ATHLETICA METHODOLOGY AND TRAINING TERMINOLOGY

Index

1. Introduction to Athletica

Welcome to Athletica. Athletica is a premium coaching plan that adapts to your current fitness levels, goals, training sessions and life, allowing you to reach new levels of health and performance you never thought possible.

Here, we outline the training principles, terms, acronyms, abbreviations and concepts used throughout the Athletica platform.

There are no secrets to Athletica. As we like to say — Athletica is built on the shoulders of giants — the work of great scientists that have come before us. All the Athletica features, how it measures and guides you as an athlete to perform at your best, are based on automated first principle exercise science, as described in the book, *Science and Application of High-Intensity Interval Training*, supplemented with a modern twist. We learn best by feeling and doing.

What may be unique to Athletica, is that these principles can not only be learned, but experienced. As you go forth with your training endeavours guided by Athletica, you should do so with the confidence that you will be experiencing the most intelligent training program ever built. For more detailed information on all the first principle concepts that are applied within Athletica, please visit HIIT Science.

You are here to learn how to prepare best for an athletic endeavor. Where does one begin? In the words of professional triathlete Andi Bocherer, “it's not easy nor given to know the right direction”. And how could it be? We are all individuals, and life is complicated. And when it comes to training, as we often say, there’s more than one way to skin the cat. One thing we know for sure however, is that there are often better, or less worse choices one can make.

With Athletica, we’re here to guide you, on a daily basis, with good training decisions based on your context, to enable you to reach your full potential as an athlete. The other important aspect you will discover in Athletica is that it is a tool for learning and interpersonal growth.

By giving you the knowledge and understanding of the training sessions aims, by attaching you to them — by feeling and doing — your motivation to train will improve, making sure that every session you do has purpose, giving you the most bang for buck every time you train.

2. Training Zones

As a place to start with training, Athletica needs to learn some things about you. We all have different exercise abilities, and we are all made up a little differently.

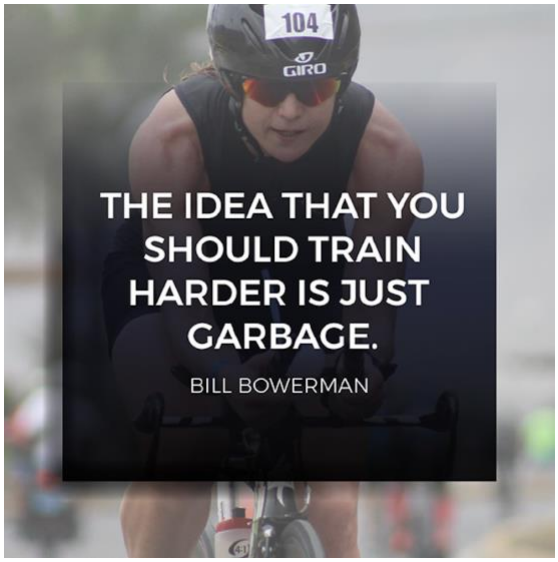
Some of us have different muscle types to enable good sprinting vs. endurance characteristics, some have different size hearts that advantage their endurance, different combinations of both, and all of us come with different ages, genders and training backgrounds.

To make training appropriate for you, we need to find out where your abilities lie, and how your physiology works to enable those abilities. Herein begins the rationale for determining your exercise training zones.

These zones, or your training intensity/duration bandwidth, will help to guide you in the training sessions Athletica prescribes.

Figure 1 depicts the spectrum of exercise training zones, experienced exercise intensities, as well as the typical training formats performed, and physiological response targets so that you understand the session aims.

The key physiological transition points between zones include the first ventilatory threshold (maximal aerobic function; Z 2/3), the second ventilatory threshold (Z 4/5), maximal oxygen uptake (Z 5/6).



