Training for Optimal Power Development

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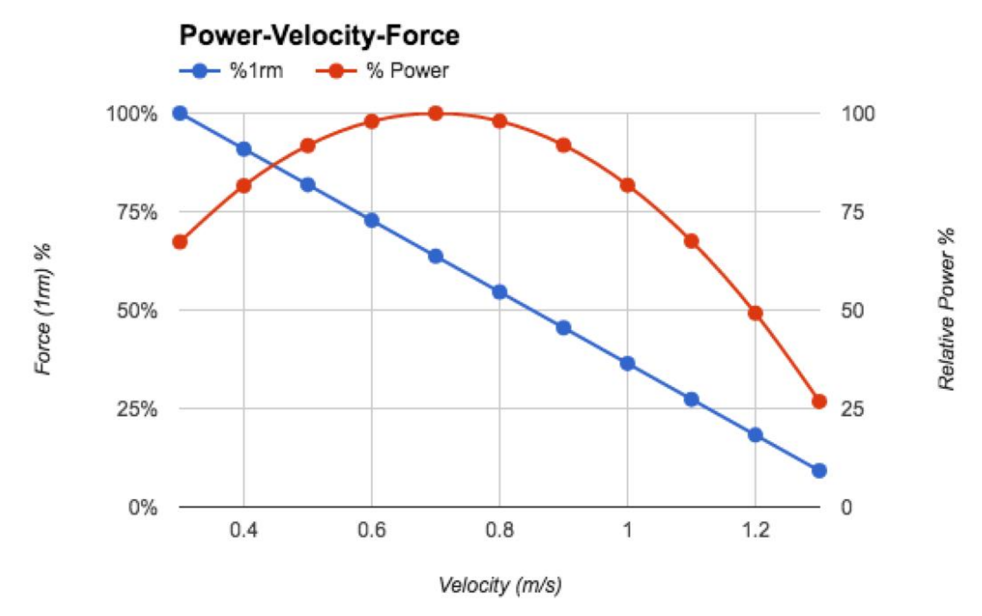
Overview

- Introduction to power aspects
- Pre-cursors to power availability
- Maximal intent
- Creating high levels of readiness
- Optimal loading
- Quality training
    - Maintaining velocity/minimizing fatigue
- RFD/RFA/transfer of training
- Athlete individualization

Introduction to Power

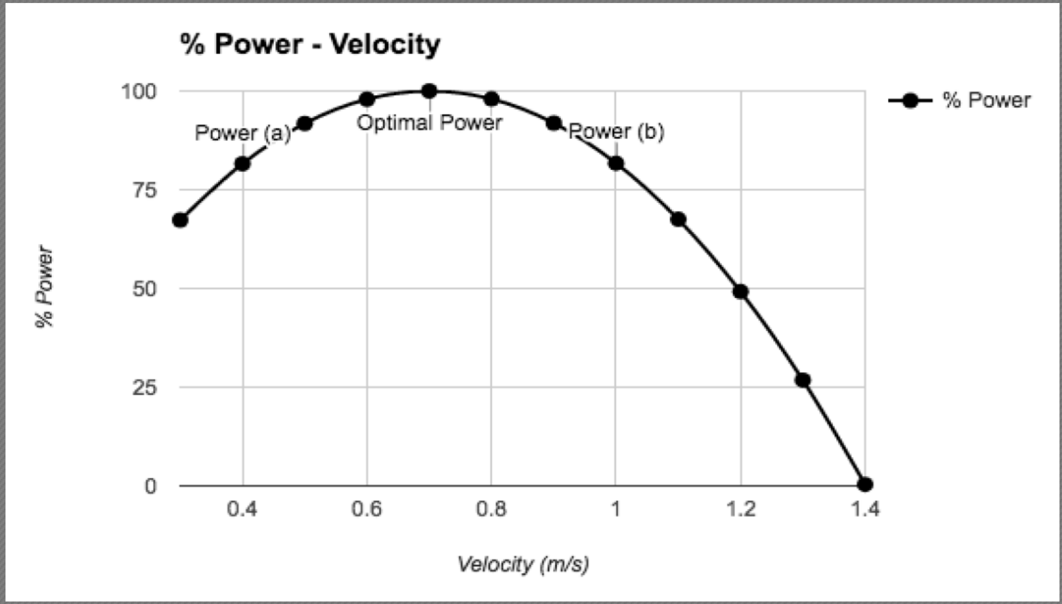
- Power = Force * Velocity
  - Force-Velocity Curve (blue) is linear
  - Power (red) is maximized with both force and velocity
- Primary goal of performance coach is to create “power” in competitive event
  - Transfer of training key
  - Strong athletes in weight room, but not on field are not successful
    - Goal is usable strength



Introduction to Power

- Same power can be realized in different methods
  - Power (a) = FORCE x velocity
  - Power (b) = force x VELOCITY
  - Optimal Power = FORCE x VELOCITY

- Must understand goal of programming
  - "Keep the goal the goal"
  - Not only power, but how that power was achieved in training

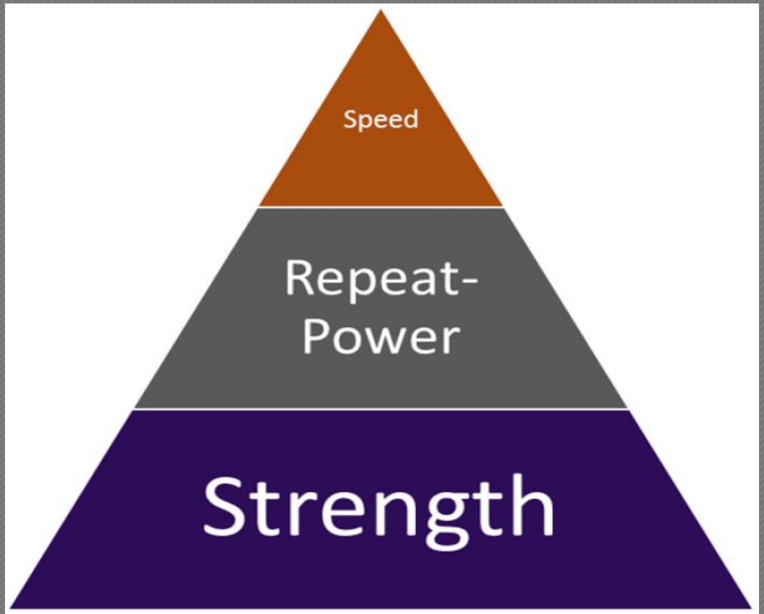


Pre-Cursors to Power Availability

- Prior to creating power, must have certain qualities
- General/absolute strength
- Efficient/powerful stretch-shortening cycle
- “Athlete function”
- CNS readiness

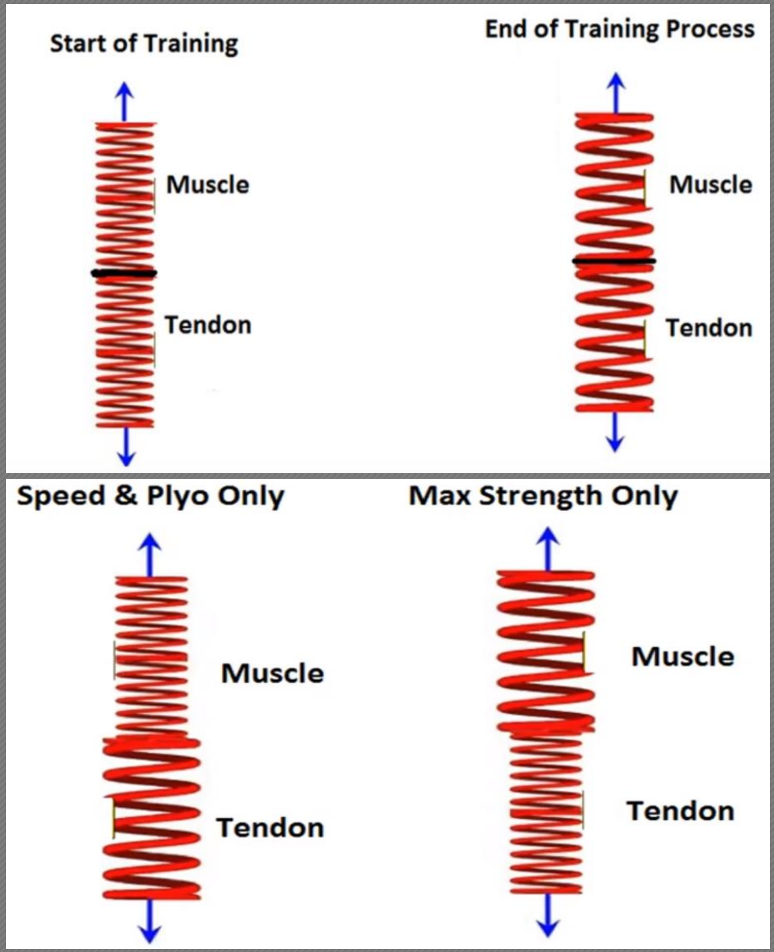
General/Absolute Strength

- Foundation for all force production
- Power ultimately the expression of strength (force)
- Shift F-V curve upwards and to the right



