



Human  
Vortex  
Training

Here's Your  
Free Chapter from

# THE VORTEX METHOD



# Performance Limiters & Responses to Training: Power Output & The Energy Equation



This chapter is very science and detail heavy, if you're just getting started in strength training and are not ready or interested in learning the WHY behind the Vortex Method, go ahead and skip this chapter.

Before we get into the nuts and bolts of the Vortex Method and how to build an intelligently designed strength training program, I want to share with you the deeper reasons why strength training is so important for cyclists, and endurance athletes as a whole.

And it has very little to do with maximum strength in the weight room.

**Competitive cyclists as a whole tend to become really focused on power numbers:**

- ⦿ "What were your watts per kilo for that climb?"
- ⦿ "What were her average watts to take that KOM on that Strava segment?"
- ⦿ "How many watts did you put out in your sprint?"

Watts are a way to objectively measure and compare abilities, but what if I told you there are a few ways that most people don't even realize they can improve their power output & performance. Would you believe me, or would you think I was just going to tell you some "secret interval" or "pro recovery treatment"?

It's actually just basic understanding of how the human body works.

Before we jump in, I just want to give you a heads up that this chapter is a little heavy on the technical sciency stuff, so bear with me!

Having a basic understanding of the topics covered in this chapter will really help you better understand not only how strength training improves on-bike performance, but it will also help you make small changes to your own training program to get more out of your time training.

I've purposefully kept it short and to the point. This will be the most sciency of the chapters in this book, but it's WELL worth it.

Read on!



# How do we improve performance?



When it comes to trying to improve performance, we all tend to get lost down the rabbit hole of



**Sleep**



**Nutrition & Hydration**



**Interval Training**



**Tactics**

While these are pretty widely accepted as being the “determinants of performance” we’re actually missing the bigger, and more impactful picture. Yes these 4 pieces are important, but we really need to broaden our perspective if we’re going to truly achieve top performances!

**When we take a step back and look at what 3 “Main Things” determine our performance successes we’ll actually find they are:**

## ● **Power output (Fitness)-**

You GOTTA have the power to keep up, or to stay away!

## ● **Technical Skills-**

This is an area an incredible amount of cyclists completely avoid giving proper attention or time, which almost always costs them dearly in events!

## ● **Tactics and a race strategy (Specific Race Preparation)-**

When walking around the parking lot before races I almost always hear teammates talking race strategies, they are usually extremely optimistic, and rarely have anything to do with actual real course recon or knowledge aside from reading a paper map that shows turns and elevation gains.



While we could get lost in talking about technique and specific race preparation, we're going to focus in on the fitness side of things, aka power output. However, as I'm guessing that many of you have picked up this book in an effort to improve your performance in some kind of race or event, I feel it is my duty as a coach to at least make you aware of the major considerations you should be taking in your event or race preparation, which will truly help you have a fantastic result.

If you take the time to look for local or regional skills clinics, and race strategy clinics or presentations, and buff-up on your abilities & knowledge in these areas as well, you'll truly maximize the results you gain from this book & its programs to unleash your full power out on the road!

Speaking of unleashing your full power on the road...

## What influences power output?



Many riders dive head-first into the waters of increased performance via lighter and stiffer equipment, but this is both a very expensive path, and one that should only be taken on much later down the road of your development as a rider/athlete.

Yes, you absolutely can buy speed, but it comes at a heavy price... and I am NOT talking about the massive dent it would put in your bank account!

Buying speed is essentially cheating yourself of learning how to tap into your own potential as a rider and slows down your learning curve on riding technique, riding skills, and improving your movement patterns.



Let's not kid ourselves, it IS fun to buy a new set of wheels and to see that speedometer roll up an extra few mph/kph, but really these kinds of advantages should be saved until you begin to unlock your full potential with good, solid basic equipment, and you begin to move towards mastery of the 6 factors that affect power output that you can easily train without spending mucho dinero:

### ⦿ **Motor Control-**

Good coordination & control of your body allows for better neural connections to the muscles, and less energy used to create a movement

### ⦿ **Stress Management-**

Not just training stress, but also life stress has a huge impact on our abilities to perform at our best & to recover. When we're stressed our hormonal status is skewed, which leads to more energy being used as we're constantly "on high alert".

### ⦿ **Movement Qualities-**

the better in balance your body's joints are, and the higher the quality of your movement patterns, the better you're going to be able to perform. Loose is fast, and fast is loose. But if your muscles are out of balance at a joint, you're going to hold tension, and have to work harder for a given movement.

