

EXAMINING PROGRESSION/REGRESSION PATHWAYS FOR STRENGTH TRAINING

Danny Foley- MS, CSCS,D*

Head Strength Coach

Virginia High Performance



COACHING:

- Dynamic & interactive
- Malleable
- Critical thinking
- Problem solving
- Athlete driven
- Solutions based



Everything effects everything.

**1.) Strength/performance training
is perpetually dynamic**

-Constant process of observe/
analyze/ modify

-Variation \neq chaos or
randomized

**-Goal is simple: *challenge
then facilitate***



**2.) Applications are variable,
and should remain thoughtful**

- Specificity for addressing individual differences
- General for increasing/
decreasing demand
- Think dimmers not switches
(evolutions should be gradient)



CENTRAL NERVOUS SYSTEM

3.) Creating layers in our training

-CNS is like a river...

**Increase ability to tolerate variability*

-Requires coach-athlete communication & trust

-Constant refinery process

**There is no finish line*



REGRESSION OPTIONS : PROGRESSION OPTIONS

EXTERNAL LOAD

Subtract Weight

Add Weight



BREATHING

- Belly/Positional
 - Teach proper breathing mechanics
- Nasal Only
 - Improve HRV
- Hypoxic
 - Improve CO2 tolerance
- Valsalva
 - Creating intra-abdominal pressure

TEMPOS

- Eccentric
 - Slowed for control and practice
- Isometric
 - Used as biofeedback to teach/introduce position
- Eccentric
 - Overload/ Supramax
- Isometric
 - Heavy positional
- Reactive/Plyometric
 - Dynamic Strength
- Pulsing
 - Used as means for neuromuscular facilitation

POSITION

- Partial
 - Used to bypass pain or damaged areas while still receiving strength benefits
- Hand Supported
 - Used to increase contact stability
- 1/2 Kneeling
 - Less variables to manage
 - Emphasize core stability
- Split
 - Introduce frontal stability
 - Kickstand- slightly reflects more "athletic" position
- Unilateral
 - Introduce transverse mechanics/stability
- Partial
 - Used to either overload a movement pattern or attack specific weaknesses
- Offset
 - Introduce new vectors

ACCOMMODATING RESISTANCE

- Biofeedback
 - Used as learning (kinesthetic) tool for teaching/improving movements
- Band Assisted
 - Used as a means for unloading bodyweight to achieve full ROM.
- Chain Resisted
 - Used as overload means
- Band Resisted
 - Used as end-range overload (eccentric velocity)
- Band Overspeed
 - Used as a means to unload mass to move faster than naturally able
- Band Chaos
 - Used as a means to facilitate proprioceptive & neural

The Base of Our Discussion...

-Progressing exercise goes well beyond *adding 5 or 10 lbs.*

-Consider the athlete (i.e. individual deficits, weaknesses, sport/life demands) and how certain variations benefit

-Optimizing sport performance has several variables. Pure linear strength is just one of them.

****DON'T EMPHASIZE PROBLEMS, FIND SOLUTIONS**

DON'T PUT YOURSELF IN A BOX!

WE **MUST** CONTINUE TO WORK BEYOND
SETS/REPS/LOAD!

Adding/reducing external load

- Perfectly appropriate for young or novice athletes (<1 yr. training history)
- Minimally effective as training age increases (aside from main lifts)
- Consider the dynamics of sport, external load is only one of several variables needed.



Breathing

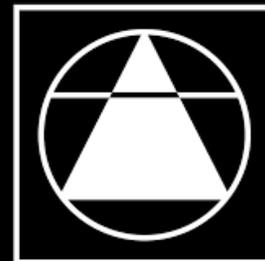
-Likely the most underappreciated training variable

-Very much a trainable skill. Various ways to apply, each having their own benefit

-Build into warm-ups, add to lift/conditioning

BREATHING

- **Belly/Positional**
 - Teach proper breathing mechanics
- **Nasal Only**
 - Improve HRV
- **Hypoxic**
 - Improve CO2 tolerance
- **Valsalva**
 - Creating intra-abdominal pressure



ART OF BREATH

Rob Wilson/Bryan McKenzie

IG: @preparetoperform

Belly Breathing

- Has gotten a bit of a bad wrap in recent years... Disproportionately IMO
- We must consider biological equilibriums. Both training and resting states.
- Your ability to recover (think like a skill) is a direct influence on your ability to perform.