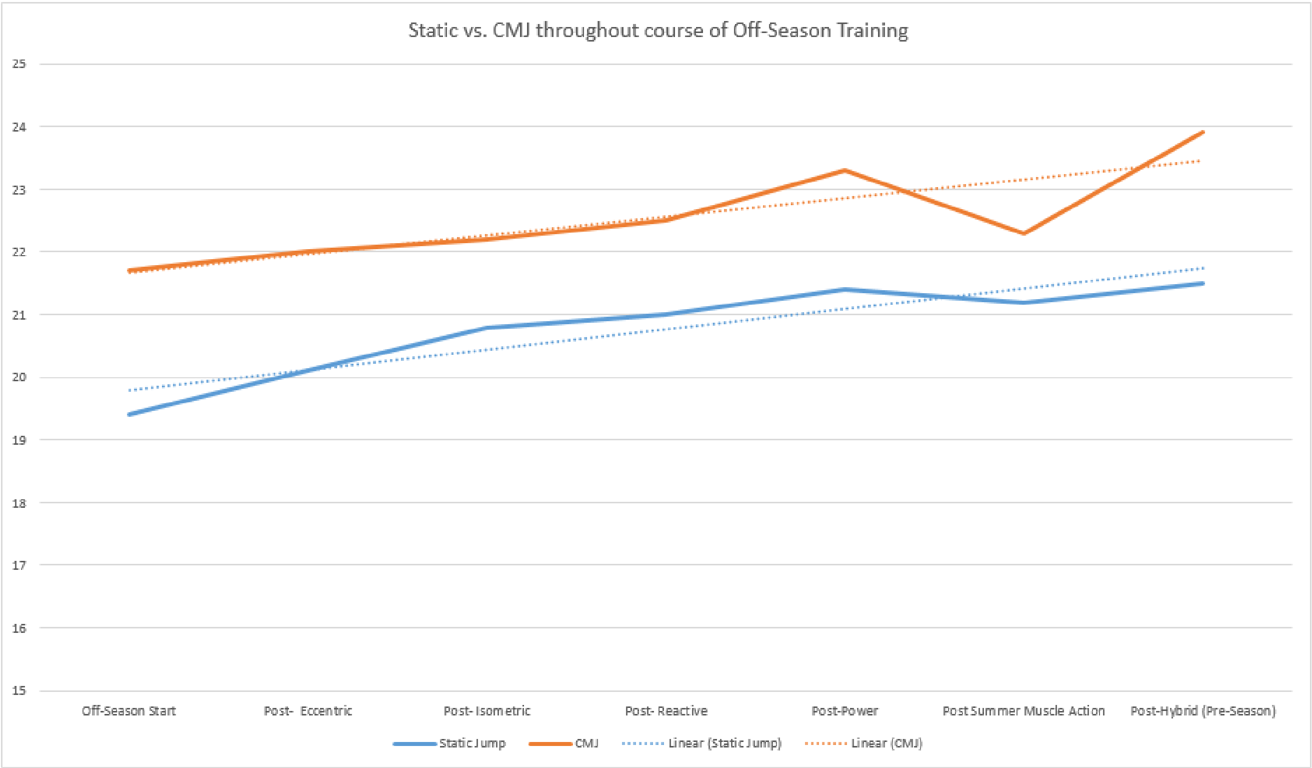
Efficient/Powerful SSC

- Training must relate to performance requirements
  - All dynamic movements require SSC
- SSC efficiency and power remains ultimate goal
  - Strength work only → muscles are developed to a greater extent than the tendons
    - Truck with mountain bike shocks
    - Tendon not able to maintain
  - Speed/plyo work only → tendons more trained than muscles
    - Mountain bike with monster truck shocks
    - Muscles eventually unable to keep up



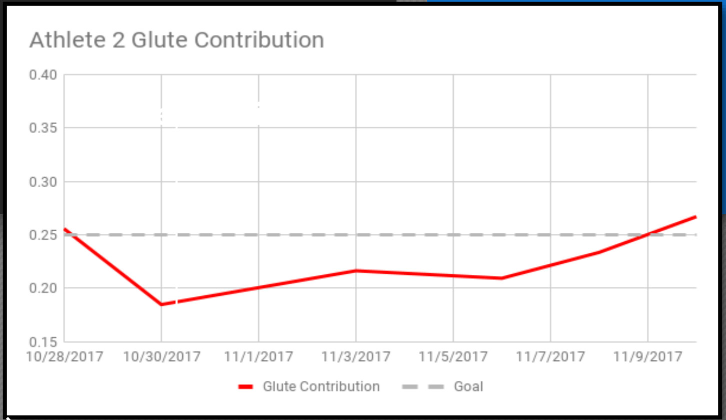
Determining Efficient/Powerful SSC

- Countermovement vs. static jumping
  - Transfer of force through SSC vs. muscle force production
  - Prefer 10% difference personally
- If difference is less than 10%
  - Relatively strong and weaker tendons
  - Force of a truck, with bike shocks
- If difference is greater than 10%
  - Springy athlete, but muscles relatively weak
  - Mountain bike with monster truck shocks
- Know the goal of your programming based on time of year

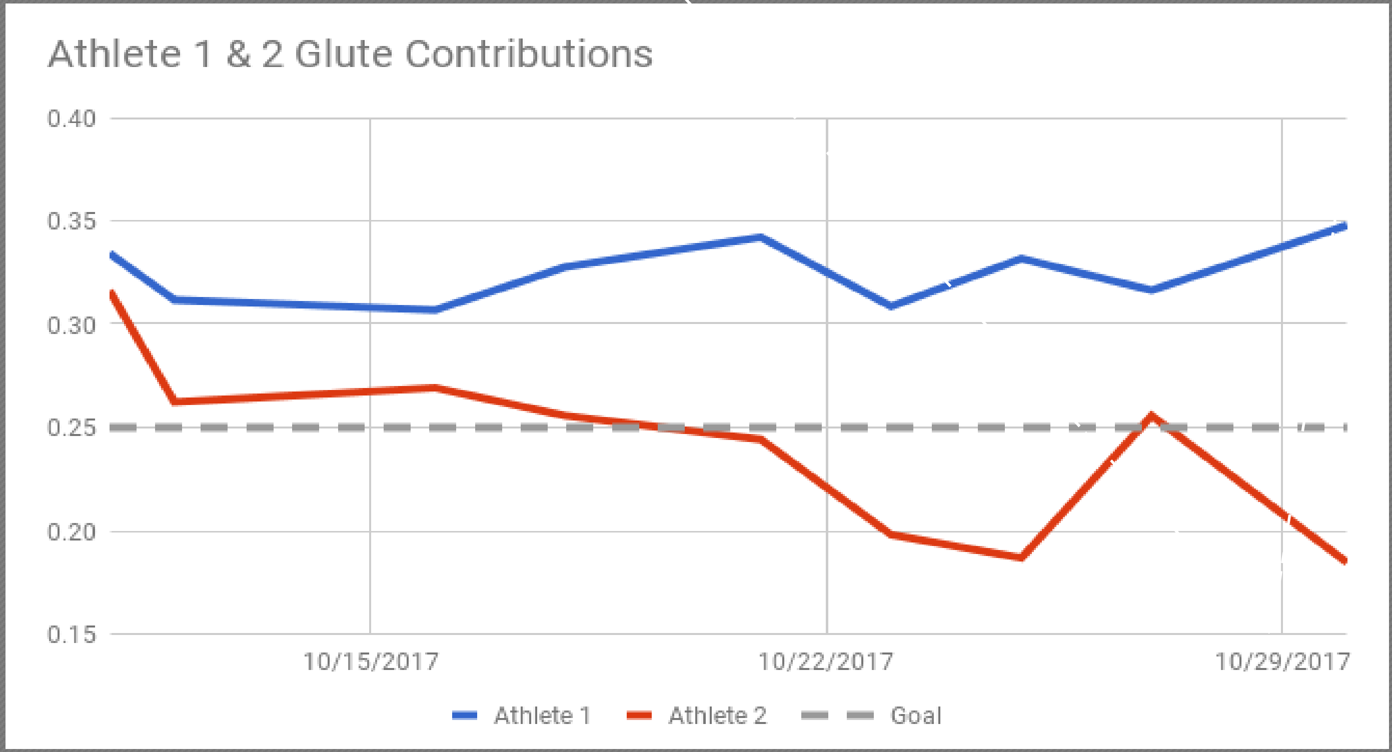


	Off-Season Start	Post-Eccentric	Post-Isometric	Post-Reactive	Post-Power	Post Summer Muscle Action	Post-Hybrid (Pre-Season)
Static Jump	19.4	20.1	20.8	21.0	21.4	21.2	21.5
CMJ	21.7	22.0	22.2	22.5	23.3	22.3	23.9
Difference (%)	12%	9%	7%	7%	9%	5%	11%

