x min, while the men had an average value of 78 ml/kg x min with a range of 75-81 ml/kg x min.

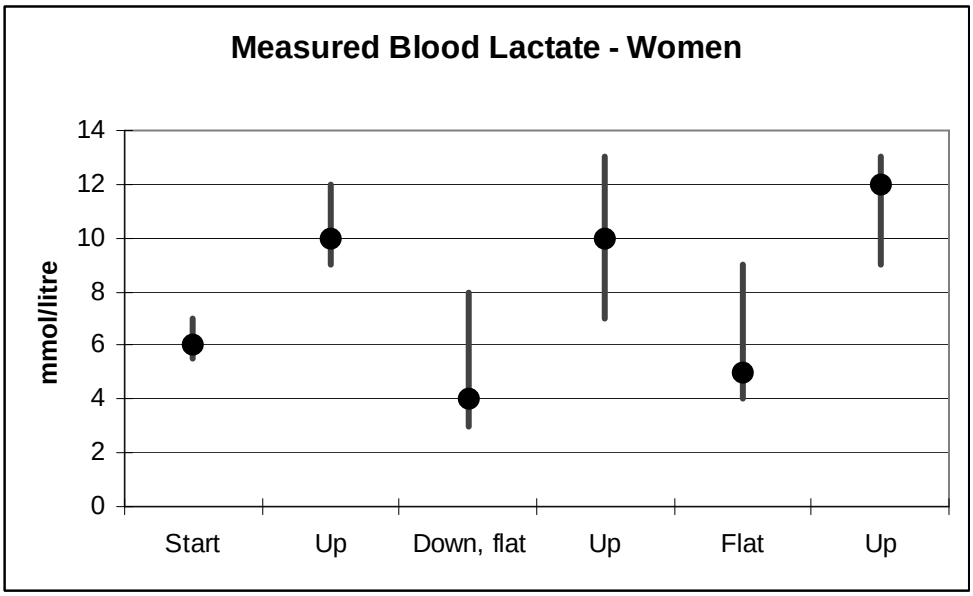


The most surprising result of the study was that orienteers had very high lactate levels at maximum exertion, which suggested that they were used to eliminating and tolerating lactic acid during exertion. Women had an average value of 12 mmol/litre with a range of 8.4-14.0 mmol/litre, while the men had an average value of 12 mmol/litre with a range of 10.0-17.0 mmol/litre.



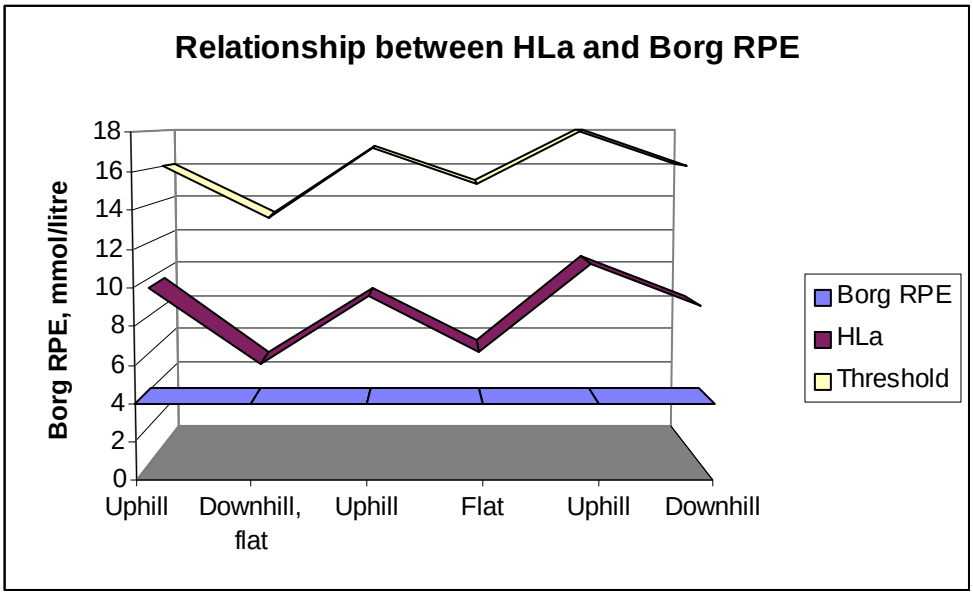
It has also been shown in another Swedish study, that blood lactate levels during a simulated competition lie on or over the lactate threshold (nominally 4 mmol/litre) during practically the entire course. Actual measured values for the runners varied between 3.5-15.5 mmol/litre at different points of the course. The average value was 8 mmol/litre. These results show that orienteers are forced to work anaerobically for long periods: Classic courses last 65-70 minutes for women and 90-100 minutes for men. Additionally, the runner is working at approximately 90 percent of his or her maximal oxygen uptake capacity, and the heart is pumping at 89-99 percent of its maximum frequency. When we consider these factors, an orienteering runner could be seen as a combination of a cross-country skier and a middle distance runner. An interesting result from the same Swedish study was that the athletes' own rating of their aerobic effort and leg tiredness reflected measured lactate levels very accurately, while there was no significant correlation between heart frequency and lactate.