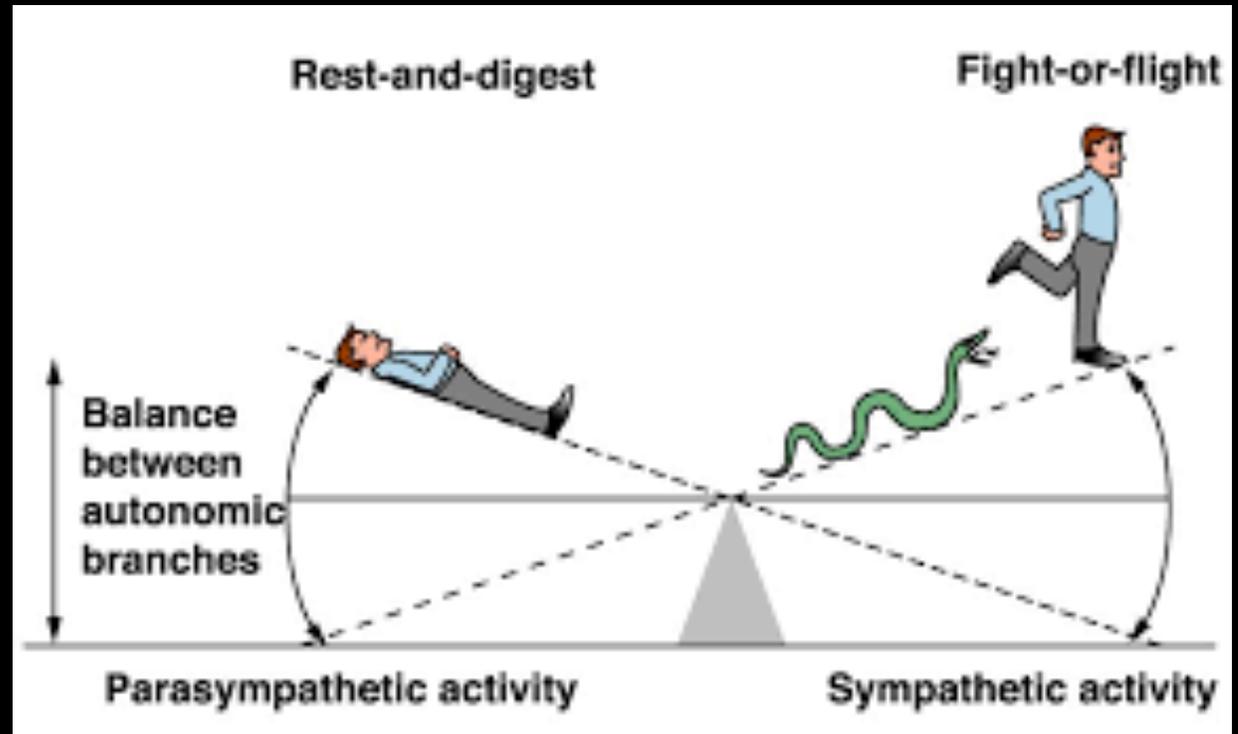