Athlete Function



- Without structure, body enters "protect" mode
  - State of "explosion"
  - Triplanar loading
    - Foot function
- Hip Stability Progressions
- Direct relationship to CNS and power availability



	Athlete 1	Athlete 2
Average	32.5%	24.1%

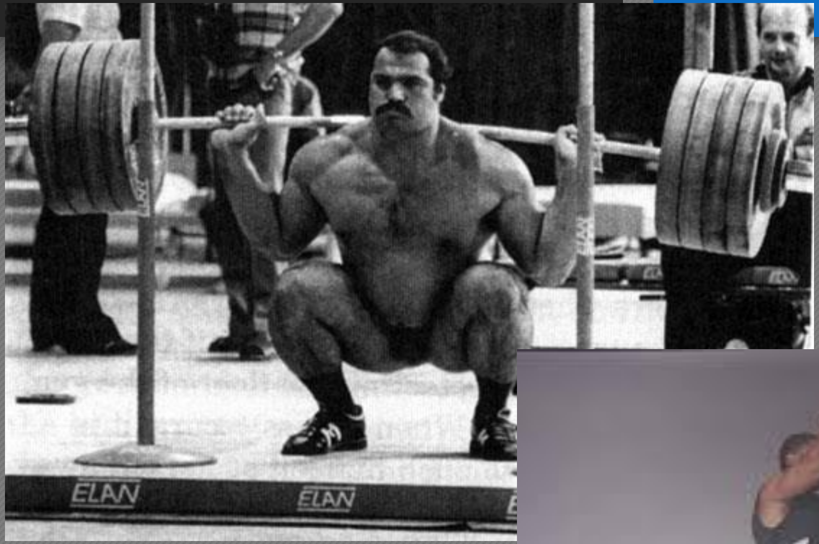
Pre-cursors to Power Availability – CNS Readiness

- CNS readiness
  - Central governor of entire system
  - Without it, maximal force and/or velocity decrease
- Place emphasis on quality training with maximal intent
  - Focus on "explosive" muscle development, not as much hypertrophy
    - Extent depends on sport requirement
    - "Mass" based sport such as football will differ
      - General to specific with programming (mass to power)
    - "Quality" of training

Maximal Intent

- Without intent (velocity), maximal power at any load is not possible
  - Maximal intent is just as important as the actual velocity [1-4]
    - Neural adaptations with intent (early phase of RFD)
  - Goal is to create “power” at all points along the F-V curve
- Adaptations ultimately determined by effort exerted by athlete in training
  - If no intent, no/less stress experienced at all levels
- Always consider “quality” of training
  - Intent is not available with sets to failure
  - Driving wrong stimulus if going this far
    - 20% cutoff vs. 40% cutoff [5]
    - Same strength gains
    - Reduced type IIx fibers in 40% group
    - Capacity training leads to reduced power output potential

Maximal Intent - Measurement



- Velocity based training (VBT)
  - Athletes are competitive, drives intent [6]
  - Also provides feedback of CNS readiness for that day
    - If "down" is it optimal to train power?
- Appropriate velocity measurement
  - Non-ballistic exercises
    - Both acceleration and deceleration in movement (typical barbell movements)
    - Use mean velocity
  - Ballistic exercises
    - Concerned with exit velocity (jumps, throws, Olympic movements) [7]
      - Determines distance traveled by projectile
    - Use maximal velocity

Maximal Intent – VBT Measurement

- Ballistic exercises elicit greater velocities through nearly entire ROM (8)
  - Ideal for power production
  - Not always safe as loads increase
  - However, can utilize accommodating resistance
    - Training at 55% 1RM is only 55% at weakest point, may not be training power optimally through entire ROM

Athlete Readiness - PAP

- CNS drive is critical for optimal power development
  - Pre-cursor of power
- "Ramp up" CNS through the use of post-activation potentiation (PAP)
  - Requires full engagement of the nervous system
  - Must be implemented in a manner that does not induce fatigue
    - Maximal intent in brief amount of time/reps and adequate rest

PAP Exercise Guidelines					
Maximal Isometric Exercises			High Load Exercises		
Sets	Time	Load	Sets	Reps	Load
2-3	5-7 sec.	Maximal	2-3	1-3	85-100%

Athlete Readiness – Physiological Changes from PAP

- Increase in high threshold motor unit recruitment [9]
  - Greater utilization of explosive muscle fibers
  - Allows greater force in a rapid fashion
- Decrease in pennation angle [9]
  - Smaller pennation angle allows for greater mechanical advantage for muscle to act upon the tendon
- Increase in calcium sensitivity [9]
  - Potentiation of subsequent muscular contractions
- Increased in rate coding [10,11]
  - Speed of signal being sent to muscle
  - Increased “doublets” or reduced time between impulses sent during contraction
  - Increases speed and power of contraction
- Increase in central drive [12]
  - Nervous system is “turned on” or “primed”
  - Coordination of muscle activity by CNS
  - High level force exertion is a skill in which muscles must be appropriately prepared for

Athlete Readiness – Exercise Selection

- PAP exercises can be programmed to fit a desired outcome
  - Pair with major exercise of upcoming session
    - Personally avoid axial loading due to maximal intent
  - General strength
    - Low position Iso work
    - Improving strength at weakest point
  - Critical joint angle
    - Designed to optimize transfer of force through SSC
    - Improve ballistic concentric power
- As competition phase approaches, increase specificity
  - Depends on level of athlete

Optimal Loading

- Optimal load varies on exercise and athlete
- “Optimal” also depends on desired outcome
  - Recall goal is to maximize power in the competitive movements
    - More advanced athletes require higher velocity power for transfer
    - Less advanced athletes need more force based power
  - Can create this even in a team setting
    - Elite group
      - OC work, timed sets, lower %
    - Advanced group
      - OC work, timed sets, higher %
    - Basic group
      - Full range work, reps, higher %

Exercise Implemented	Optimal Load Range
Bench Press	40-50% of 1RM
Bench Press	30-45% of 1RM
Bench Press and Throw	50-70% 1RM
Bench Throw	55% of 1RM
Bench Throw	15-45% of 1RM
Jump Squat	55-59% of 1RM
Squat Jump (Static and CMJ)	10% of 1RM
Half-Squat	60-70% of 1RM