### ⦿ **Energy Systems-**

Your training should place demands on ALL of the energy systems you will need for an event in ways they can adapt, improve, and become more efficient

### ⦿ **Skill-**

As mentioned above, riding is a SKILL that must be taught, learned, and practiced often. Yet the vast majority of cyclists never, or rarely, practice the basic skills of braking, cornering, sprinting, bumping, pedaling, or learning how to work the bike in a figure 8 up the climb, just to name a few.

### ⦿ **Technique-**

While this is often grouped together with skill, in large part due to the various skills and many different techniques that should be learned, I prefer to separate it from skills, as there are different techniques used for each skill.

**While all of these greatly affect power output, if we dig a little bit deeper, we'll recognize that power output REALLY comes down to energy creation & energy use, and how efficiently your body can do both.**



# Energy Creation & Energy Use



Looking at Energy creation, there are 3 main components that will affect energy creation:

## 🕒 **Developing/training the energy systems-**

This is where the on-bike training does a major part of the work. When we perform specific intervals in particular fashions, we are challenging the specific energy systems to become stronger and more efficient.

## 🕒 **Muscle size & type-**

I could go very deep into detail here, but let's just boil it down to this: Type 2 muscle fibers use shorter energy systems, and thus if you have more type 2 muscle fibers you'll do much better in short, explosive power sports like basketball & Olympic lifting, but if you have more Type 1 muscle fibers, you'll be more primed to perform sports that last longer, like road cycling.

## 🕒 **Nutrition-**

Types and timing of fuel will affect how you perform and recover. This ties in closely with your properly developing the energy systems and training them with specific timing and use of nutrients. Nutrition intake can also significantly affect hormonal balances in the body, as you'll learn later on.

When it comes to energy use, we can also break it down into 3 primary categories that determine how well you can take energy produced into performance:

## 🕒 **Skill & Technique-**

We group these together here, as one will greatly affect the other. The more you practice a skill, the better you can refine your technique, and so they continually feed into one another.

## 🕒 **Mental Preparation & Performance-**

The better you prepare your mind for the event at hand, the better you'll perform. This is another area that many athletes fall short in, but the best of the best make it a point to train their mind, just as they train their body. Check out Lanny Bassham's *With Winning in Mind* for more on this skill.

## 🕒 **Movement Capacity-**

This is where strength training comes in to play, as the better you MOVE, and the higher the quality your movements, the more efficient and economical your body can be, the LESS energy your body will burn to perform.

This is also why how you sit on the bike, how you pedal, and if you perform an interval sitting, standing, on the hoods, or in the drops matters. But the better you balance and build your body via strength training, the better you're going to be able to perform on the bike.

When we talk about increasing power output, the vast majority of cyclists are very inefficient on the energy use side of this equation, which means there are a LOT of performance gains that can be made simply by focusing on movement.

By learning how to better move your body through the FUNdamental 5+1 movement patterns (to be addressed later), improving breathing patterns, and working towards better postures, you'll be able to increase your movement capacity, and improve your skill & technique on your bike (as long as you actually practice them on the bike!). You'll not only be seeing improvements in your strength & technique in your FUNdamental 5+1 human movements, but you're also making your brain more aware of where exactly in space your body parts are.

OK, deep breath... WHEW! That was a lot! See, I told you it wouldn't be that bad! I hope you've found this last little part to be really eye opening. For many of the athletes I've worked with it really blows their mind as to how much they never knew they were getting, and needed, from strength training.

Now, we're almost through the chapter. We're going to go back into some more technical science stuff, but it's super short, and will help you understand HOW your body responds to the training sessions you do in order to get you the results your after. It's super short, I promise.

Ready?

Let's go!



# The 4 Stages of Training Response



Understanding HOW your training sessions will create the changes that you want to see so that you can ride strong is very important. The better you understand your body, even at a very basic level, the smarter you're going to be able to be when it comes to adjusting and changing your training program to keep you on track.

This basic understanding of how you plan and perform your training programs will lead to different changes in your movement patterns, your fitness, and in the end, your performance.

## 1 The Training Session- Creating Stress

During each and every training session, we need to have a specific goal and desired outcome from the training session and the changes we want to see from our putting in the work in this area. This is one of the reasons why many self-coached athletes tend to flounder and fail: They try to do everything in each training session, or try to focus on too many changes in 1 training block.

By doing their training in this shotgun approach and trying to train too many things at the same time, they make it very unclear to the body exactly what changes you're trying to get. We want to be crystal clear with the body about how we want it to adapt to the training.

## 2 After the Training Session- Structural and Energy System Changes

As we place a specific training stress on the body, our body will respond to the SPECIFIC wastes and products made by the particular energy systems we are using, as well as what kind of stresses are being placed on the muscles and tissues of the body.