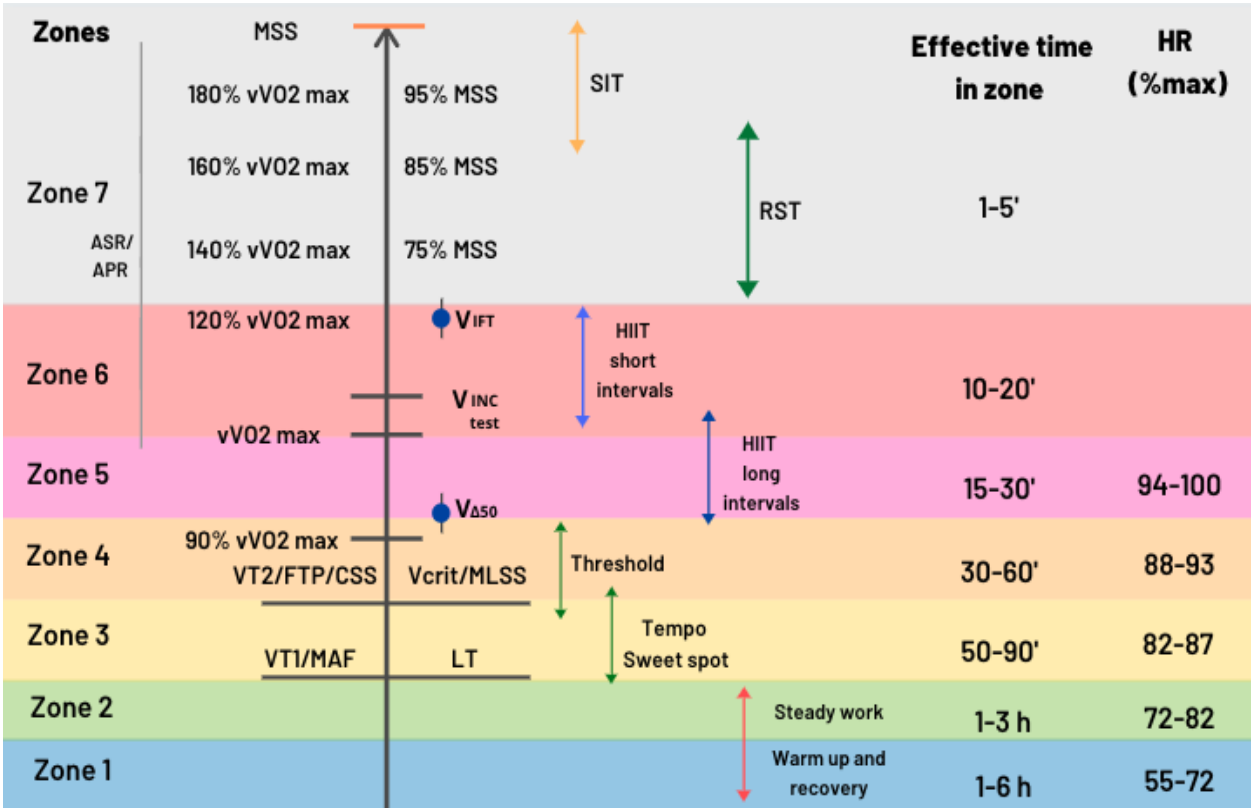


Figure 1. Training zones used in Athletica, reference intensity landmarks, typical training formats used, effective time in zone, and percent of maximal heart rate.

ASR: anaerobic speed reserve; APR: anaerobic power reserve; MLSS: maximal lactate steady state; MSS: maximal sprinting speed; RST: repeated sprint training; SIT: sprint interval training; (VO2max: maximal oxygen uptake; vO2max: minimal running speed required to elicit VO2max, VΔ50: speed halfway between VO2max and MLSS; Vcrit: critical velocity; VIFT: peak speed reached at the end of the 30-15 intermittent fitness test; VIncTest: peak incremental test speed; FTP: functional threshold power; CSS: critical swim speed; MAF: maximal aerobic function; VT1: first ventilatory threshold, VT2: second ventilatory threshold, LT: lactate threshold, HIIT: high-intensity interval training; HR: heart rate

The first ventilatory threshold (VT1)

The first ventilatory threshold (VT1) is the transition point between easy steady exercise and moderate intensity exercise. Simply put, this is your “exercise all day pace”. This exercise intensity is associated with high rates of fat oxidation and low levels of sympathetic stress.

In the laboratory, VT1 is technically detected as the first rise in your breathing ventilation relative to the volume of oxygen consumed. The VT1 corresponds with your lactate threshold (LT) measured in the laboratory, defined as a 1 mmol/L rise in blood lactate above baseline. This measure of exercise intensity is important because it is indicative of the transition point between zone 2 and zone 3.