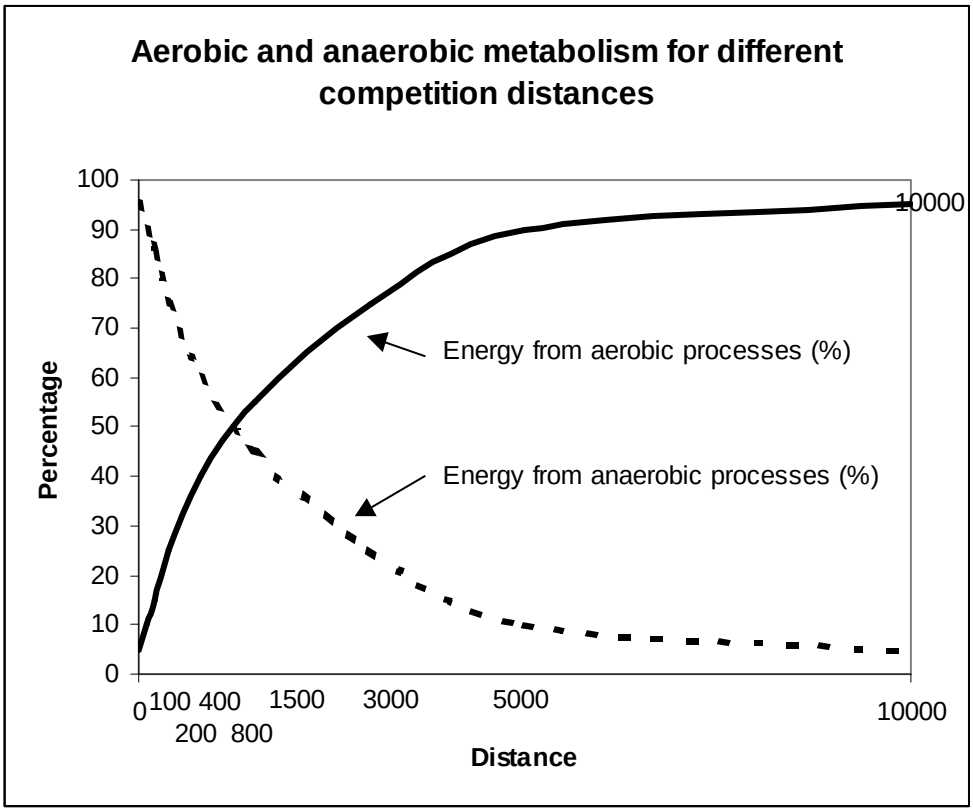
Orienteering, in common with cross-country skiing and running distances longer than 5000 metres, is an endurance sport. The main factors that separate orienteering from other fitness

and endurance sports are the variety of terrain that the runner must negotiate and the steep climbs and descents that may be encountered.



These factors lead to a running speed which varies between 4-10 min/km and a continually changing stride, where no step is the same as the one before. To cope with this a very high aerobic capacity is required, both centrally in the heart and lungs and locally in the "orienteering muscles". This capacity is usually measured by maximal oxygen uptake ability, VO_2 max, and we know that elite runners have had high values for a long time.

Lactic acid is also a performance limiting factor: It has been shown that blood lactate can average 5-7 mmol/litre for a whole race in Norwegian, Swedish and continental studies. This shows that a well-trained orienteer is dependant on lactate production during a race. An elite orienteer needs to have good anaerobic capacity to be able to run in the undulating and rough terrain encountered in orienteering races.