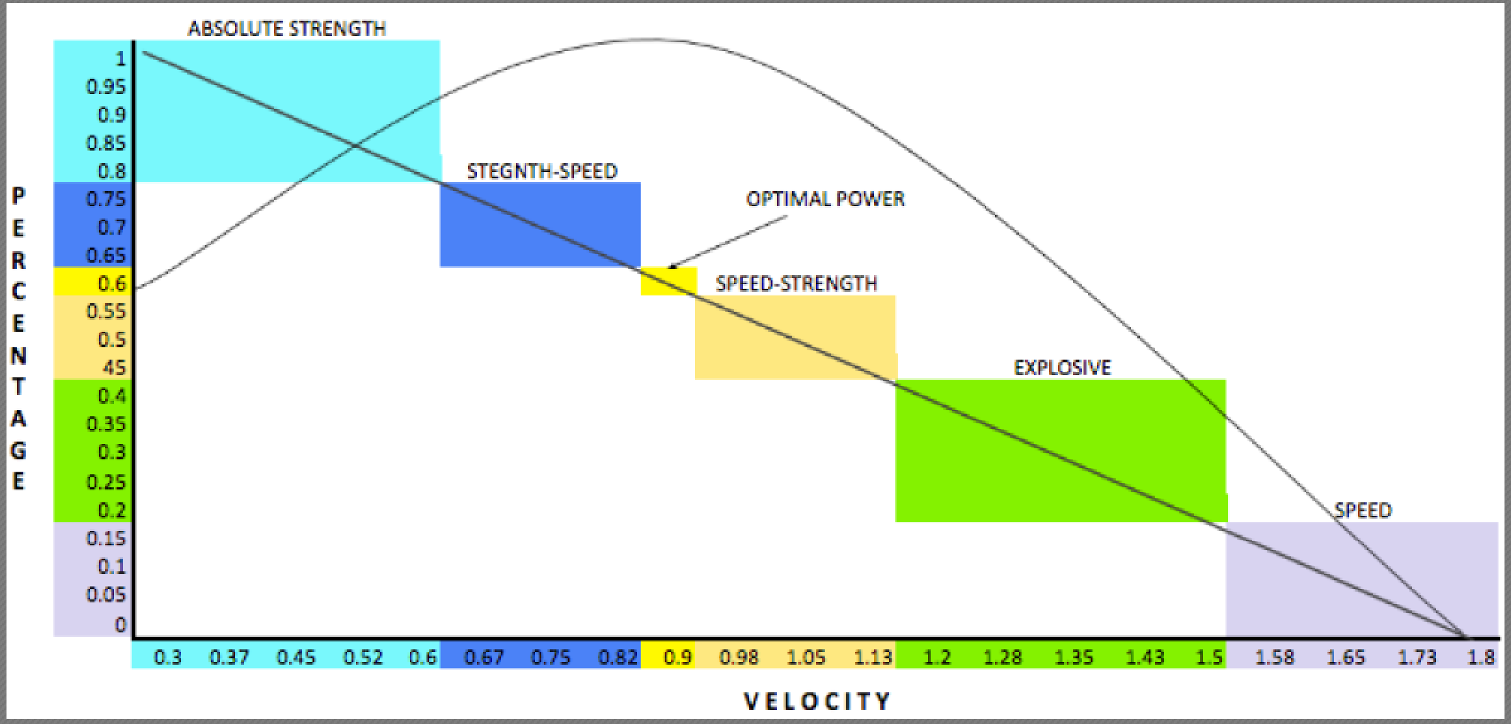
Optimal Loading – Categorizing

- Base programming on desired outcome
  - Strength-Speed
    - Strength listed first, thus the priority
    - Adaptations to "force" portion of F-V curve
  - Speed-Strength
    - Speed becomes priority, but still moderate force
  - Speed
    - Adaptations to "velocity" portion
    - Most transferrable, but must have ability to produce force
- Use of "Block" training to cover all aspects and increase transfer when desired

%	Velocity	Rel. Power	
1	0.3	0.56	Absolute Strength
0.95	0.37	0.65	AbSt
0.9	0.45	0.75	AbSt
0.85	0.52	0.82	AbSt
0.8	0.6	0.89	AbSt
0.75	0.67	0.93	Strength Speed
0.7	0.75	0.97	StS
0.65	0.82	0.99	StS
0.6	0.9	1	OPTIMAL POWER
0.55	0.98	0.99	Speed Strength
0.5	1.05	0.97	SSt
45	1.13	0.94	SSt
0.4	1.2	0.89	Explosive
0.35	1.28	0.83	Exp
0.3	1.35	75	Exp
0.25	1.43	0.66	Exp
0.2	1.5	0.56	Exp
0.15	1.58	0.44	Speed
0.1	1.65	0.31	Spd
0.05	1.73	0.16	Spd
0	1.8	0	Spd

Optimal Loading

- Regardless of load, still maintain maximal intent
  - Early phase RFD adaptations max with intent
  - Maximize power at each velocity trained



Absolute Strength	
Back Squat	80-100% 1RM
Leg Press	90-100% 1RM
Deadlift	90-100% 1RM
Strength-Speed	
Clean Pull	80% 1RM
Deadlift	80% 1RM
Squat Jump	> 70% of BW
Countermovement Jump	> 80% of BW
Speed-Strength	
Squat Jump	20-30% of BW
Countermovement Jump	35-45% of BW
Single Leg Squat Jump	BW
Single Leg Countermovement Jump	10% of BW
Clean Pull Jump	65% 1RM
Explosive	
Depth Jumps	BW
Squat Jumps	BW
Single Leg Countermovement Jump	10% of BW
Maximal Vertical Box Jump	BW
Speed	
Maximal Roller Push Off	< BW
Countermovement Jump with Arms	BW

Quality Training – Minimize Fatigue

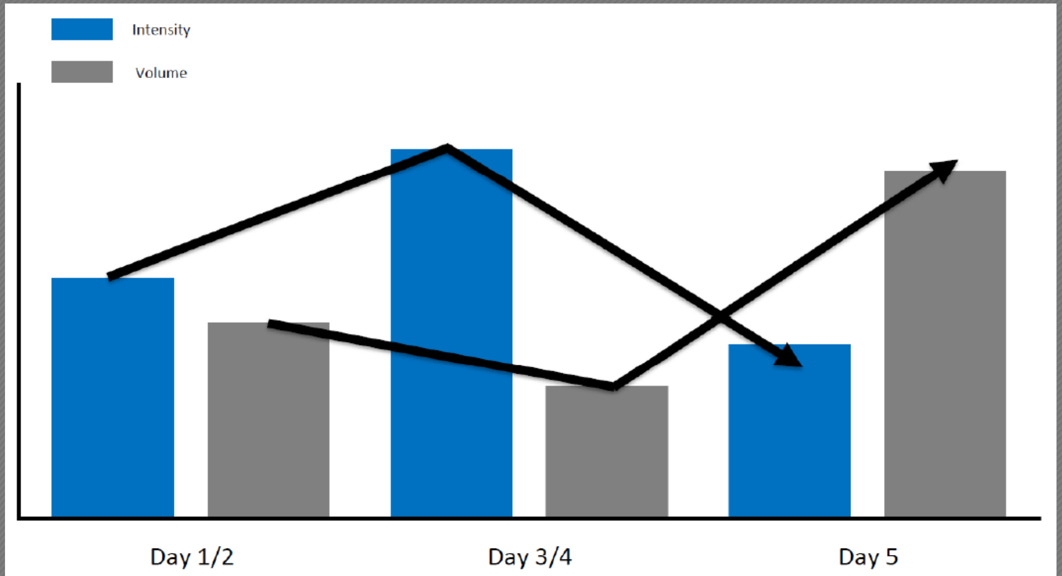
- With fatigue accumulation, velocity decreases
  - Must run fast in order to improve velocity
- Focus on quality of training
  - Capacity training (energy system development) early in annual plan
  - Continue to "keep the goal, the goal"
  - As reps increase, ability to recover decreases
    - Particularly with repeated, maximal intent
- Dependent upon each athlete's capacity (energy system)

Athlete 1					Athlete 2				
Set #	Load (% of 1RM)	Bar Velocity (m/s)	% Drop-Off	Adaptation	Set #	Load (% of 1RM)	Bar Velocity (m/s)	% Drop-Off	Adaptation
Set 1	70	0.96	0%	Quality Power (Desired)	Set 1	70	0.96	0%	Quality Power (Desired)
Set 2	70	0.96	0%	Quality Power (Desired)	Set 2	70	0.96	0%	Quality Power (Desired)
Set 3	70	0.95	1%	Quality Power (Desired)	Set 3	70	0.96	0%	Quality Power (Desired)
Set 4	70	0.95	1%	Quality Power (Desired)	Set 4	70	0.96	0%	Quality Power (Desired)
Set 5	70	0.95	1%	Quality Power (Desired)	Set 5	70	0.96	0%	Quality Power (Desired)
Set 6	70	0.94	2%	Quality Power (Desired)	Set 6	70	0.95	1%	Quality Power (Desired)
Set 7	70	0.94	2%	Quality Power (Desired)	Set 7	70	0.95	1%	Quality Power (Desired)
Set 8	70	0.94	2%	Quality Power (Desired)	Set 8	70	0.95	1%	Quality Power (Desired)
Set 9	70	0.94	2%	Quality Power (Desired)	Set 9	70	0.95	1%	Quality Power (Desired)
Set 10	70	0.94	2%	Quality Power (Desired)	Set 10	70	0.95	1%	Quality Power (Desired)
Set 11	70	0.93	3%	Quality Power (Desired)	Set 11	70	0.95	1%	Quality Power (Desired)
Set 12	70	0.93	3%	Quality Power (Desired)	Set 12	70	0.95	1%	Quality Power (Desired)
Set 13	70	0.93	3%	Quality Power (Desired)	Set 13	70	0.95	1%	Quality Power (Desired)
Set 14	70	0.93	3%	Quality Power (Desired)	Set 14	70	0.95	1%	Quality Power (Desired)
Set 15	70	0.93	3%	Quality Power (Desired)	Set 15	70	0.94	2%	Quality Power (Desired)
Set 16	70	0.92	4%	Power (Not Desired)	Set 16	70	0.94	2%	Quality Power (Desired)
Set 17	70	0.92	4%	Power (Not Desired)	Set 17	70	0.94	2%	Quality Power (Desired)
Set 18	70	0.92	4%	Power (Not Desired)	Set 18	70	0.94	2%	Quality Power (Desired)
Set 19	70	0.92	4%	Power (Not Desired)	Set 19	70	0.94	2%	Quality Power (Desired)
Set 20	70	0.91	5%	Power (Not Desired)	Set 20	70	0.94	2%	Quality Power (Desired)
Set 21	70	0.91	5%	Power (Not Desired)	Set 21	70	0.94	2%	Quality Power (Desired)
Set 22	70	0.91	5%	Power (Not Desired)	Set 22	70	0.94	2%	Quality Power (Desired)
Set 23	70	0.90	6%	Power (Not Desired)	Set 23	70	0.93	3%	Quality Power (Desired)
Set 24	70	0.90	6%	Power (Not Desired)	Set 24	70	0.93	3%	Quality Power (Desired)
Set 25	70	0.89	7%	Power (Not Desired)	Set 25	70	0.93	3%	Quality Power (Desired)
Set 26	70	0.89	7%	Power (Not Desired)	Set 26	70	0.93	3%	Quality Power (Desired)
Set 27	70	0.89	7%	Power (Not Desired)	Set 27	70	0.93	3%	Quality Power (Desired)
Set 28	70	0.88	8%	Power (Not Desired)	Set 28	70	0.93	3%	Quality Power (Desired)
Set 29	71	0.88	8%	Power (Not Desired)	Set 29	70	0.92	4%	Power (Not Desired)

