

# PERFORMANCE CYCLING CONDITIONING

A NEWSLETTER DEDICATED TO IMPROVING CYCLISTS

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## Power in the Bubble Cheek™: What's Been Hiding in Plain Sight! Precision Form Training™ (PFT) for Power Development and for an Explosive Sprint Across the Finish Line!

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*Dr. Veera Kharé Asher, is the inventor of Precision Form Training™ (PFT), a new discovery in human performance for power development. With her unique background and expertise in strength and conditioning, as well as elite opera singing, she alternates between roles as a performance coach for both athletes and artists, a scientific researcher, phygital entrepreneur, and a Loyola Marymount University voice instructor.*

*Dr. Veera Asher is the only voice professional with a cumulative education or training with pre-medical studies in biochemistry from the University of British Columbia, a Doctor of Musical Arts degree in voice performance with published interdisciplinary dissertation from the University of Nevada Las Vegas, as well as her NSCA-CSCS and USAW1. In 2015 she was appointed to the National Faculty of the United States Sports Academy and is also a former Board member of the Positive Coaching Alliance-Los Angeles Chapter.*

*As the founder of KPERFORM™, Dr. Veera Asher's company very recently committed to developing performance optimization and injury prevention products targeted for 2019, including in-person trainer certifications, as well as digital products that can measure real-time performance parameters for assessment via smartphone or sensor-based technologies. Dr. Veera Asher is based in Marina Del Rey, California. She is grateful for the support from her fellow colleagues, coaches and scientists from Strength and Conditioning communities locally, nationally and internationally, for continued collaborations focusing on LTAD (long-term athletic development), military, medicine, health & wellness, elite athlete performance and sports team training.*



Dr. Veera Kharé Asher

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**T**o date there is no training protocol known, apart from Precision Form Training™ (PFT), that specifically prescribes Bubble Cheek™ exercises. Precision Form Training™ (PFT) is a specified neuromuscular recruitment pattern (i.e. muscle action sequence) that targets, with a nonnegotiable specified breath pattern, the proprioceptive system and neural feedback control loop, optimizing biomechanical parameters including dynamic joint stability for power development.

The Bubble Cheek™, as seen in the first photo of Tour de France cyclist Alberto Contador in 2007 and another of an athlete in a pack, is performed intuitively during explosive power movement. However, the Bubble Cheek™



is not limited to cycling.

The Bubble Cheek™ is also seen performed in other sports and athletic actions such as sprinting, batting in baseball, jumps in figure skating, javelin throwing, dunking in basketball and diving. The Bubble Cheek™ forced exhale, used intuitively by so many elite power athletes is the first external cue, that hints as to why it could be a hidden tool for improving rate of force development (RFD) or explosive power movements for all athletic levels. Here are some photos to further represent this concept.

This article will focus on (4) areas, as to why PFT initially uses the Bubble Cheek™ exhale and inhale when training for power development. The four areas will focus on the: breath, center, spine and vocal cords (inclusive of the glottis and larynx). Once the connection between the Bubble Cheek™ exhale and power is illustrated in this article also addressing joint performance, it will then be revealed how there is possibly something even better than the Bubble Cheek™ exhale, to recruit the closest to a maximum force production with speed, delivering maximum power (i.e. 1RM).



### Performance Target Goals of the Bubble Cheek™ for Power Development in Precision Form Training™ (PFT)



**Breathing Options:**  
FI=Forced Inspiratory (Inhale)  
FE=Forced Expiratory (Exhale)  
Sus: Suspended breathing between FI & FE  
GR=Grunt (Forced Exhale with Sound)  
VM=Valsalava Maneauver with open airway (i.e. open glottis)



PFT's Bubble Cheek™ exhale can be used as a baseline reference connecting the four areas of breath, performance of the proprioceptive system's neural feedback loop, spine, and glottis, thereby improving PFT's overall goals of **Focus**, **Center** and **Power** for an athlete [NOTE: see PFT Chart on Focus-Center-Power at end of article]. The PFT sequence once learned, can then become integrated into a sport or skilled movement via a Tai Chi (conscious) to Kung Fu (unconscious/automatic) training approach; thus, allowing for it to be activated during race day in performance-under-pressure situations. For example, in cycling, if the cyclist can activate PFT during a sprint (e.g. race across the finish line) they can optimize repetitive explosive power performance targeting increased speed, with the support of percussive breathing (i.e. faster rates of forced inspiratory and expiratory breath cycles), but without compromising smoothness of their pedal stroke by keeping core strength, and a stable posture due to functional joint performance. In my opinion, a complementary sport to cycling, would be boxing sessions (i.e. 'gloves on' mitt work) to simulate the 'mirror' activation of this neuromuscular sequencing. Boxing has similar breathing patterns to cycling, based on the demands of keeping a consistent cadence (i.e. pedalling rate).