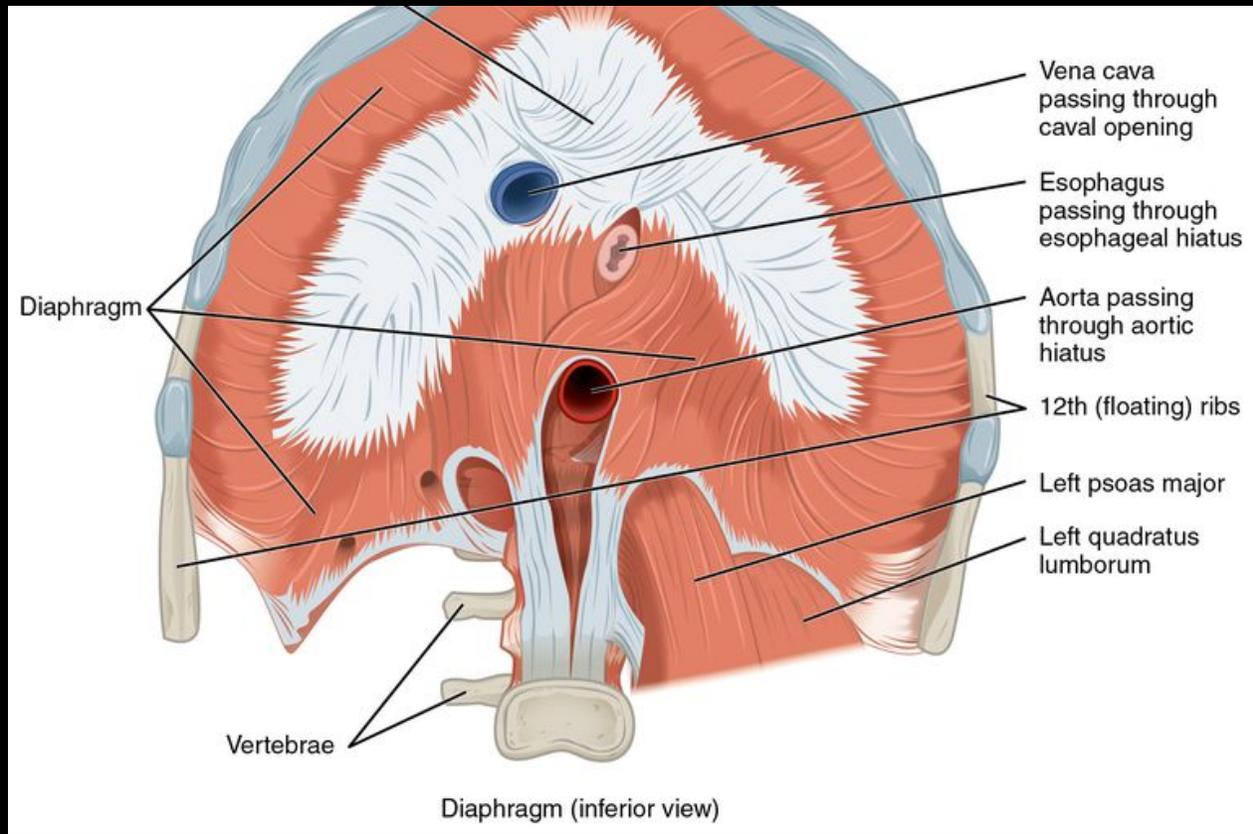


