Training at the right intensity

There are several ways to measure effort and check that you are training at the right speed or intensity for different types of endurance training. We have already metioned percentage of maximum heart rate and perceived exertion, in your breathing or your legs. There are also other ways to measure intensity, including measuring lactacte during a session or using the speed in minutes per kilometre or mile as a guide. For practical reasons we have chosen the simplest measures of effort, heart rate and perceived exertion to control intensity and give feedback during training. Perceived effort is really the only method which can both provide reliable feedback and help control training pace.

Estimating training intensity with the Borg Scale

Perceived effort is actually an old method for describing training intensity. Gunnar Borg, professor in psychology at Stockholm University, developed this method nearly 30 years ago. The scale below is often used now when testing athletes, but very seldom used as a way of guiding training.

The method is under-rated in endurance sport, but when you learn to use the system, it is far better than all other methods. By using the Borg Scale, or the RPE scale (Rating of Perceived Exertion) as it is actually called, it is possible to rate your effort level both for your breathing and your legs. Within orienteering the method is being used more and more and is often used by elite runners now.

The feeling associated with different levels of effort is directly linked to the work you are carrying out that moment. If you measured heart rate or lactacte level at the same moment you would get a result based on what was happening before. Heart rate and lactate give secondary feedback. If you increase your effort, increase speed, more lactate will be produced and this in turn means that the body must compensate with increased breathing and raised heart rate. However, these responses are delayed in comparison with the differences in effort that you can immediately feel yourself. Lactic acid measurements are usually taken from blood samples from the tip of the finger, and this is a long way from the legs which are actually producing the lactate. However, you will feel lactic acid n your legs as soon as it is produced and this means that your own perceived effort in your leg muscles is a simple and reliable indicator of how intensive your training is at that particular time.

We talk about central and local effort. Local effort includes, in the case of an orienteer, the legs while central effort is linked to breathing and heart rate. Gunnar Borg developed two scales, the “lactate scale”, 0-10, and the “heart rate scale”, 6-20. It is simpler to use just one scale during training. Experience has shown that the pulse scale seems to be the most relevant for endurance sports, both for the legs and breathing. When you are training it is important to consider what you are measuring. When running in the forest you might rate the heaviness of your breathing at 17 while the effort in your legs is 13. This is why we must always consider effort level for central and local effort seperately.

It can be useful to have the Borg Scale with you during training, for example of the back of a map, so that you can learn how different effort levels feel and to help guide training intensity in different types of training. The Borg Scale is especially useful for holding a steady pace during a long run or running at the right speed during continuous fast, interval and lactate training.

Borg's heart rate scale is based on percentage of maximum pulse. If the effort level is 9 this corresponds to a very easy effort and the pulse may be just 70. Training which is perceived as hard is rated at 15 and the pulse could be around 150. Remember that maximum pulse is very individual and can vary from 170-220. This is why it is not possible to give absolute heart rates to the different points on the scale, and we work with percentages instead.

Comparing absolute heart rate with effort level works well when external factors such as undulation and terrain are constant. This is very unusual in orienteering training. Heart rate is often raised and remains at a high level during a whole run. During uphill running oxygen is needed to create energy in the muscles and when running downhill, oxygen is required to help eliminate and neutralise lactic acid in the muscle cells. Heart rate remains high throughout the whole session, while lactate levels rise and fall in relation to the effort level. See also the "Dalarna Study" in the analysis of the demands of the sport.

The Borg Scale is an excellent tool to use for guiding training intensity, as it is possible to judge actual central and local effort levels immediately.

BORG-RPE

	Perceived effort	Corresponding heart rate
6		
7	Extremely easy	< 60 percent of max HR
8		
9	Very easy	
10		60-75 percent of max HR
11	Fairly easy	
12		
13	Somewhat hard	75-85 percent of max HR
14		
15	Hard	
16		85-95 percent of max HR
17	Very hard	
18		95-100 percent of max HR
19	Extremely hard	
20	Maximum effort	100 percent of max HR

Using heart rate to get training feedback

Heart rate and lactate level are both good methods to use if we want to know what happens during training. Measuring pulse and lactate level gives excellent feedback and helps us to describe and learn the different intensity levels. Unfortunately it is relatively difficult and complicated for a coach or athlete to carry out lactate measurements in the field. If it is possible to gain access and to the equipment and competence needed, lactate measurement can be a good way of describing what happens in training or competition, especially from a learning perspective. On the other hand for the orienteer heart rate and lactate are less useful tools for controlling training.

Heart rate is a useful tool to teach yourself about the type of levels you work at when training and competing. If you work out what percentage of your maximum heart rate you are aiming for during training and try to subjectively judge your effort level at the same time it is easier to find the right pace. However, you should remember that heart rate is a “blunt” tool in comparison to the Borg Scale.

If you are going to use heart rate measurement, you need to know your maximum pulse for reference.