For example, my boxing Coach Justin Radley, suggests that in boxing, “the hands are relaxed until you actually deliver the punch or strike. The power of the punch, supported by maximum efficiency in torque, is delivered by a coordinated movement between breath, core, posture and stance (i.e. foot position when shifting weight)”. In my experience with boxing, the nonstop ‘shoe shine’ combination with a 1-2 (i.e. jab and cross), is comparable to hand tension rates and transverse plane core performance with stable posture, to that of pedal strokes during powerful sprints in cycling. Strength and Conditioning Coach Matt Hank, MS, CSCS, USAW, in his experience with PFT suggests benefits for an athlete in that, “PFT helps to create optimal alignment which can directly enhance performance RFD (rate of force development). PFT in athletic posture helps to take slack out of the system. Joints are in correct position. Thus muscles/fascia are in the optimal length tension relationship, which would lead to improved performance in all athletic qualities – strength, power and speed.”



An initial PFT activation can be triggered with a Bubble Cheek™ exhale in a ready position (i.e. athletic stance). So, let's define Bubble Cheek™ in more familiar terms. It is a Valsalva Maneuver (VM), but with one major difference. The Bubble Cheek™ exhale uses VM with an open airway, or more technically, an open glottis. As a certified strength and conditioning specialist, the VM both closed glottis and open glottis is listed in our strength and conditioning literature, but I could not find anyone who specifically taught the open glottis version of the VM in training for maximum strength and power.

#### **Valsalva Maneuver:**

**Definition 1:** “Valsalva Maneuver described for decades in medical physiology literature as the voluntary increase in intrathoracic pressure by forcible exhalation against a closed glottis.”

From: <http://www.dtic.mil/dtic/tr/fulltext/u2/a283651.pdf>

NAVALAEROSPACE MEDICAL RESEARCH LABORATORY 51 HOVEY ROAD, PENSACOLA, FL 32508-1 046 AD-A283 651 NAMRL-1393 EFFECTS OF WEIGHT LIFTING ON INTRATHORACIC PRESSURES GENERATED BY ANTI-G STRAINING MANEUVERS L. G. Meyer, J. D. Grissett, and J. G. Lainberth

**Definition 2:** “ The rhythmic action of breathing may compromise spinal stability through the transient relaxation of the core muscles; this is why during performance of maximal lifts, breathing may transiently cease altogether with the Valsalva Maneuver, whereby lifters attempt to exhale against a closed airway. For healthy people without cardiovascular limitations such as high blood pressure, this maneuver can be advantageous by increasing intra-abdominal pressure and thus increasing the compressive forces between adjacent vertebrae to preserve spinal stability.

From: exclusive excerpt from the book *Developing the Core*, published by Human Kinetics.

<https://www.nsc.com/education/articles/kinetic-select/anatomical-core-neural-integration/>

Most of us have activated and experienced the Valsalva Maneuver (VM) with a closed glottis, to stabilize and protect our lumbar spine during heavy lifts. What we know is to breathe, hold the breath, close the airway and then lift. However, what if there was a way to move the breath through an open airway rather than holding it against a closed glottis, to get the same effect achieving a rigid torso for spine support, while also reducing risk to those with cardiovascular issues? Well the Bubble Cheek™ exhale, because it allows for an open airway with a VM type activation, is the first step towards learning more about this.

To understand why the open glottis or open airway is beneficial to a power athlete, one must be open to learning more about the larynx and its role related to the glottis and the vocal cords.