Quality Training – Maintain Velocity

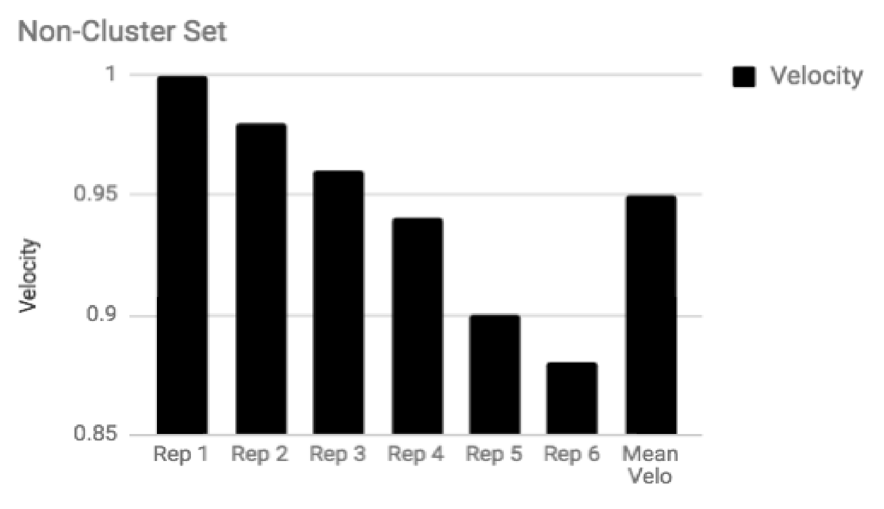
- By maintaining velocity:
  - Explosive, type II fibers trained
  - Energy systems trained similar to RSA sport
    - Max intensity, recover, repeat
    - Timed sets beneficial
  - Maximal neural drive
- Weekly set-up
  - Volume at end of week
- All allow maximal power at the given load

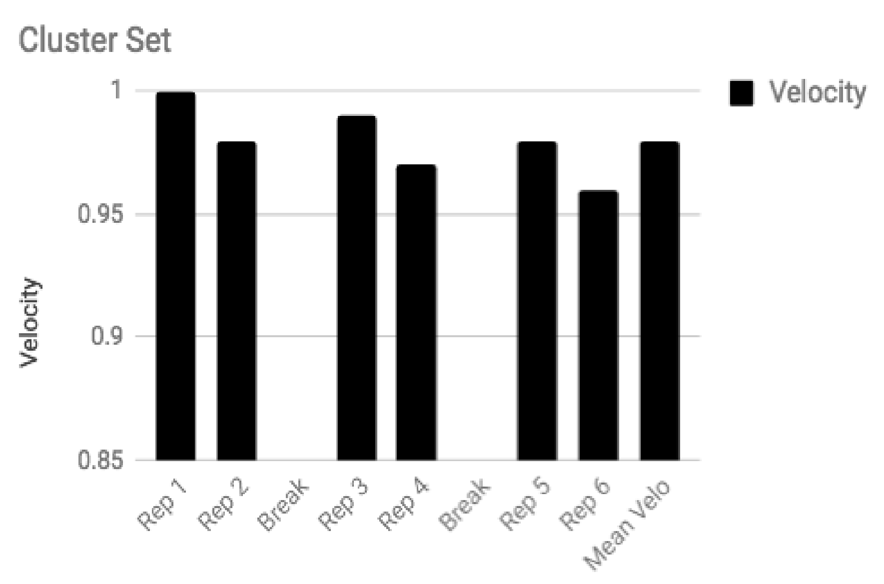
*Henk Kraaijenhof



Quality Training – Methods to Maintain Velocity

- Cluster sets [13,14,15]
  - Small rest between reps
- Target velocity sets
  - Determine aimed velocity
  - Start at weight that this speed is easily reached
  - 2 reps and keep fastest speed
  - Goal is to create new 1RM at desired speed
- Cutoff/drop-off sets
- Ultimate goal: maintain quality training



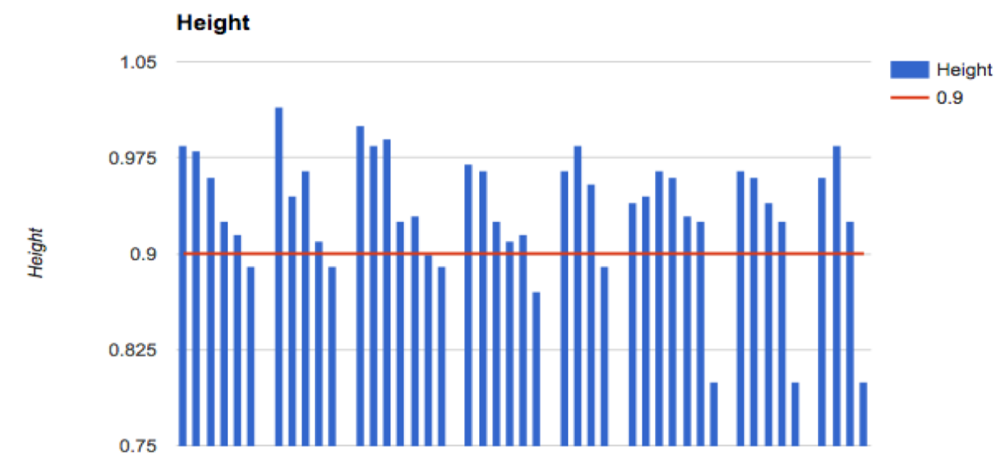


Quality Training – Measurement

- Target velocity sets
  - Goal of 1.0 m/s (example)
  - Increase until goal not met
  - Allow adequate rest
    - Between reps and sets
    - Depends on desired adaptation
  - Continue until first set is below desired velocity
- Know desired speed and maximize force production at given velocity
- Leads to optimal power at that moment at specific point on F-V curve

Set #	Reps	Load (lbs)	Bar Speed (Fastest rep)
1	2	175	1.2 m/s
2	2	185	1.18 m/s
3	2	195	1.12 m/s
4	2	205	1.09 m/s
5	2	215	1.04 m/s
6	2	225	1.01 m/s
7	2	235	0.98 m/s
Speed Requirement Not Met Try Again			
8	2	235	0.97 m/s
Reduce Load			
9	2	225	1.08 m/s
10	2	230	1.0 m/s
11	2	230	0.98 m/s
Speed Requirement Not Met Try Again			
12	2	230	0.97 m/s
Exercise Terminated			