Anaerobic capacity has to be developed in the specific muscle groups which work when we run in steep and rough terrain, such as the hip-flexors and quads. We can only really get this capacity by recreating the actual competition situation in our training - fast running in the forest. However, cycle training can also help to build up muscle mass, and develop aerobic and anaerobic capacity in these muscle groups. There is also good reason to include running on paths and faster, harder surfaces in our training, as courses often include such runnable sections. A good summary is that “we become good at the things we train” and therefore we should let the character of the terrain at our most important competitions determine what sort of training we do.

As blood lactate levels are well correlated with our own rating of effort during a run, using for example the Borg scale, we can use this as a good measure of training intensity. Heart rate is a less useful tool for judging training intensity in orienteering training. By studying effort levels during competition, we can use this to guide competition-like training in our programme so that we are prepared for the real competition situation.

General and specific strength

Strength requirements for orienteers can be divided, roughly speaking, into two areas – general and specific strength. General strength is required everywhere in the body for posture and the control and coordination we need to carry the body during a competition. General strength helps both to prevent injury and provide a base for further training and intensive competition and training. Abdominal, side and back muscles form a supportive corset round the torso and make it possible for the legs to work intensively for long periods. This support has to be strong and stable if we are to run further, faster and more often. Core stability must be continually maintained and developed to cope with increased training. Even the shoulders, chest and upper back contribute to this supportive corset, though not as much. Being strong

and well balanced, so that you can lift your own weight and stand on your hands can only be an advantage for an orienteer.

Specific strength is strength in the muscles that we use in orienteering for the sport specific movements that we make. The leg muscles work hardest in orienteering of course. The large and small muscles in the legs and the hip flexors work together to move us quickly through steep forest terrain. The muscles work dynamically for long stretches of time which means that we need dynamic strength, both eccentric and concentric, to drive our body weight forwards. The muscles must have excellent strength endurance, but also be light. In this way we can get the most from our strength. Specific strength is best trained through fast running with resistance, such as uphill running (concentric strength), downhill running (eccentric strength), running on marshy ground or in snow.

Where are we today?

The following questions can be a good starting point for discussion between athlete and coach:

- What is orienteering really? Short, classic, park, today an in the future?
- What demands does an orienteer face?
- What capacity do I have now?
- How can I train to be better or even the best?
- What sort of ambition, attitude and motivation do I have to working towards the above?
- Do we have shared goals as athlete and coach? What are they?

Analysis of requirements

Physical capacity

	Poor				Excellent
Aerobic, central	1	2	3	4	5
Aerobic, local	1	2	3	4	5
Anaerobic, central	1	2	3	4	5
Anaerobic, local	1	2	3	4	5
Running economy	1	2	3	4	5
Strength, general	1	2	3	4	5
Strength, specific	1	2	3	4	5
Flexibility, general	1	2	3	4	5
Flexibility, specific	1	2	3	4	5

Running ability

	Poor				Excellent
Running on paths	1	2	3	4	5
Running in flat terrain	1	2	3	4	5
Running in gentle undulating terrain	1	2	3	4	5
Running in undulating terrain	1	2	3	4	5
Running in steep terrain	1	2	3	4	5
Running in Nordic terrain	1	2	3	4	5
Running uphill in Nordic terrain	1	2	3	4	5
Running downhill in Nordic terrain	1	2	3	4	5
Running in continental terrain	1	2	3	4	5
Running uphill in continental terrain	1	2	3	4	5
Running downhill in continental terrain	1	2	3	4	5
Running in marshes	1	2	3	4	5
Running on stony ground	1	2	3	4	5
Running in heavy undergrowth	1	2	3	4	5
Running over felled areas	1	2	3	4	5
Running through green areas	1	2	3	4	5
Getting past obstacles in the terrain easily and quickly	1	2	3	4	5
Capability to change tempo when the terrain changes	1	2	3	4	5
My own rating of my ability as a “forest runner”	1	2	3	4	5
_____	1	2	3	4	5
_____	1	2	3	4	5
_____	1	2	3	4	5
_____	1	2	3	4	5

Analysis of my strengths and weaknesses

Physical capacity

	Poor				Excellent
Aerobic, central	1	2	3	4	5
Aerobic, local	1	2	3	4	5
Anaerobic, central	1	2	3	4	5
Anaerobic, local	1	2	3	4	5
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Running downhill in continental terrain	1	2	3	4	5
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