The Bubble Cheek™ exhale is a first external cue of an open glottis VM, but a grunt or voicing, that also necessitates an open airway for glottal performance during a powerful action, as observed in tennis, javelin, shot put and various martial arts, could then be that second cue hinting another action that could define new target goals to measure performance optimization during powerful movements. For purposes of this article, the neural feedback control loop and the proprioceptive system, because it is always activated (i.e. a human is not an inanimate object), does not allow any physical position to be considered static. Therefore, potential for a variety of dynamic movement is possible in an athletic stance or just standing or sitting, even if there are no major visible changes in the outer physical body. A good example is with elite and powerful singers, who seem to perform without much effort, and yet, there is a lot of dynamic movement internally. The importance of the open glottis with or without sound (i.e. nonphonatory approximation of the vocal cords) then introduces new external cues we can borrow from the voice performance discipline. We, as strength and conditioning specialists and sport coaches can look at high performance vocal athletes and their specified target goals, to discover new areas of potential to improve athletic performance for maximum strength and explosive power movements.

In voice training and voice science, there are several ways one can measure how the voice performs. However, in relation to strength and conditioning, it is important to understand that the power source for the vocal cords is air, via lung pressure, creating something called subglottal pressure (below the glottis/vocal cords). This subglottal pressure is coordinated by laryngeal and core musculature in order to manipulate the qualities of speech and singing. There are also ways



to approximate (i.e. shape) the vocal cords, to almost come together, but not make sound. This is where balance and coordination, via the stability and strength of the laryngeal and abdominal core muscles, stability and mobility of joints, are critical for optimized glottal control, agility and overall vocal power.

**The Bubble Cheek™ Exhale revealed! Why the Vocal Cords, even when not making sound, is important for Athletic Performance.**

The Bubble Cheek™ exhale is a version of the Valsalva Maneuver (VM) with an open airway, or more specifically, VM with an open glottis. The glottis sits in the larynx, which is also called the voice box. The shape of the glottis is determined by the vocal cords (i.e. vocal folds). The vocal cords are housed in the voice box, and the power source to the vocal cords is the air that you exhale. The stronger the forced exhaled air, the stronger the sound, and that sound is supported by lung pressure, or subglottal pressure. The laryngeal muscles of the larynx help to stabilize the vocal cords during an open airway with varying subglottal pressures so that they can perform phonatory (voicing) or nonphonatory functions efficiently. This is where grunting or voicing in a power movement could also be deemed a VM with open glottis but with phonation (i.e. sound). There is a level of precision needed in performance of the vocal cords and glottis, because as seen in the images of the larynx and vocal folds (i.e. vocal cords), the vocal folds are very tiny relative to the larynx, and thus the entire body. Their size alone, necessitates a need for an extra level of precision in training to optimize performance.

Sources: (1) [https://en.wikipedia.org/wiki/Laryngeal\\_ventricle](https://en.wikipedia.org/wiki/Laryngeal_ventricle)  
 (2) [https://en.wikipedia.org/wiki/Vocal\\_cords](https://en.wikipedia.org/wiki/Vocal_cords)