Image via: [Medium.com](https://medium.com/@knelson) (Kate Nelson)



DIAPHRAGM = PRIMARY BREATHING MUSCLE

OXYGEN UPTAKE = MUSCLES ABILITY TO WORK

Nasal & Hypoxic Breathing

-Nasal breathing: Improved HRV and aerobic efficiency

-Hypoxic breathing: Improved tolerance to CO2 accumulation

-Increased training focus/engagement... (*biorhythm?*)

Heart Rate Variability (HRV) In Sport: What It Is And How It Works

What Heart Rate Variability (HRV) Measures

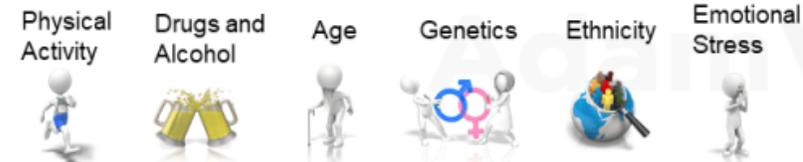
Heart Rate Variability (HRV) is the measure of variance in time intervals between successive heartbeats (i.e. cardiac cycles; R-R intervals)



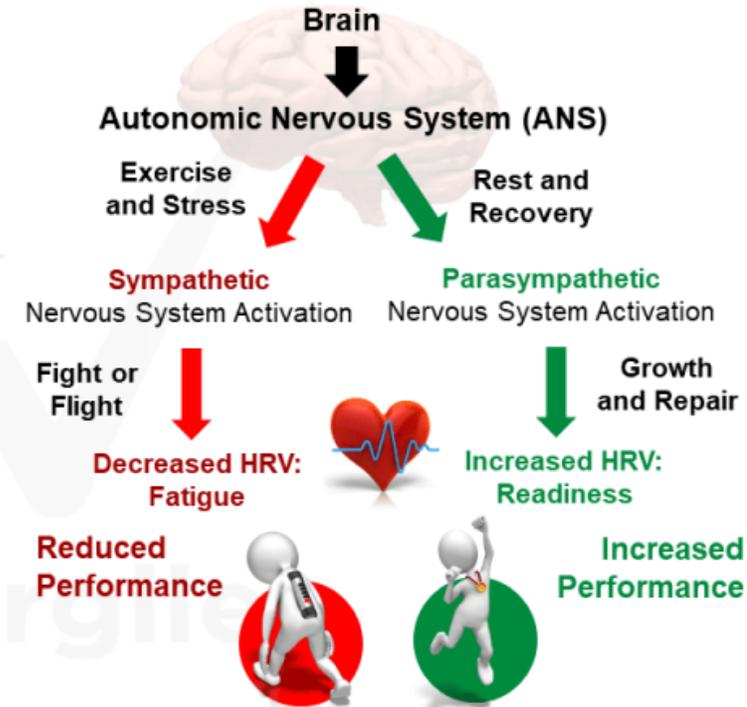
Use Of HRV To Monitor Athlete Training Stress

Heart Rate Variability (HRV) is a valid and reliable predictor of Autonomic Nervous System (ANS) function, which controls the sympathetic-parasympathetic balance of the body. This balance is altered in response to training stress; HRV could, potentially, be used to better understand the training adaptation and maladaptation in response to training stress

A Few Factors that Impact HRV Response Include



How Heart Rate Variability (HRV) Works



Created by Adam Virgile
adamvirgile.com

Social Media @AdamVirgile @AVSportSci



Graphic References

Fatissou, J., Oswald, V. and Lalonde, F., 2016. Influence diagram of physiological and environmental factors affecting heart rate variability: an extended literature overview. *Heart International*, 11(1), pp.heartint-5000232.

Image via: Arizona Chiro Neurological Center (credit Adam Virgile)

Tempos

- Likely the most overlooked training variable
- Can be used both as a progressive and regressive measure (most only consider the progression side)
 - Applies for both novice & advanced athletes
- Should be a mainstay in most programming

TEMPOS

- Eccentric
 - Slowed for control and practice
- Isometric
 - Used as biofeedback to teach/ introduce position



- Eccentric
 - Overload/ Supramax
- Isometric
 - Heavy positional
- Reactive/Plyometric
 - Dynamic Strength
- Pulsing
 - Used as means for neuromuscular facilitation

- 1.) BW Split Squat- EE
- 2.) TRX Row- EE
- 3.) Hip IR- IE
- 4.) Spring Ankle

- 1.) Safety Bar SS- EE
- 2.) DB Incline Press- IE
- 3.) Dynamic Hex
- 4.) Pulsing Push-Up

Playing with neurology

BENEFITS OF ECCENTRIC TRAINING	BENEFITS OF ISOMETRIC TRAINING
Increased stimulus to muscle fibers resulting in increased biological adaptations	Increased motor unit recruitment, which is the number of muscle fibers that fire during muscular contraction
Helps to remodel muscle and tissue (consideration for rehabilitative-based training)	Also increased/improved rate coding, which is the speed at which muscle fibers are recruited (results in increased muscular tension)
Improved neuromuscular synchronization of the afferent/efferent neural pathways, while desensitizing GTO inhibition.	Change in muscle fascicle length; once adequate muscular strength has been achieved
Able to tolerate greater force, while also expending less metabolic energy	Joint-angle specific training can potentially augment more specific neural adaptations
Stressing muscle fibers and tendons with slow, concentrated movements is essential for deceleration mechanics	Where eccentrics improve force absorption, isometrics now improve athlete's ability to withstand greater forces
Accentuated tissue remodeling due to forceful tearing of myosin heads	Increases stretching of tendons, which maximizes the stretch-shortening cycle