This sounds complex, and it is, but just think of it like this:

If you want to be able to climb mountains well, you need to stress the energy systems in the body, as well as the muscles, in ways that will help you be able to adapt and get stronger to the forces and energy demands that climbing places on you.

You cannot become a fast and strong climber riding only on the flats.

## 3 While You Recover- Gene Expression

This one is really complex, and we're only now beginning to understand it, but put simply, when you stress the body in specific ways, it will turn on your genes that will help you to respond as best as possible to the demands you're placing on the body.

# 4

## While You Sleep- Tissue Adaptations

The end of all these stages, will be your body going and building muscles and other tissues of the body so that they can be BETTER at dealing with the specific stresses and forces that you are putting on it.

These changes happen due to your training, and are also where the body improves its energy creation and use to be more efficient and economic.

**That's it!**

**With all of these different factors of energy creation and use in the body, combined with the 4 stages of response to training, is how YOU become faster, fitter, stronger, and more powerful as a cyclist.**

**But there is still one more thing we need to consider when it comes to getting the most out of our training. That is our posture, and how it can impact or change the effect exercise or training will have on us.**



## Importance of Posture in performance and injury prevention



One of the things that we often forget in sports, is that posture can tell us quite a lot about the abilities of the athlete (muscular imbalances, movement patterns they have adapted), as well as where they are on the fatigue spectrum.

As we have touched on already, having the endurance for the muscles to perform the task at hand is the baseline for performance. This is especially true when it comes to riding the bike, for as soon as your posture starts to change, your technique will suffer, zapping you of your power, as well as alerting your competition to your wariness.

**Keep in mind the 5 stages of strength training for success:**

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- 1** Anatomical Adaptation (Refine and groove movement patterns)
  - A.** Attain better movements at joints
  - B.** Learn/ Retrain appropriate movement patterns\*
- 2** Hypertrophy (Building cross sectional strength + stability)
- 3** Maximum Strength (Develop Strength in movement patterns)
- 4** Transfer to Sport (Develop Speed, Power, and if appropriate, Agility)
- 5** Maintenance (Develop Strength-endurance for movement patterns, maintain abilities)



\*The higher the level of the athlete, the more difficult this gets, because they have moved certain ways in order to get where they are.

Because these building blocks are not glorious, nor are they sexy, many books on strength training for endurance sports seem to neglect these. Especially the first 2 steps, take focus and attention to detail.

First and foremost, ENDURANCE athletes MUST have muscular endurance! This can be seen no more clearly than in cycling. As one rides more and more, they begin to consciously or subconsciously pick up subtle cues as to how the riders around them are feeling:

Shoulders rounded or elevated, hips wiggling a bit side to side, excessive lean on the handle bars, and becoming fidgety on the bike are all signs that someone's tiring, and the time to drop or attack, is here or quickly arriving.

One of the first things that I look for when I meet cyclists is their posture. How one carries oneself tells as much about their daily activities as their preferences for training. As I move through the movement screen with each athlete, it becomes more and more apparent to me how they ride their bike- what they may be strong at and what kind of terrain or rides in which they become fatigued the quickest- and this is all before we even get on the bike!

The exercises to help address these postural issues are difficult, and many, if not most athletes skip them due to frustration and how technically challenging they are, or due to not seeing any immediate results. It's frustrating how much this idea of instant gratification has infiltrated training. "Two weeks to lose five pounds" and "Thirty days to a sexy six-pack" have become staples of the fitness industry, and endurance athletes are no less guilty. "Twelve weeks to your fastest race", and "Couch to 5k" have become parts of our little world. While some may be thinking that these are no "instant" results, they are. Some of these plans actually do work, but they make it well known to the individual purchasing them from the get-go, that the fitness will be short-lived, and a longer term (6-12 month) program, is far better than the shortcut.

The approaches I have set forth in this book are NOT short term or fast return. While most everyone WILL see at least a slight return on their performance in as little as 4-6 weeks, the true power of the program comes after having stuck with it consistently for at least 16 weeks, if not a full calendar year.



# Breathing, at the heart of it all



Understanding HOW your training sessions will create the changes that you want to see so that you can ride strong is very important. The better you understand your body, even at a very basic level, the smarter you're going to be able to be when it comes to adjusting and changing your training program to keep you on track.

This basic understanding of how you plan and perform your training programs will lead to different changes in your movement patterns, your fitness, and in the end, your performance.

## Breathing and Recovery

While we often think about the muscles getting tired and limiting our abilities, nervous system fatigue actually has a far bigger and far more reaching impact on limiting our performance, as it affects the whole body, not just the used muscles.