Maximal aerobic function (MAF)

Maximal aerobic function (MAF) is a field-based estimate of your VT1, pioneered more than 40 years ago by Dr Phillip Maffetone. MAF is defined as the exercise intensity associated with high rates of fat oxidation and low levels of sympathetic stress. Specific instructions for estimating your MAF HR are provided within Athletica, and for more detailed information, the reader is referred to the following paper.

Second ventilatory threshold (VT2)

Your second ventilatory threshold (VT2) is the theoretical transition point between zone 3 and 4. Traditionally, this point has been termed the ‘anaerobic threshold’, as well as the maximal lactate steady state (MLSS). The corresponding intensity is often associated with the *critical* intensity, i.e.: a point that represents a semi-sustainable high-intensity exercise ability for periods between 30 min and 1 hour.

While precise measurement of VT2 is only available in the laboratory setting, we can make inferences and estimations of this point using your training data (power, speed, heart rate) across various durations. At time of writing, we determine your cycling VT2 using a traditional functional threshold power (FTP) test, whereby you perform a 20 min cycling time trial and the average power output attained in that 20 min is used to estimate your VT2.

Similarly, your running VT2 is determined using your time to complete a 5 km running time trial (Jack Daniels Vdot method). For both tests, we take your average heart rate in the last 10 min of the test to estimate the heart rate associated with your VT2.

Critical Swim Speed (CSS)

Critical swim speed (CSS) refers to the speed associated with your VT2 for swimming. We determine this using two all out time trials of 50m and 400m, completed during the course of a regular swim training session. As with VT2, we use the CSS to calibrate many of the swim training sessions within Athletica.

That is, many of the sessions are individualized to be completed at this swim pace, followed by varying periods of recovery to elicit the required response. Additionally, we use this marker to estimate the swim training load, as we do with your VT2 for bike and run.

Maximal Oxygen Uptake (VO2max)

VO2max, or maximal oxygen uptake, refers to the maximum amount of oxygen that an individual can use during intense or maximal exercise. This measurement is generally considered one of the best indicators of cardiovascular fitness and endurance performance, as the more oxygen a person can use during high-intensity exercise, the more energy a person can produce 'aerobically'.

In runners, the anaerobic speed reserve (ASR) is typically defined as the difference between maximal sprinting speed (MSS) and running speed at VO2max. In cyclists, the anaerobic power reserve (APR) is defined as the difference between maximal sprint power output and power output at VO2max.

Notwithstanding the important contribution of the neuromuscular system, the ASR/APR range may broadly reflect a combination of both maximal aerobic and anaerobic energetic capacities. Traditionally, this upper range is less appreciated. However more recent data suggests it may be of great use to individualize exercise intensity of (supramaximal) HIIT.

Anaerobic Speed / Power Reserve

3. Training Load, MP^4, Fitness, Fatigue, Form, Performance Potential

Training Load

Training load (LD) is the accumulation of training stress. To compute your training load, Athletica combines markers of intensity (i.e., speed, power, heart rate) determined from the zone measurements with the actual time spent exercising or the distance covered across the various pre-established intensity zones outlined. These are ultimately used to determine your fitness, fatigue and form levels described below.

Quartic Mean Power (MP^4)

Quartic Mean Power (MP^4) is a power averaging method, measured in Watts, used to equilibrate for variable riding conditions (i.e., periods of high and low power output). The MP^4 weighs periods of hard riding, such as with surges in pace, as higher compared to the condition of simply averaging the power over the same duration. This results in a more accurate depiction of the power requirements in a given duration and resultant training load.

'Performance Potential' chart

Fitness

Fitness can be defined as the accumulation of, and adaptation to, training stress, over a long period of time. This broadly can be considered as your capacity to perform (i.e., how fit you are). Athletica uses a modified version of the original Banister et al. (1975) paper to make this calculation.

Form

Form (or freshness), refers to how much relief you have from training stress. Form is considered the inverse of the fatigue term. Athletica uses a modified version of the original Banister et al. (1975) paper to make this calculation.

Fatigue

Fatigue is the accumulation of training stress over a short period of time. For example, perform a large training session (high stress) relative to the daily amount of training you are used to having, and naturally, you will feel fatigued. Athletica uses a modified version of the original Banister et al. (1975) paper to make this calculation.