Quality Training – Measurement

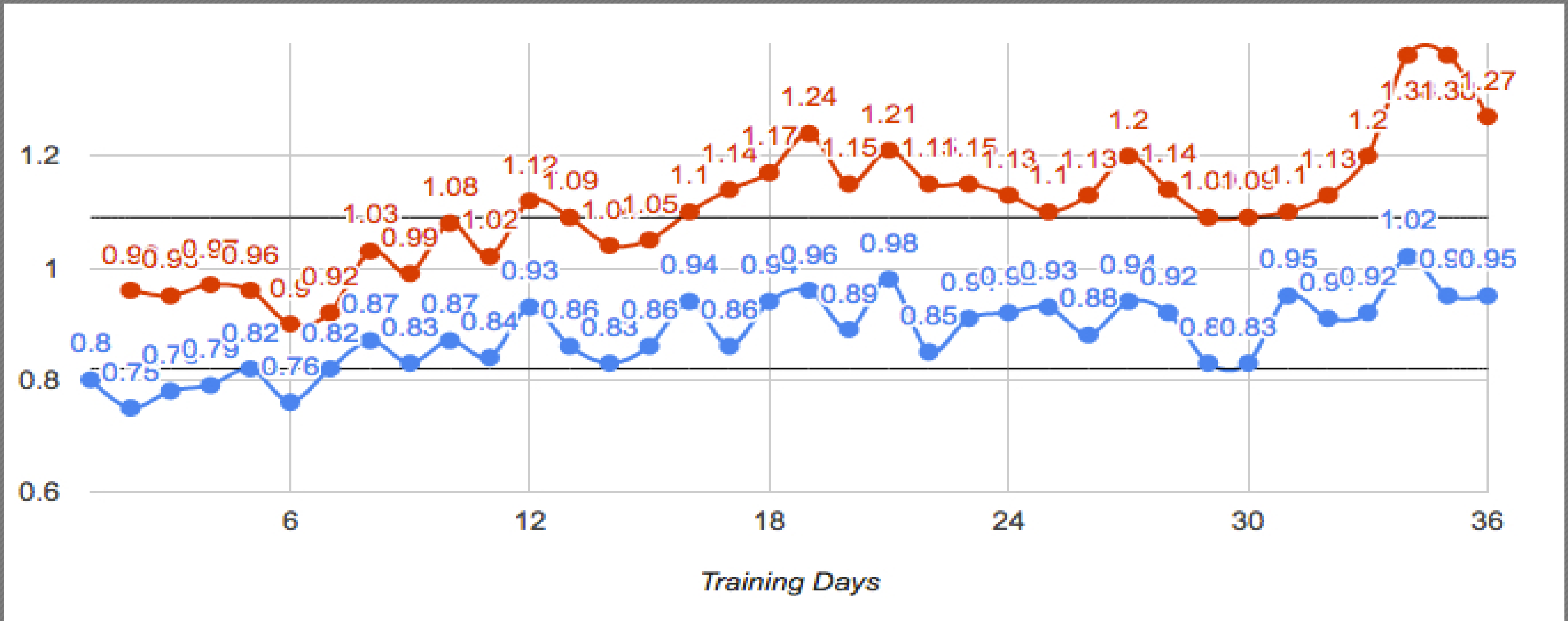


- Cutoff/drop-off sets
  - Set cutoff based on quality
    - Velocity or % change
  - Set cutoff: -0.10 m/s
  - Series cutoff: -0.05 m/s
    - Within first two reps of set
- Can use jump mat also
  - Difficult because only testing at the end of the set, not actual movement

	Rep #							
Set #		1	2	3	4	5	6	7
	1	1.0 m/s*	0.98 m/s	0.97 m/s	0.97 m/s	0.95 m/s	0.92 m/s	0.89 m/s
	2	0.98 m/s	0.97 m/s	0.96 m/s	0.93 m/s	0.91 m/s	0.90 m/s	Set Terminated
	3	0.97 m/s	0.96 m/s	0.93 m/s	0.91 m/s	0.89 m/s	Set Terminated	
	4	0.97 m/s	0.96 m/s	0.91 m/s	0.89 m/s	Set Terminated		
	5	0.96 m/s	0.92 m/s	Exercise Terminated (0.92 m/s is greater than a 0.05 m/s reduction from the fastest rep)				

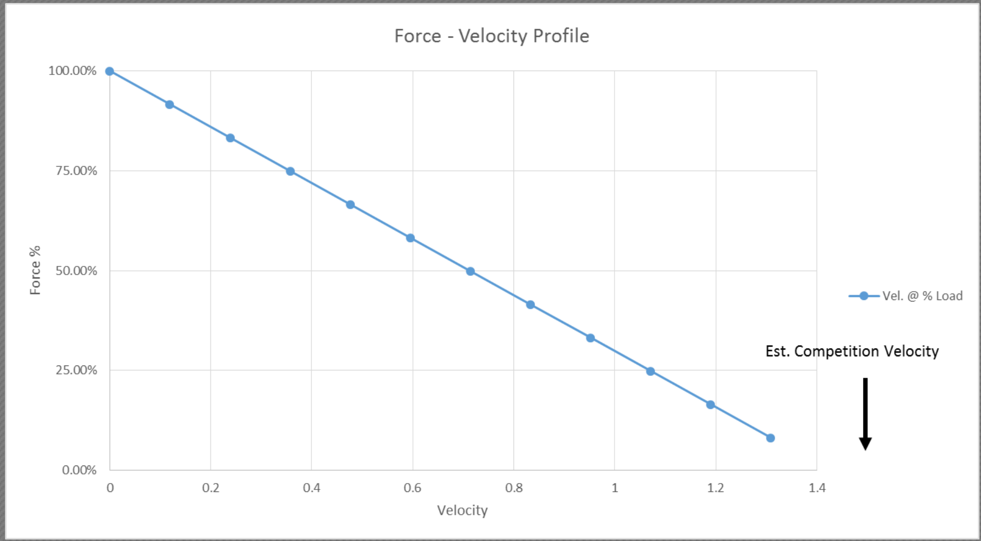
Quality Training – Measurement

- Long-term trends become available through tracking
  - Athlete 1 vs. Athlete 2
  - Same relative load
  - Reduced intent from athlete 2
  - Reduced adaptation realization
- Begin to predict training effects on a micro and macro level
  - Good for in-season



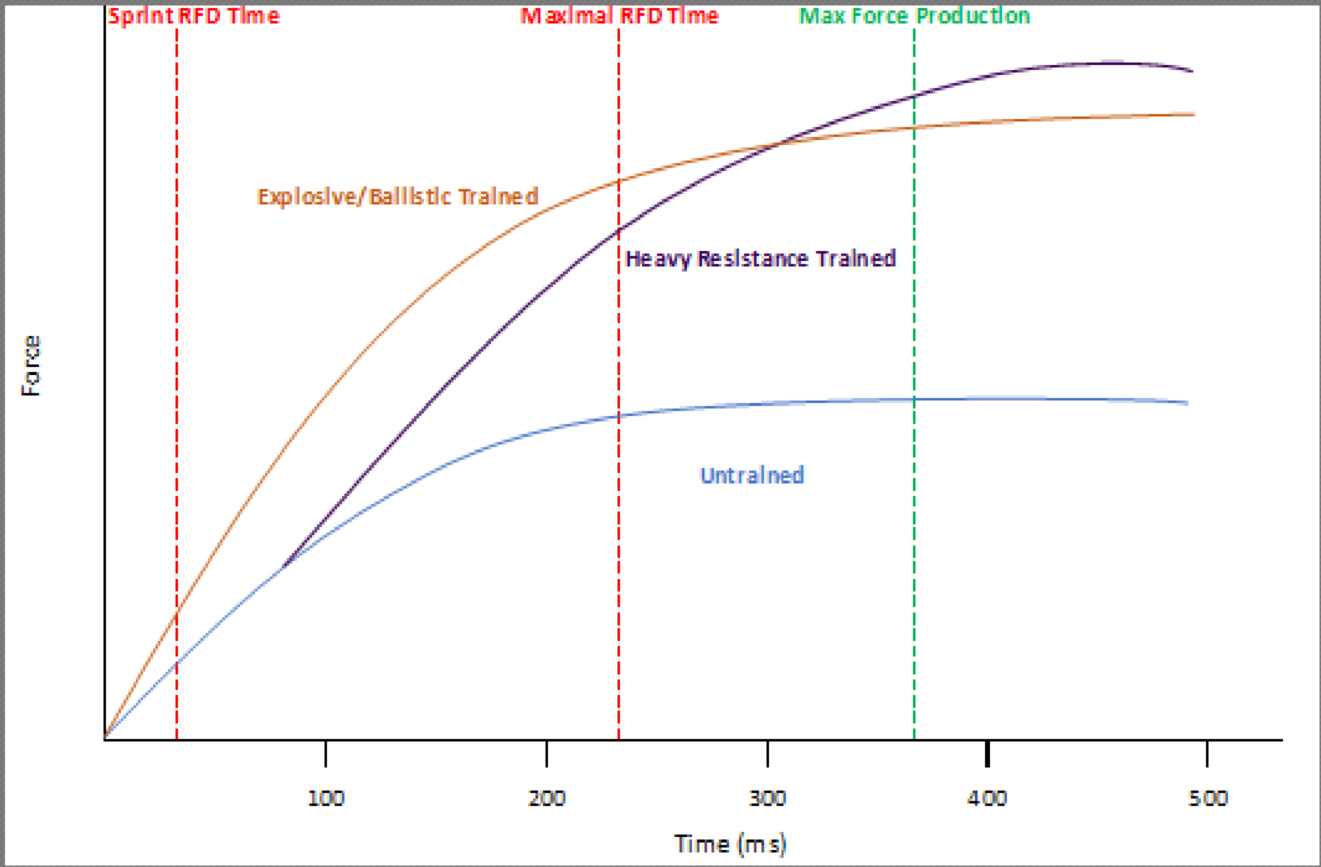
Rate of Force Development (RFD)