Muscle Sensory Receptors (Proprioceptors)

Image via: [Medium.com](#) (Kate Nelson)

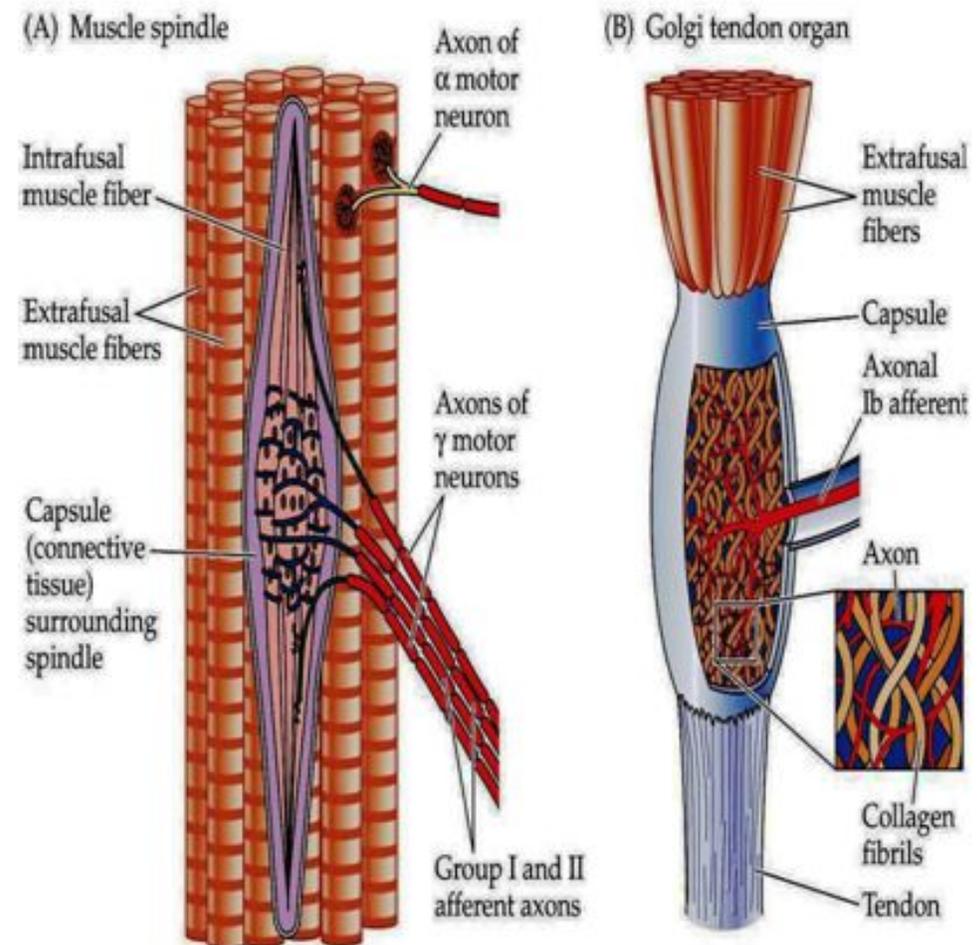
Proprioceptors provide information about the position of body parts

▶ Muscle spindle

- Response to stretch
 - Within muscle fibers as **intrafusal fiber**
 - Autonomic with **gamma motor neurons**

▶ Golgi tendon organ

- Muscle tension especially during isometric
 - Relaxation reflex – protective



Positional

- Everyone has weaknesses, our job is to find and address them
- The best athletes are usually the best compensators
- Always consider the relation to sport/duty

POSITION

- **Partials**
 - Used to bypass pain or damaged areas while still receiving strength benefits
- **Hand Supported**
 - Used to increase contact stability
- **1/2 Kneeling**
 - Less variables to manage
 - Emphasize core stability
- **Split**
 - Introduce frontal stability
 - Kickstand- slightly reflects more "athletic" position
- **Unilateral**
 - Introduce transverse mechanics/stability
- **Partials**
 - Used to either overload a movement pattern or attack specific weaknesses
- **Offset**
 - Introduce new vectors