Your Performance Potential chart (Figure 2) amalgamates the concepts of training load, into levels of fitness, fatigue and form, and subsequently reveals the journey you are on towards optimizing your Performance Potential for the races you have entered.

Simply put, Athletica prescribes a training load that maximizes fitness and minimizes fatigue (enhances form) just prior to the performance you declare you are targeting (A, B or C race). Your Athletica training program updates its recommendations on a daily basis depending upon what does or doesn't get completed in training.

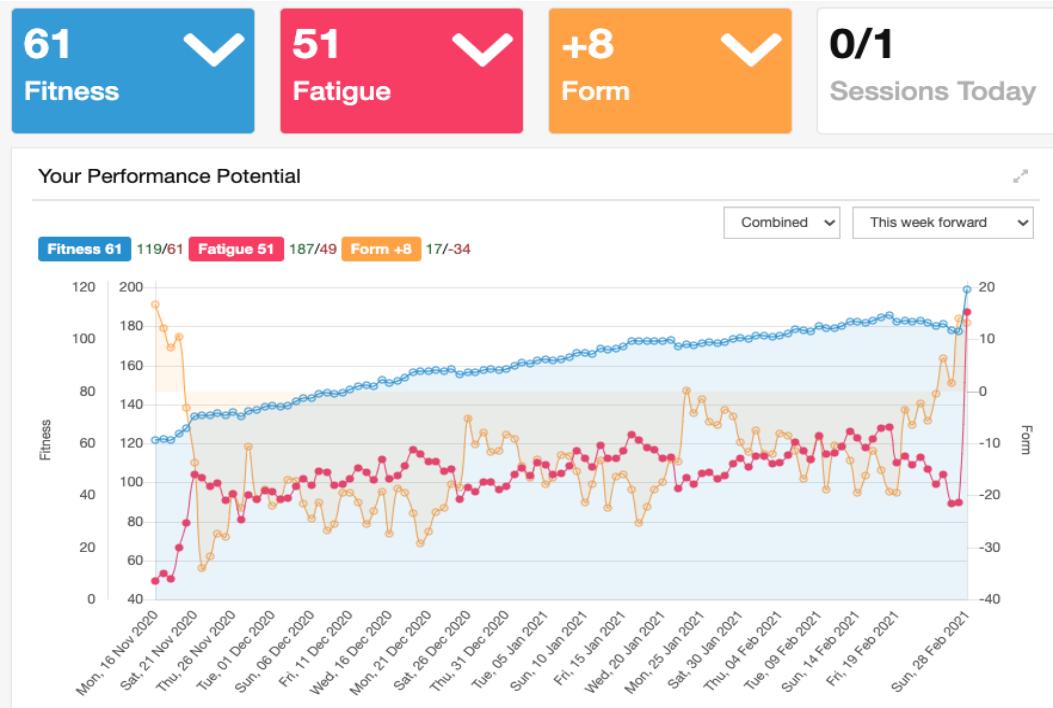


Figure 2. Example chart of Athletica providing daily load prescriptions to control fatigue, maximize fitness and maximize form before your next key event.

4. Training Load Response

As well described in HIIT Science, we can try to optimize our fitness through precise loading, however we are all individuals when it comes to training. Athletica modifies your subsequent training sessions based upon how you respond to training. We currently use a number of key metrics for this calculation, with more on their way (Figure 3). Currently these are as follows:

- Rating of perceived exertion (RPE) (Foster, 1998) - how hard was the session?
- Feeling - how did the session feel?
- Semantic analysis of your comments - drawing more meaning from your text

From just these simple three entries, we can obtain great information about what is going on inside of you - how you're responding to the training - and what this means for upcoming sessions to ensure that we keep you on the right track.