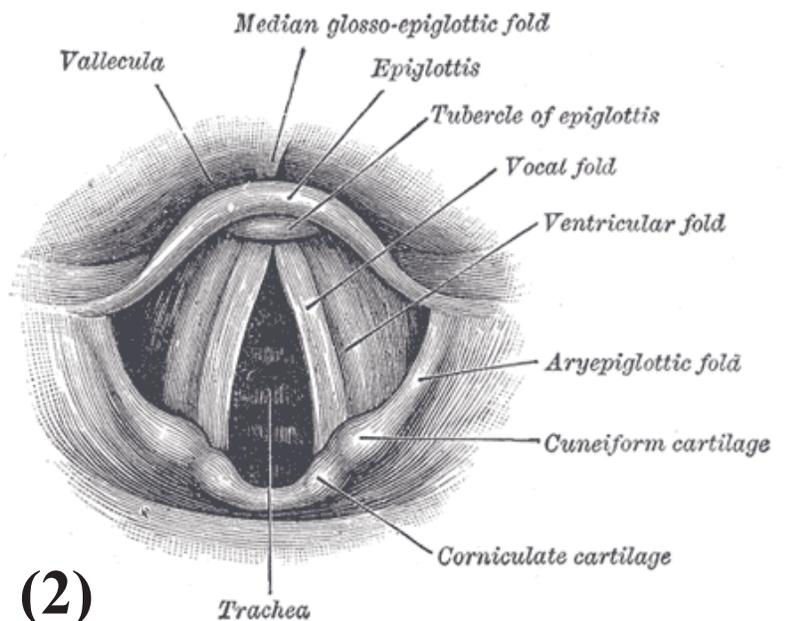
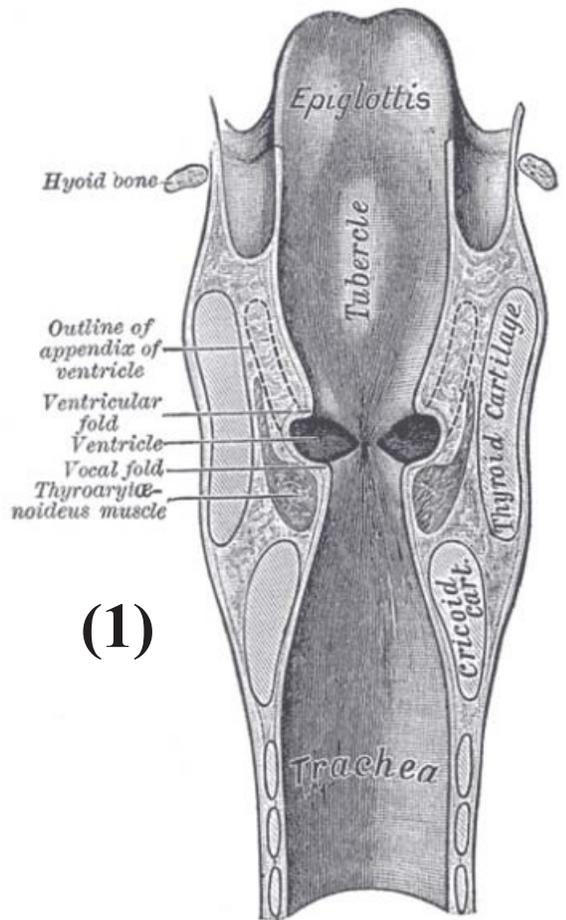
In order to have optimal subglottal pressure to approximate the glottis with an open airway for voicing on a forced expiratory breath, there is a complex but precise coordination that also needs to be optimized with intrathoracic (ITP) and intrabdominal pressures (IAP). This complex coordination is true during forced inspiratory breathing as well for optimal power development. The three coordinated internal pressures (i.e. subglottal, ITP and IAP) work together with optimized laryngeal, core and joint stability for advanced level voicing.

**Athletic Spine Performance™ (ASP):**

This complex whole-body coordination activates Athletic Spine Performance™ (ASP), a target goal in PFT. ASP is where the spine remains expanded like a loaded coiled spring with the potential of further loading during torque or transverse plane movements, at both the thoracic (i.e. T-Spine) or Cervical (C-Spine) levels. ASP allows for sustained length in the torso, with segmental stabilization of the entire vertebral column, on both the inhale and the exhale (or voicing) for single or repetitive (inclusive of percussive) breath cycles during performance of powerful movements. The Bubble Cheek™ forced inspiratory breath, a PFT skill, targets total lung capacity so that potentially all the ribs are affected thereby optimizing range of motion within the ribcage (i.e. the thoracic cage). Due to the connection between the ribs and the vertebral column, by keeping the ITP, IAP and subglottal pressures optimized, and with core strength and stability, the vertebral column is stabilized with the torso expanded (i.e. spinal column decompressed) even on the PFT forced exhale (including but not limited to a Bubble Cheek™ exhale).

**Center of Pressure (COP) as a measurement:**

Once a PFT muscle action sequence with the specified breath pattern is achieved targeting the proprioceptive system, center of pressure (COP) is also optimized. COP, that is, center of mass over base of support with a single point of ground reaction forces is never static because it is based on the proprioceptive system. [NOTE: see glossary for measurement details.] Therefore, an athlete's performance ready position that also has optimal COP will have balanced and dynamic movement characteristics internally activated with potential to improve reaction and response time as well.



## Joint Performance:

Precision Form Training™ targets to improve both ASP and COP by optimizing core and laryngeal stabilization and strength (trunk control). The result of that PFT activation results in a ‘suspended-like’ athlete, with dynamic joint stability for improved controlled movements, to the extent of fine motor control of fingers and toes. This is an ideal athletic state for a cyclist for both long distance and sprints where consistent stress on joints (depending on the power of the pedal stroke) related to hands, feet and hips or pelvis, can increase risk for numbness, usually experienced in fingers, feet and groin. With PFT activated, there is a reduced stress on the joints as measured with myopressure plate technology. It is represented as reduced pressure (measured in N/cm<sup>2</sup>) on the base of support in contact with the ground but keeping optimized



dynamic joint stability via COP with ASP, allowing for potential for maximum force production at faster speeds for improved explosive power. For cyclists, their base of support would have to be measured through points of contact with the wheels of the bike, as it is what is in contact with the ground. Thus, it is possible to measure the COP of the cyclist in position on the entire bike, but also measure COP focusing on a cyclist’s handlebars, pedal(s) or saddle position(s).