- 1.) Block Bench
- 2.) Hand Support SL RDL
- 3.) 1/2 Kneel OH Press

- 1.) OHP from Split
- 2.) Unilateral FFE SS
- 3.) Cycle Squat
- 4.) Kickstand Zercher GM
- 5.) Offset Bent Row

Position Considerations

-1/2 Kneel used as preliminary position or by demand

-Get athletes out of bilateral position if and when possible

-Get athletes on one leg as soon as you can and in several ways

Position	Focus	Notes
1/2 kneel	<ul style="list-style-type: none"> -Increased contact stability -Neutralizes pelvis -Biofeedback 	<ul style="list-style-type: none"> -Largely beneficial for young, injured, and novice athletes -Can be used to isolate specific muscle group (i.e. taking core/legs out of equation for OHP)
Tall kneel	<ul style="list-style-type: none"> -Progression from 1/2 keel (decrease A-P stability) -Anterior core emphasis 	<ul style="list-style-type: none"> -Least commonly used position for me -Accentuates anterior core
Bilateral	<ul style="list-style-type: none"> -Traditional starting ground for most movements -May not be as favorable for some as we've long thought 	<ul style="list-style-type: none"> -Bilateral needs to be earned in my book. Frankly have grown away from bilateral for most athletes. -Have begun to use this more as a progression from split stance
Split	<ul style="list-style-type: none"> -Arguably more functional position to work from for athletes -Puts pelvis in neutral position -Independent hip action 	<ul style="list-style-type: none"> -Significantly favorable for those with poor lumbopelvic control/mechanics -Love the effects at foot/ankle, feel like most athletes can move more naturally from split
Kickstand	<ul style="list-style-type: none"> -Slightly more reflective of athletic positions -Similar observed benefits to split stance 	<ul style="list-style-type: none"> -Something I've added more of recently, still finding applications -Great for foot, ankle, hips and hamstrings -Highly beneficial for athletes
Single Leg	<ul style="list-style-type: none"> -Triplanar strength/stability -Unilateral hip action -Foot and deep core activation 	<ul style="list-style-type: none"> -Although SL work is technically a late progression, I try getting every athlete on one leg as soon as I can -So much benefit from SL proficiency -Absolutely transfers to B/L and split positions

Accommodating Resistance

- Bands are the most versatile piece of equipment in the gym
- Optimize tissue loading while deemphasizing joint loading (anecdotal, but I feel strong on this)
- Biofeedback and precise vectors
→ Exceptionally beneficial for athletes coming off injury

ACCOMMODATING RESISTANCE

- **Biofeedback**
 - Used as learning (kinesthetic) tool for teaching/improving movements
- **Band Assisted**
 - Used as a means for unloading bodyweight to achieve full ROM.
- **Chain Resisted**
 - Used as overload means
- **Band Resisted**
 - Used as end-range overload (eccentric velocity)
- **Band Overspeed**
 - Used as a means to unload mass to move faster than naturally able
- **Band Chaos**
 - Used as a means to facilitate proprioceptive & neural



- 1.) Farmers w/ Band Pull
- 2.) RNT Split Squat
- 3.) Band Unload Squat
- 4.) Band Unload Hinge

- 1.) Floor Press w/ Chain
- 2.) Band Front Squat
- 3.) Plyo Push-Up (OS)
- 4.) Hamstring Tantrums

