

The Moving Bar of Intensity

By Coach Marc Evans

Perceptual signals of intensity are constant and consciously processed and organized in the cerebral cortex. And while heart rate (HR) training is popularly considered an effective training tool HR cannot be perceived. On the other hand, *effort* is accurately perceived through a complex array of sensory signals arising in part from respiratory, metabolic and the muscles.

In 1960, Gunnar Borg developed the rating of perceived exertion (RPE) scale (table 1 – first two columns). It is a method for measuring effort during physical work. RPE is used in many settings for clinical diagnostics, therapy and rehabilitation, training of athletes, research and testing exercise intensity at sports science laboratories.

My first introduction in a clinical setting to this innovative intensity assessment protocol was at the Olympic Training Center. During the first elite testing clinic with USA Triathlon professional team members in 1989 physiologists used HR, Lactate and RPE during testing of VO_{2max} in swimming and running. And without exception athletes consistently rated the work intensity with precision simply by touching a point on the RPE scale.

There are many adaptations of the Borg scale but the exactness of the perceptual estimation of intensity is remarkably accurate. To be sure, there are few better ways to monitor effort than using perceptual sensations, feelings and breathing rates to gauge and control exertion.

Successful endurance and triathlon outcomes are the result of the ability to sustain effort at or slightly above lactate threshold. This intensity is not so great the body's lactate buffering capacity is lessened. And using a HR monitor does not perceptually consider factors such as glucose depletion, environmental conditions and duration as HR remain level and even plateau as exercise durations extend while RPE rises and falls respectfully to changes in effort. Though HR generally parallels RPE it can be altered for example by heat exposure while RPE remains the same. So, RPE responds to the *intensity of effort* rather than the HR response.

Experienced triathletes intuitively recognize the subtleties of increases and decreases in intensity relative to the length of competition, environment, and nutrition status and certainly, pace. If this weren't so HR monitors would be customarily used by the elite during competitions. They simply are not.

Many studies demonstrate that HR response to exercise fluctuate due to variables like sleep status, stress, dehydration, environment, illness, cardiac output improvement and cardiac drift. The latter occurs normally with corresponding increases in muscle temperatures. And can result in a *drift* of 20 beats a minute. Therefore, that little *beating icon* on your watch and the blinking number do not always accurately identify intensity. HR monitoring while interesting cannot compare to the efficacy of perceived exertion training. And RPE works for any state of training and fitness whether an elite or novice.

By now you've recognized I don't advocate HR training. I do not. And over the years I've collected and confiscated monitors from athletes who believe the

beating number and *flashing heart icons* accurately identify intensity. They do not. And as a coach I've needed a method to assign effort and RPE has been the most consistent, practical and useful to date.

While RPE scales help considerably with intensity there's one important element missing. And frequently I'm asked *how hard should I race or complete an interval? What should the pace feel like?* In racing or training situations these are perhaps the more important questions. Using Borg's scale, I adapted it using time and RPE dependent upon the duration of the interval or event. The *moving bars* of intensity scale.

The moving bars work simply enough using an athlete's intuitive internal feeling based upon the time of the interval or event. The shorter the interval the less time is used to measure effort (table 1). The athlete can clearly figure out intensity levels and how long these can be maintained and of course, pace.

For example, an Olympic distance triathlon for many triathletes is a test of pushing the highest levels of the anaerobic threshold (AT). A two minute *bar* is used for this distance. I tell athletes to ask themselves several times, *Can I maintain this effort for the next two minutes?* Once the question is asked and answered affirmatively the bar extends for another two minutes. In effect, the intensity level remains constant as the *moves* along with the athlete. At no time does the bar get closer to the athlete than two minutes. If there is ever a point where you cannot positively answer *yes* the intensity is too high.

In overdistance aerobic training the *moving intensity bar* ranges from fifteen to thirty minutes. A three-hour aerobic conditioning bike ride in the base

preparatory phase has an RPE of extremely light to very light. The *moving bar* scale helps an athlete select intensities prior to workouts and remain consistent within the appropriate range of intensities.

In my training programs I use six levels of intensity. Table 1 illustrates these increasing in that order from zone 1 through zone 6. Because of space limitations in this article (and not a bad way to sell a few books) I'll refer you to *Triathletes' Edge* (Human Kinetics publishers) for more detailed descriptions. Each zone therein is described by the degree of intensity, duration, RPE, HR (estimated ranges when maximal HR tests are done regularly), workout characteristics, physiological and biological contributions and respective work: rest ratios for interval training.

Exertion	RPE	Training Zone	Moving Bar (time to fatigue)	Training/racing Characteristic
no exertion at all	6	Na	Na	At rest
extremely light	7	Zone 1	0:30:00	Following intervals or event as warm down
	8	Zone 1	0:30:00	Sub-aerobic
very light	9	Zone 1	0:20:00	Aerobic Conditioning Training
	10	Zone 1	0:15:00	Aerobic Conditioning Training
Light	11	Zone 1	0:15:00	Aerobic Conditioning Training

	12	Zone 2	0:03:00	Sub-Threshold – Half to Ironman pace
somewhat hard	13	Zone 2	0:03:00	Sub-Threshold – Half Ironman pace
	14	Zone 3	0:02:00	Threshold Intervals – Olympic Triathlon pace
hard (heavy)	15	Zone 3	0:02:00	Threshold Intervals – Sprint and Olympic Triathlon pace
	16	Zone 4	0:01:00	Supra-Threshold Cruise Intervals – Sprint Triathlon pace
very hard	17	Zone 5	0:00:45	VO _{2max} High Intensity Interval Training
	18	Zone 5	0:00:45	VO _{2max} High Intensity Interval Training
extremely hard	19	Zone 6	0:00:30	Lactate Tolerance Training - Sprints
maximal exertion	20	Zone 6	0:00:15	Lactate Tolerance Training - Sprints

Table 1 Borg Scale Adapted by Marc Evans 2005

*Marc Evans is triathlons first coach (1982) and continues coaching triathletes full-time from his offices in Menlo Park, CA— www.evanscoaching.com. Coach Evans was the 1989-90 USA Triathlon Head Coach and is the author of *Triathletes Edge* and *Endurance Athletes Edge*.*