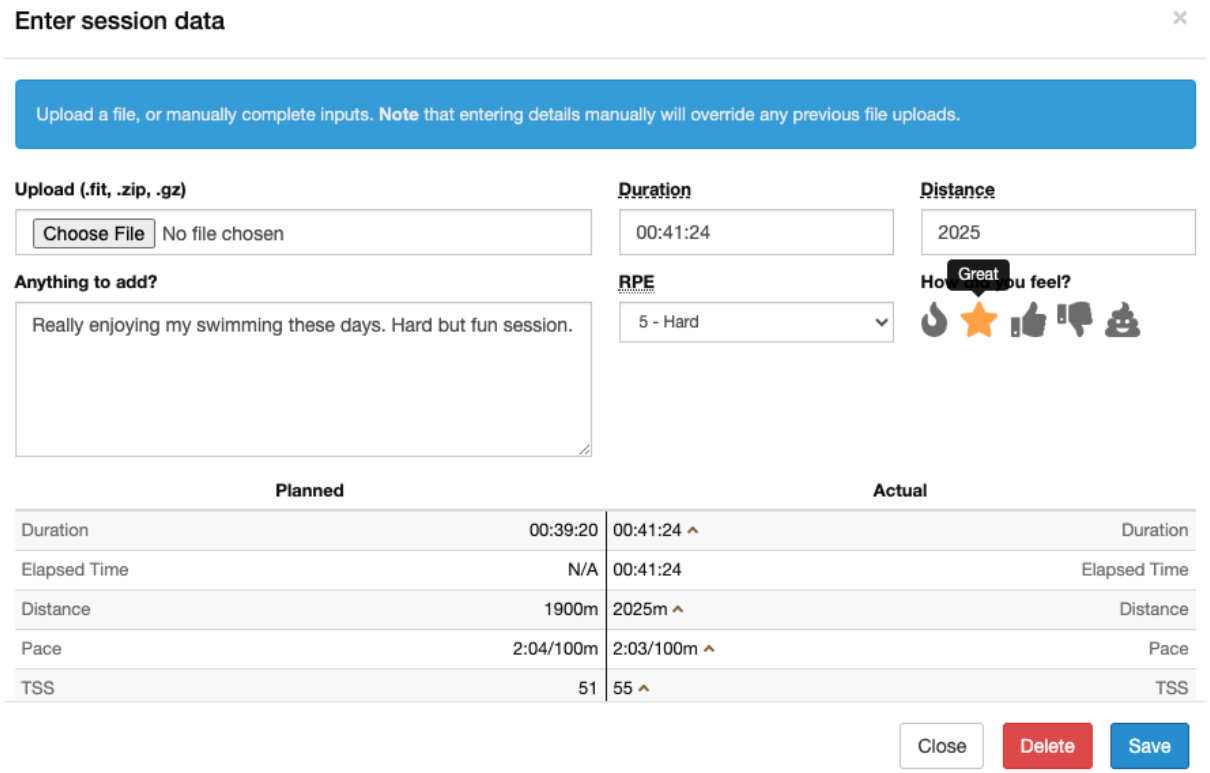


Figure 3. Load response variables you need to enter after session to get the most out of Athletica and your own training.

5. Physiological Profile and Race Prediction

Your Physiological Profile chart (Figure 4) provides an indication of how your physiology works to achieve your performance capability over different exercise durations. We are all unique in this regard, which is why it's so important to individualize training in line with how you function. In particular, this chart provides an indication of your aerobic (endurance) and anaerobic (sprint) performance potential over set time periods.

Your Physiological Profile is the best indicator of your capacity to perform across exercise durations that compare with those of the event you are training for. Additionally, your Physiological Profile shows the heart rate associated with exercise performed over such durations. Combined, your Physiological Profile assists us to accurately determine your exercise training zones and an optimal pacing profile for your upcoming event.

Figure 4. Physiological profile chart showing an individual's heart rate response over different training durations during cycling and run speeds over varying training durations.

6. Session aims

Session aims of Athletica align with the physiological targets shown in Figure 1 alongside different contexts. Thus, Athletica prescribes training in line with the specific training load and

contexts needed to gain an optimal gain in performance potential and physiological response/adaptation Training session aims are outlined below.