## Transverse Plane Movement and Torque in Explosive Power:

If an athlete needs to be in performance ready position, they will ideally access the PFT sequence, allowing for lengthened torso with segmental stabilization of the spine (i.e. ASP), optimized center of pressure (COP), and forced breathing with an open airway, ready to activate during performance-under-pressure an explosive power movement or maximum strength. Since Athletic Spine Performance™ (ASP) is a parameter of PFT, then isolation of the head, shoulder girdle and pelvic girdle is possible, while keeping a stable and strong center due to that expanded loaded coiled spring-like vertebral column. The movement is further supported by joint stability and mobility, and abdominal core strength, powered by the forced expiratory musculature, also responsible for transverse plane movement. Thus, the transverse plane, even in sagittal or frontal movements, is always ready to react or respond when PFT is activated. The athlete keeping a lengthened torso during a full PFT breath cycle, allows for better isolation of the pelvic girdle, the shoulder girdle and head, leading to a more optimal unrestricted rotation. Rotation, somewhat subtle in cycling, is a part of every pedal stroke, but more integral to timed and synced torqued movements on an explosive power action during each pedal stroke in a sprint. This is true for grounded, suspended or midair power actions. A primary benefit of preparing in what may be a visibly static stance, is an internally dynamic ready position with PFT so that explosive power or maximum strength can be performed in any plane without any extra delay to reaction time or feedforward response. A further benefit of the reduced head movement, especially in cycling posture with hands on the handlebars, is better eye tracking.

## The “Silent Grunt”: Alternative to the Bubble Cheeks™

If an athlete were to activate PFT at its elite level for explosive repetitive power, but wishes to stay silent, there is an option for the vocal cords to approximate similarly to a voicing posture, while not actually needing to make sound (i.e. the “silent grunt”). The ability to posture the vocal cords with the articulators (i.e. primarily the tongue and jaw position) to mimic voicing but not make sound, necessitates for a more advanced recruitment of musculature than the Bubble Cheek™ exhale due to a need for more overall stability, strength and power to facilitate the increased subglottal, ITP, and IAP pressures. A progression of this, can be seen in images of elite athletes with their tongues sticking out of their mouths. One of the best basketball players of all time, legend Michael Jordan was known for sticking his tongue while playing.

The Bubble Cheek™ exhale is a more closed mouth option, in contrast to forcefully ‘sticking out’ the tongue, due to the lips being used as resistance approximating for optimal jaw and tongue position. Although the resistance by the lips on the Bubble Cheek™ exhale is helpful to support subglottal pressure, it can also limit potential for breath speed and velocity on the exhale during an explosive movement, as well as on the inhale for a repetitive power performance, and thus limits RFD. Although there may be limitations with the Bubble Cheek™, the tongue example is not recommended due to possible injury to the tongue during play or practice. The photos below, however, are examples of how it can prevent one from clenching their teeth, and thereby reducing added joint stress to the jaw hinge (i.e. the temporomandibular joint). The best option for explosive power training is to keep the tongue in the mouth, but to progress from the Bubble Cheek™ exhale to the advanced skill of a silent vocal cord/glottis approximation using PFT, ideally with an open mouth, where benefits of breath, center (core) and spine (ASP) performance can still be optimized.

## Final Summary, Comments and Exercises:

Precision Form Training™ (PFT) always starts the athlete with a specified Bubble Cheek™ breathing pattern, matched with the nonnegotiable neuromuscular recruitment pattern. PFT focuses on new considerations inclusive of performance of vocal cord approximation (i.e. glottis) to optimize the neural feedback system and Athletic Spine Performance™ (ASP) during explosive power movements, thereby improving the neural feedforward system for overall human performance optimization and injury prevention. PFT can be integrated and activated during traditional strength and conditioning programs. Precision Form Training™ (PFT) not only addresses the sympathetic mode in performance-under-pressure, but there is also a reversed PFT sequence that targets the parasympathetic mode for down regulation back to rest. Overall, PFT for performance-under-pressure, targets the proprioceptive

system, center of pressure (COP), Athletic Spine Performance™ (ASP), the use of breath perturbations for core strength and stamina anaerobic conditioning, and the importance of eye focus, laryngeal stabilization and dynamic joint stability.