- Ultimate goal is the production of power in the competitive event
  - Sports occur at the highest velocities available
  - Maximize the force production in the minimal time available
    - Maximal force requires 0.3-0.4 seconds
    - Elite sprinters ground contact time is 0.08-0.12 seconds
- Strength is great, but if it doesn't translate to the field then it is useless
- Must train with maximal intent at high velocities
  - Strength production gains are velocity specific (16,17)



RFD Adaptations Based on Training

- Must be trained for in biphasic manner
  - Early phase
    - Neural drive
    - Maximal intent
    - “Speed”
  - Late phase
    - Force producing capabilities of muscle
    - Cross-sectional area
    - “Strength”
- Need both for success



RFD Adaptations Based on Training

- Early phase RFD linked to skill acquisition
  - Motor unit recruitment
    - Maximal intent
  - Rate coding
    - Increased doublets with increased velocity of movement (18)
  - Muscle synchronization (18)
    - Appropriate exercise implementation
    - Transfer of training
- RFD Adaptations

Peaking Back Squat for Track and Field

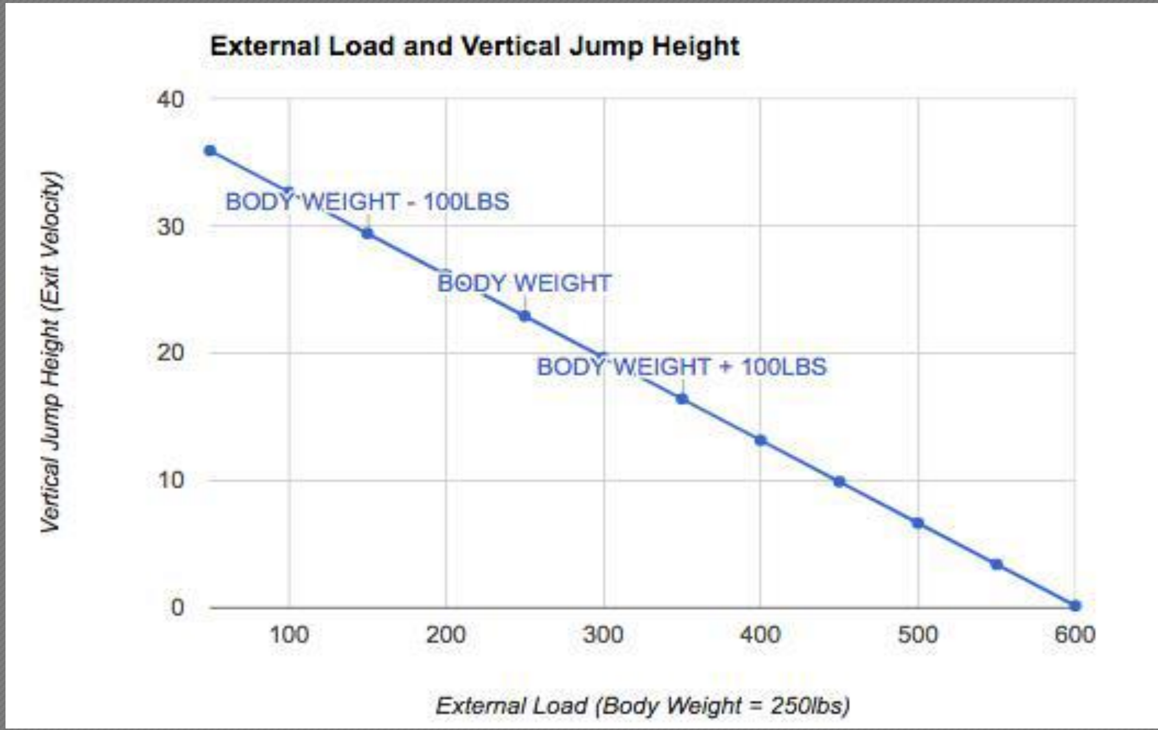
Weak athlete		Load	Strong athlete		Load	Advanced Athlete		Load
Week 1	Regular back Squat	Above 80%	Week 1	Regular back Squat	Above 80%	Week 1	Regular back Squat	55 to 80%
Week 2	Regular back Squat	Above 80%	Week 2	Regular back Squat	Above 80%	Week 2	Regular back Squat	55 to 80%
Week 3	Regular back Squat	Above 80%	Week 3	Regular back Squat	Above 80%	Week 3	Regular back Squat	55 to 80%
Week 4	Regular back Squat	Above 80%	Week 4	Regular back Squat	Above 80%	Week 4	Regular back Squat	55 to 80%
Week 5	Regular back Squat	Above 80%	Week 5	Sport Back Squat	55 to 80%	Week 5	Sport Back Squat	Above 80%
Week 6	Regular back Squat	Above 80%	Week 6	Sport Back Squat	55 to 80%	Week 6	Sport Back Squat	Above 80%
Week 7	Regular back Squat	Above 80%	Week 7	Sport Back Squat	Below 55%	Week 7	Sport Back Squat	Below 55%
Week 8	Sport Back Squat	55 to 80%	Week 8	Sport Back Squat	Below 55%	Week 8	Sport Back Squat	Below 55%
Week 9	Sport Back Squat	55 to 80%	Week 9	Sport Back Squat	Below 55%	Week 9	Sport Back Squat	Below 55%
Week 10	Sport Back Squat	Below 55%	Week 10	Sport Back Squat	Below 55%	Week 10	Sport Back Squat	Below 55%
Week 11	Sport Back Squat	Below 55%	Week 11	Sport Back Squat	Below 55%	Week 11	Sport Back Squat	Below 55%
Week 12	Sport Back Squat	Below 55%	Week 12	Sport Back Squat	Below 55%	Week 12	Sport Back Squat	Below 55%

Weak athlete		Load	Strong athlete		Load	Advanced Athlete		Load
Week 1	Regular back Squat	Above 80%	Week 1	Sport Back Squat	55 to 80%	Week 1	Sport Back Squat	Above 80%
Week 2	Regular back Squat	Above 80%	Week 2	Sport Back Squat	55 to 80%	Week 2	Sport Back Squat	Above 80%
Week 3	Regular back Squat	Above 80%	Week 3	Sport Back Squat	Below 55%	Week 3	Sport Back Squat	Below 55%
Week 4	Sport Back Squat	55 to 80%	Week 4	Sport Back Squat	Below 55%	Week 4	Sport Back Squat	Below 55%
Week 5	Sport Back Squat	55 to 80%	Week 5	Sport Back Squat	Below 55%	Week 5	Sport Back Squat	Below 55%
Week 6	Sport Back Squat	Below 55%	Week 6	Sport Back Squat	Below 55%	Week 6	Sport Back Squat	Below 55%
Week 7	Sport Back Squat	Below 55%	Week 7	Sport Back Squat	Below 55%	Week 7	Sport Back Squat	Below 55%
Week 8	Sport Back Squat	Below 55%	Week 8	Sport Back Squat	Below 55%	Week 8	Sport Back Squat	Below 55%

Weak athlete		Load	Strong athlete		Load	Advanced Athlete		Load
Week 1	Regular back Squat	Above 80%	Week 1	Sport Back Squat	55 to 80%	Week 1	Sport Back Squat	Below 55%
Week 2	Sport Back Squat	Above 80%	Week 2	Sport Back Squat	Below 55%	Week 2	Sport Back Squat	Below 55%
Week 3	Sport Back Squat	Above 80%	Week 3	Sport Back Squat	Below 55%	Week 3	Sport Back Squat	55 to 80%
Week 4	Sport Back Squat	Below 55%	Week 4	Sport Back Squat	Below 55%	Week 4	Sport Back Squat	Below 55%
Week 5	Sport Back Squat	Below 55%	Week 5	Sport Back Squat	Below 55%	Week 5	Sport Back Squat	Below 55%
Week 6	Sport Back Squat	Below 55%	Week 6	Sport Back Squat	Below 55%	Week 6	Sport Back Squat	Below 55%

RFD Training Options

- French contrast
  - Considers speeds at, just above, and just below competition movements
  - Increases motor learning at velocities when programmed correctly
  - Running progressions for transfer of training
- Oscillatory training
  - Disadvantageous vs. advantageous positions
- Partial training
- Specific joint angle – Peaking back squat
- Accelerated movements