Session aim	Abbreviation	Description
Aerobic	AeR	A session completed at an aerobic intensity (<L2) with the aim of enhancing aerobic endurance.
Anaerobic Capacity	ANC	For an ANC session the aim is to fully tax the anaerobic energy system. Such a session requires all out exercise performed for short periods of time ranging from 5-40s. Repeat sprint training and sprint interval training formats are used to hit this target (Figure 1).
Open Water	OPW	It's important to get familiar with open water swimming if you race in this condition, so practice in the race environment for this session. Wear your wetsuit if preparing for a wetsuit legal race.
Recovery	REC	A recovery session is completed at low exercise intensity (i.e., L1). This session is good for activating the body, getting the circulation going, but keeping overall stress low. Anecdotally speaking, many athletes feel better doing a short Rec session compared to sitting around and doing nothing.
Second ventilatory threshold	VT2	A session with a MS focus on zone 4 work.
Speed	SPD	For a speed session in swimming, the focus is on swimming very fast and close to your maximum. This session usually triggers the VO2max response.
Steady state	SS	A session with a MS focus on zone 3 (tempo) work.
Strength Endurance	SE	A session that alters the motor pattern of movement enabling longer muscular contractions through the range of motion creating what feels like a functional strength session.
Technique	TEC	Swimming is a technical sport, so for the technique session, we usually focus on a series of drills. A TEC session is also typically performed at a low intensity, and so can be simultaneously used for recovery.
Tempo	Tmp	A session with a MS focus on zone 3 (tempo) work.
Testing	TST	In this session, we are specifically performing a test to establish physiological and performance parameters.
VO2max	VO2	A session with a MS focus on zone 5 (VO2max) work.

7. Compliance

By the term ‘Compliance’, we refer to measurements we make that consider how closely you are following the training program. This includes objective measurements made from your device files, as well as subjective measurements (RPE, FEEL, NOTES; Figure 3) we ask you to make after your session is completed. The following color code is used throughout the Athletica platform.

- As planned +/- 15%, everything looks great!
- As planned +/- 15%, missing some subjective markers.
- Above recommendation (>15%), subjective markers completed.
- Above recommendation (>15%), missing some subjective markers.
- Below recommendation (<15%), subjective markers completed.
- Below recommendation (<15%), missing some subjective markers.
- Unplanned session.
- Missed session.

8. Common Session Terms

Athletica uses several terms when prescribing sessions. These terms are abbreviated for simplicity. The full words, and their meanings are outlined below.

Term	Abbreviation	Description
As fast as possible	AFAP	All out exercise. Sprint maximally.
Choice	Ch	A stroke of your choice for this part of the swim (breast, free, back, etc).
Cool down	CD	The end phase of a training session that typically finishes in zone1 and 2, and lasts 10-20 min.
Contrast set	CS	A contrast set is a phase or portion of the workout used to break up the training session and separate one or more main sets.
Functional threshold power	FTP	Your functional threshold power (FTP) is calculated as the mean maximal power you can produce over 20 min, minus 5% to equilibrate to your 1 hour threshold (Allen & Coggan, 2019). This is also an estimate of the power associated with VT2. We can also determine the HR associated with this power, by taking the last 10 min average value during this test (VT2 HR).
Load	LD	Load is an estimate of the accumulation of stress. While stress comes in many forms, we refer to LD in the context of exercise stress. Exercise LD takes into account the training intensity and duration, and we use the MP^4 to weight higher training intensities accordingly due to the exponential increase in anaerobic glycolytic energy requirements for such intensities. Athletica uses a modified version of the original Banister et al. (1975) paper to make this calculation.
Main set	MS	The main set is the portion of the training session that really matters and is typically the bulk of the training load you will complete in the session. The MS is always aligned with the session aim or purpose of the session, and you will spend time in zone as shown in Figure 1. This is where your focus should be for any training session.
Pull, paddles, band	PPB	In this condition, the swimming technique involves the use of a pull buoy between the legs, a rubber band around the ankles, and paddles worn on the hands. This condition alters the swimmer's hydrodynamics and creates a 'strength endurance' type swim training session.
Preparation	PREP	The preparation phase of the session comes after the warm-up, and acts as a form of primer for the main set (MS). This PREP phase of your session could be considered analogous to the practice of revving the engine of a race car prior to the real work that's about to incur.
Run off the bike	ROB	Typically for the triathlon training context, running after the bike means running as soon as possible following completion of the bike training session. This session prepares you for the neuromuscular requirements of running after cycling in a triathlon.

Warm-up	WU	The beginning phase of a training session that typically finishes in zone 1 and 2, and lasts 10-20 min.

9. References

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