Since the vocal cords are so tiny in proportion to the rest of the body, the level of precision based on their performance, whether with sound or just approximating for sound, allows coaches to consider new biomechanical and optional auditory cues, to assess for potential ways for optimizing explosive power or maximizing strength in specified movements. The Bubble Cheek™ exhale was our first cue, the second is the grunt, but I conclude and reiterate, that the option of a forced expiratory breath allowing for approximation of the vocal cords and glottis in a 'silent grunt' formation (with tongue inside the mouth) during an explosive power movement should be the goal.



### **Power in the Bubble Cheek™ Exercises: (standing, sitting or in a cycling position on the bike)**

**(1) Set-Up the Power:** Bubble your cheeks and see if you can breathe in and out through your nose, keeping the bubble in the cheeks and without letting the chest fall/collapse.

**(2) Activate the Power:** Bubble your cheeks then breathe in through your nose as far as you can go. Then keeping the bubbled cheeks on the exhale, allow the force of the exhale to unseal the lips slightly so that air exits via the mouth and not the nose, all while keeping the pressure in the bubbled cheeks and staying lengthened (i.e. tall).

**(3) Progress the Power:** Bubble your cheeks and then breathe in (through the nose), then during the Bubble Cheek™ exhale when you force the exhale through the lips that unseal due to the force, try to also make sound. The air while making the sound will exit through the lips and not the nose. Once you start to make sound, consistently get louder, or accelerate the air of the exhale, all while staying lengthened (i.e. tall).

**(4) Skill Exercise for Cycling:** Bubble your cheeks and then breathe in (through the nose). Then during the Bubble Cheek™ exhale when you force the exhale through the lips that unseal due to the force, just before making sound, start pedaling with an even cadence. Once you start to make sound, consistently get louder, or accelerate the air of the exhale, all while staying lengthened (i.e. tall) and in keeping with the same cadence. Repeat at least three times (i.e. 3 breath cycles).

### **(5) Skill Exercise in Preparation for Sprints in Cycling: Percussive Breath with Explosive Pedal Stroke**

Bubble your cheeks and then breathe in (through the nose). Then at the same time as the Bubble Cheek™ exhale when you force the exhale through the lips while also making sound, try to give a maximum effort on a one pedal stroke during that exhale, but with staying tall and not collapsing the chest (i.e. don't blow out any excess air that may still be in the lungs at the end of your powerful exhale). Quickly recover with a Bubble Cheek™ inhale. Repeat cycle three to five times without break. Eventually you will be able to speed up this process at the rate of the cadence necessary for optimized sprints during race day.

**NOTE:** All exercises can be done three to five times in sequence, ensuring good form. Stop if any pain or fatigue.

**MEASUREMENT TOOL:** A sophisticated device called the [LEOMO Type-R](#) could be used as a tool for a cyclist to get real-time assessment of MPIs (Motion Performance Indicator) via smart sensors and advanced analytics. A cyclist with optimized parameters of PFT, including but not limited to ASP and COP with timed and synced torque movements, could test the target goals of reduced or minimal pelvic lateral rotation, torso rotation and foot angular range during each pedal stroke in an explosive power sprint. 

**More Information Please!** Contact/Follow DR. Veera at [DrVeera@KPerform.com](mailto:DrVeera@KPerform.com)

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Youtube: [Activate Your Brave](#)

*Matt Hank, Head of Strength and Conditioning for KPERFORM™*

### **Glossary:**

**Proprioceptive System:** Neural feedback control system. Neuromuscular system based on neurophysiology of proprioception and CNS (Central Nervous System) (i.e. Proprioceptive feedback loop).

**COP (center of pressure):** Center of mass over base of support represented by a single point of cumulative ground reaction forces on that base in a moment of time. [NOTE: A measurement that focuses on the proprioceptive system taken over a period of time, ideally with myopressure plate technology, includes the distance traveled between all single point values as COP path length (mm), represented in a confidence ellipse area (mm<sup>2</sup>) and inclusive of COP average velocity (mm/sec).

**Precision Form Training™ (PFT):** a specified muscle action sequence (i.e. neuromuscular recruitment pattern) with non-negotiable breath pattern that targets performance of proprioceptive system. Measured by, including but not limited to, center of pressure (COP),

Athletic Spine Performance™ (ASP) and performance of the larynx, vocal cords and glottis with an open airway.