Breathing is incredibly powerful, and can alone shift the body from a “fight or flight” state, into a “rest and recovery” state. You may think that in order for this to happen that we have to meditate or focus on our breathing for long periods of time, but the body is incredibly dynamic and responsive. In fact, we can see these shifts happen in a matter of seconds- if we do it properly.

The ability to shift the body from the fight or flight mode into rest and digest is significantly impacted by the position of the body, especially the spine. This is one of the areas where cycling actually gives us a fairly large advantage over other sports, as our positioning on the bike- and especially the TT bike, puts us into a position which helps us to recover quickly!

If you think back to high school when your gym teacher had you running sprints, what's the first position we take when we're completely winded? Hunched over with our hands on our knees. Trying to open up our upper back, so we can “breathe.” In fact, this position helps us drive better breathing patterns to help us turn on our parasympathetic “rest and digest” nervous system.



## Breathing and movement

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For many cyclists, neck, shoulder, and upper back pain, as well as hip and lower back pain and numbness and tingling in the hands and feet, are common occurrences. Either we ourselves have experienced it, or know someone who has. And while a large contributing factor to developing pain in these areas comes from poor strength balance at the joints, breathing patterns also play big roles!

Especially shoulder and hip position are significantly affected by our breathing patterns. Here's how:

When we inhale and exhale there are small, but significant, changes in the positions of different parts of the skeleton. When we inhale, our neck moves forward, the upper back extends up and back, while our lower back pushes forward, and our sacrum rotates down and forward.

When we exhale the opposite happens, the neck extends (moves back) the upper back moves down and forward, and the sacrum moves up and back.

Even though the movements are relatively small, they can have a huge impact on the shoulders and hips. This is because, and this is pretty interesting, is that we can get STUCK in either an inhalation or exhalation position. Over time this can lead to loss of the hips and shoulders to move through their full range of motion without pain or limitation.

While there is a lot more that we can dive into, let's stop here and summarize why breathing exercises and learning how to breathe properly is so important and must be included in your routine.



**To boil it down to 3 main points that you should keep in mind:**

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- 1** Breathing has an impact on the ability of the body to be efficient in its energy use and movement
- 2** Being able to breathe properly helps us move the axial skeleton through its full range of motion, which impacts joint positions- especially at the hip and shoulders
- 3** Improving how you breathe will allow you perform & recover better between efforts, and between sessions



## Breathwork in the strength training program

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Building breathwork into a strength training program is relatively simple, but as with anything, in order to have its intended impact they need to be done regularly with attention to detail.

There are a few breathing exercises which are simple, but not easy. Learning to breathe properly is an important task that can pay off in faster recovery and even in allowing you to produce more power on the bike. The following exercises are a few that I use here with new HVT athletes, as they learn how to breathe properly and begin to reset their bodies.

In order to get the most out of the breathing exercises we ideally want to be in a quiet place, where we can focus on slow, steady breaths, and getting air into the upper back, the sides and getting long, full, deep breaths

**Breathwork should be done early in the workout, either before soft tissue work or immediately after it. Performing breathwork at this point in the workouts serves 3 purposes:**

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- ⦿ Separates our workout from whatever else is going on in our day
- ⦿ Helps bring us into an improved status of homeostasis and balance on a mental and physiological level, allowing us to perform better
- ⦿ Allows us to use breathing to open up

**We don't need to spend a lot of time on the breathing exercises, usually we'll prescribe 1-2 sets of 4-6 breaths, that's it.**

**Breathing into postures - opening up closed areas and improving mobility**



## Sphynx Breathing

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Similar, but different than riding position  
Protraction of shoulders  
Breathing into mid back getting thoracic extension

Watch it here: <https://youtu.be/kwTmqUMu6Q>



## Crocodile Breathing

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Focusing on breathing evenly into sides, mid-back, and belly  
Feel flanks expand together, keeping shoulders relaxed

Watch it here: <https://youtu.be/pt6o70Napf4>



The thoracic spine actually is built to allow rotational movement in the sagittal plane (going up and out), while the sternum (breast bone) has more flexible cartilage, that allows the sternum to turn in the transverse plane, directing airflow from one side to the other. Meaning, if one side of your ribcage is tight, or rotates more to one side or the other, it will affect the shoulder joints, and hip joints.

**MOVEMENT QUALITY SHOULD NOT BE SACRIFICED FOR MOVEMENT SPEED WHEN FATIGUED.** Be aware of fatigue, what kind of habits you have when tired and redirect them into **BETTER** movement habits as you start to fatigue.

You'll learn about each of these breathing exercises in a later chapter, but for now just be aware that this is something that should be included in each strength training session's warmup.



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