Accommodating Resistance

-Bands for everyone

-Chains for most

-Unload movement patterns

Position	Focus	Notes
Band Assist	<ul style="list-style-type: none"> -Allows for complete ROM/POM without pain/discomfort -Learning new movement patterns -Athletes coming off injury 	<ul style="list-style-type: none"> -Largely beneficial for young, injured, and novice athletes -Great biofeedback tool that allows athlete to feel new movements with self guided adjustments
Band Unload	<ul style="list-style-type: none"> -Promotes overload/overspeed effect by reducing external mass -Acclimate to heavier loads and faster velocities 	<ul style="list-style-type: none"> -Should be reserved for experienced athletes who have developed sound foundational strength base -Used periodically throughout training calendar
Band Load	<ul style="list-style-type: none"> -Optimize muscular load/de-emphasize joint load -More evenly distributed external resistance 	<ul style="list-style-type: none"> -Dynamic moment arm, providing joints with more advantageous lever -Less movement constraints, allows athlete to seek optimal movement strategy
Band Chaos	<ul style="list-style-type: none"> -Idea is to create demand for getting muscles to turn OFF (autonomic inhibition) -True speed effect, elucidating neurology -Emphasizes fascial properties?? 	<ul style="list-style-type: none"> -Definitely should be reserved for athletes with robust training history -Dynamic variability between reps may provide better assimilation to sport and unplanned movements/actions
Band Offset	<ul style="list-style-type: none"> -Designed to emphasize core and secondary muscles -Creates nuanced stimulus requiring conscious movement strategies 	<ul style="list-style-type: none"> -Not a commonly practiced method but something I've personally had a lot of success with -Used mostly as an intermediate progression between increasing external loading -Creative way to provide unilateral stimulus
Chains	<ul style="list-style-type: none"> -Conventional applications have been well documented -Pragmatic for athletes with nagging joint injuries like tendonitis/arthritis 	<ul style="list-style-type: none"> -Used mostly as an intermediate progression for athletes who lack foundational strength -Also highly beneficial for athletes who have difficulties achieving full ROM

Training Applications

-Very little is done “just because”. We need to apply logic and reason for our selections.

-Tempos are a great equalizer.

-If you haven't yet, read *Triphasic Training* from Cal Dietz

ISOMETRICS

Early/Novice

- Motor skill & coordination
- Introductory to new ROM/POM
- Foundational development

Intermediate

- Positional strength
- Positional stability
- Time under tension (TUT)

Advanced

- Motor unit recruitment
- Improve tendon plasticity
- Increase fascicle length

ECCENTRICS

Early/novice

- Motor control
- Proprioceptive alertness
- Skill/task acquisition

Intermediate

- Tissue remodeling
- Positional overload
- Hypertrophy effect

Advanced

- Improve ability to tolerate force
- Neuromuscular synchronization
- Accentuated tissue remodeling (myosin heads)

Implementation

- Know your audience/ athletes. Find ways to bolster the time.
- Everything is fluid. Good, bad, or otherwise we are always flexible.
 - Never assume we've "peaked". Find something to improve.

Warm-Up

- Challenge known weak positions
- Exaggerate movement speeds to stimulate CNS
- Direct & oppose major muscles/movements for that day

Primary Work

- Variety of applications:
 - Dropdown sets
 - Secondary block
 - Directly to primary lifts

Accessory Work*

- This is where the magic happens
- Redundant single joint/simple movements have decreasing return as training age increases
- Consider the variation in sport, connect the dots

Sample Program:

Weeks	Focus	Volume	Intensity	Tempo	Load
1-3	STR-END	x12	@65%	3 sec- combo	Mixed (non-specific)
		x10	@70%	4 sec- combo	
		x8	@75%	5 sec- combo	
4-6	HYPER	x10	@75%	3 sec- EE	Bands (25-45%)
		x8	@80%	4 sec- EE	
		x6	@85%	5 sec- EE	
7-9	MUSC-STR	x8	@80%	3 sec- IE	Chains (15-25%)
		x6	@85%	4 sec- IE	
		x4	@90%	5 sec- IE	

Bringing it all together...

- Establish basic/starting strength by developing proficiency with foundational movements
- Once established, look to layer.
- Don't be hesitant to rely on regression models.
- Don't holster athlete by conducting myopic or bland training

Warm-Up Protocols

- Spring Ankle Series (via Cal)
- Tempo Lunge
- Hand-Release Push-Ups
- KB SA Hypoxic March
- 5-min. Bike @ 60-80 rpm (Nasal only)
- SL Glute ISO