**Athletic Spine Performance™ (ASP):** a target goal in PFT, where the torso is lengthened with segmental stabilization of the spine (i.e. intervertebral expansion with optimal performance of the spine's passive, active and neural systems) on the forced inspiratory breath and sustained on a forced expiratory breath (keeping that spine length inclusive of core stability and strength) with open airway, during any movement including voicing.

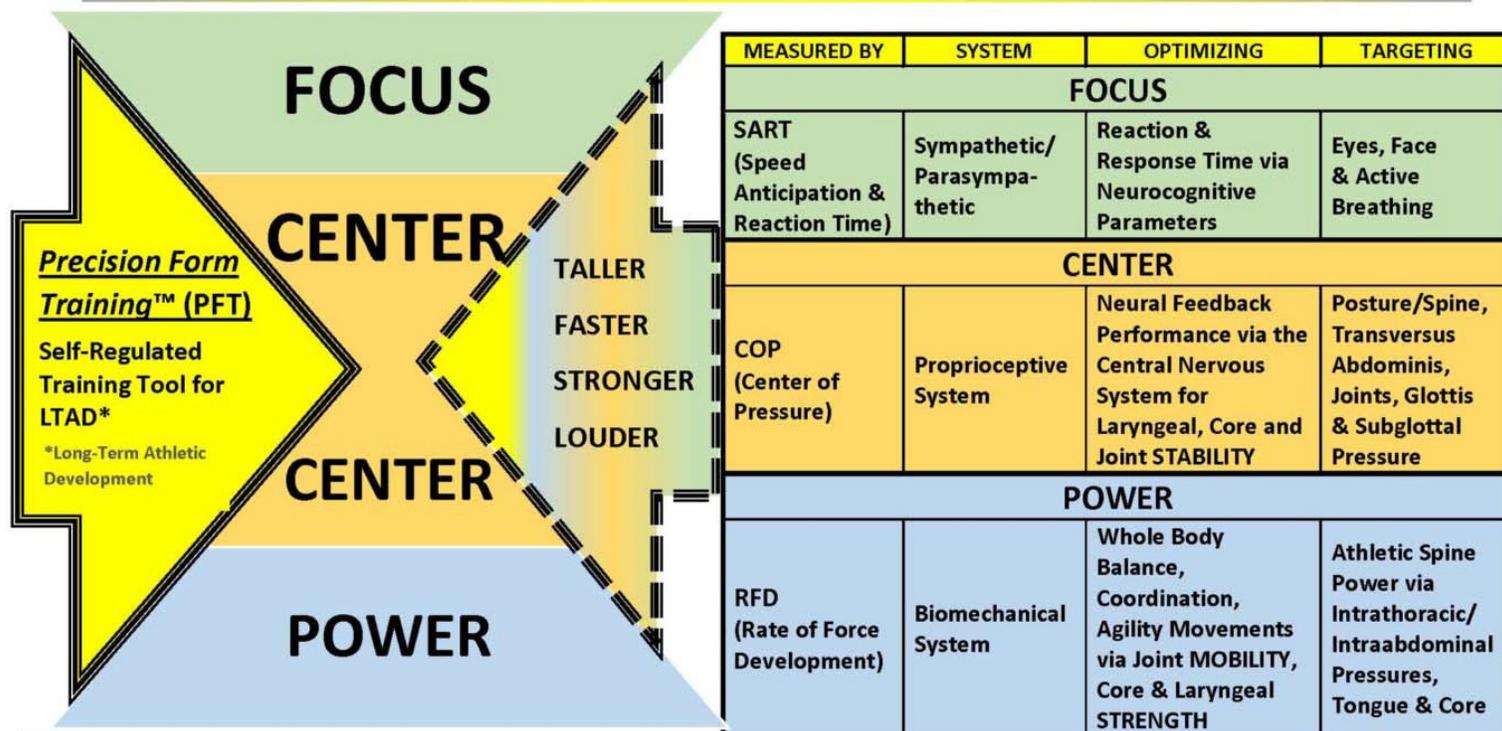
**Bubble Cheek™:** an introductory exercise in PFT where the cheeks are filled with air and the pressure is kept in the cheeks during all forms of breathing inclusive of a forced, held or suspended breath. An open airway at all times should be prioritized.

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