RFD Training Options

- French Contrast
- Transfer of Training

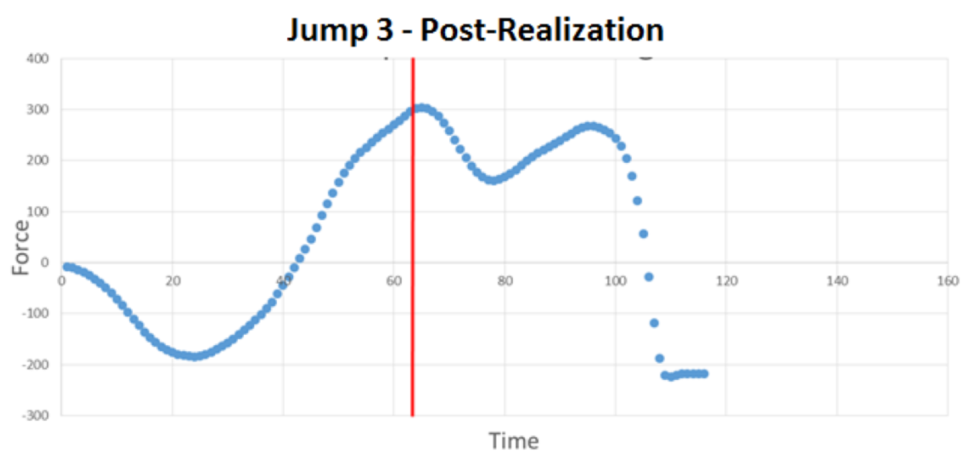
French Contrast Method Based on Running Quality			
Velocity	Acceleration	Max Velocity	Change of Direction
Same Velocity	Hurdle Hops for Distance	Hurdle Hops for Distance	Lateral Hurdle Hops
Lower Velocity	Sled Resisted Starts	Resisted Treadmill Run	Band Resisted Shuffle
Higher Velocity	Accelerated Band Bounds	Accelerated Partner Sprints	Accelerated Lateral Band Bounds

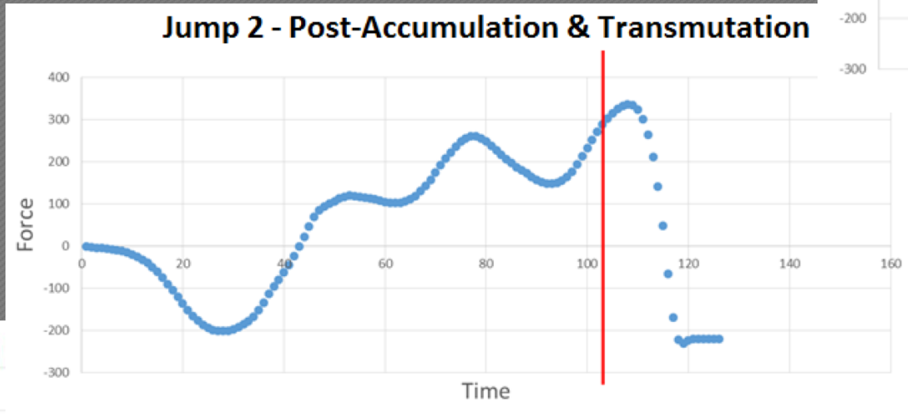
Progression Based on Block Training			
Block Parameters	Quality Trained		
	Acceleration	Maximal Velocity	Change of Direction
Above 80%	Lighter sleds for technique to start Increase weight to maximize strength	Resisted treadmill running	Resisted lateral training
55-80%	Lighten sled load to increase velocity of training	Flying 40's maintaining proper technique	Decreased resistance lateral training
Below 55%	Unloaded starts for mastery of acceleration technique	Overspeed training with partner	Unloaded lateral training with reactive response

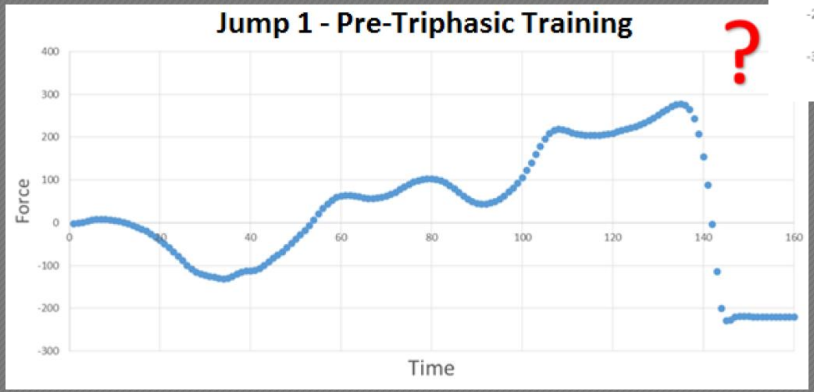
RFD – Accelerated Movements

RFD Training Outcome

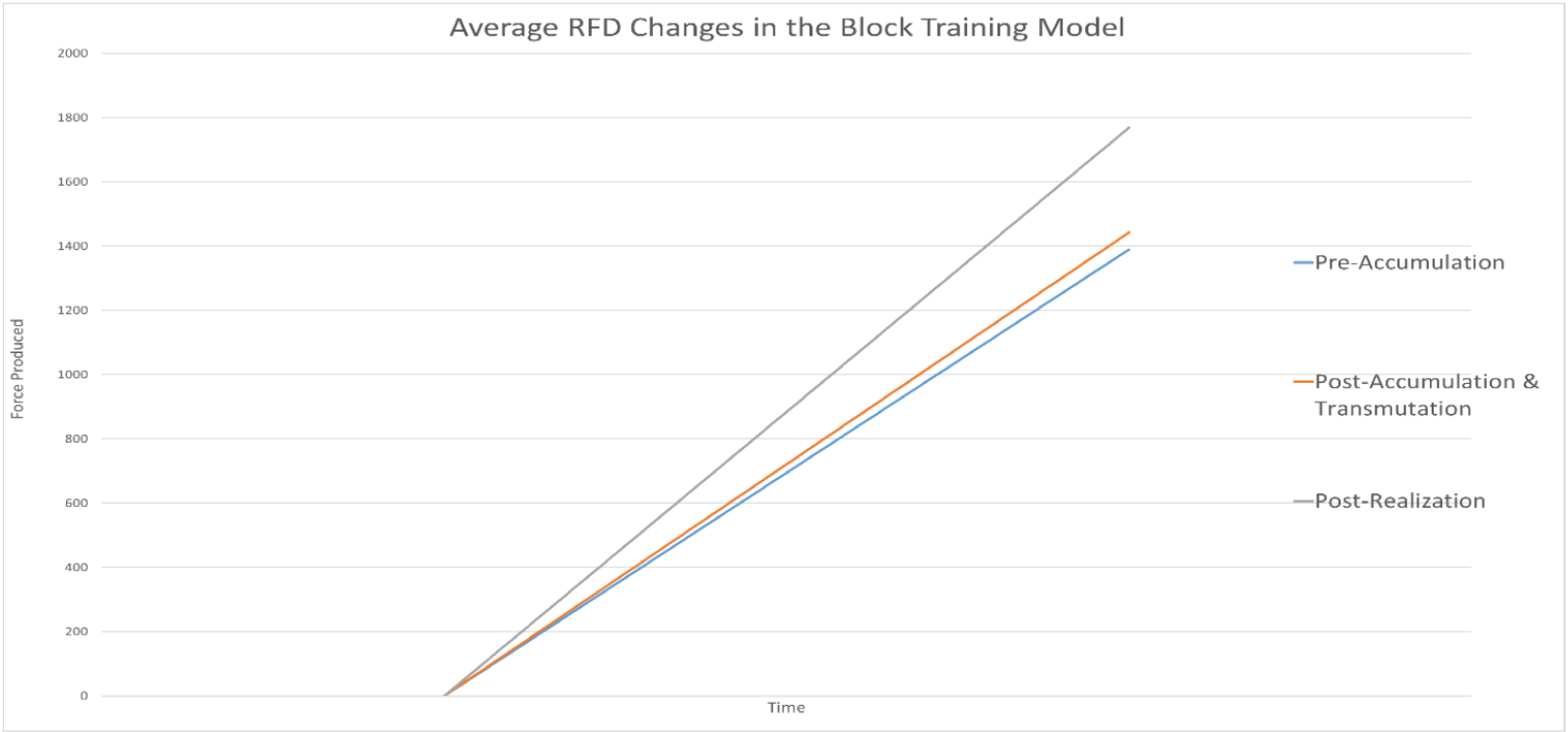
- RFD through each phase
- SSC addressed
  - “V” of athlete





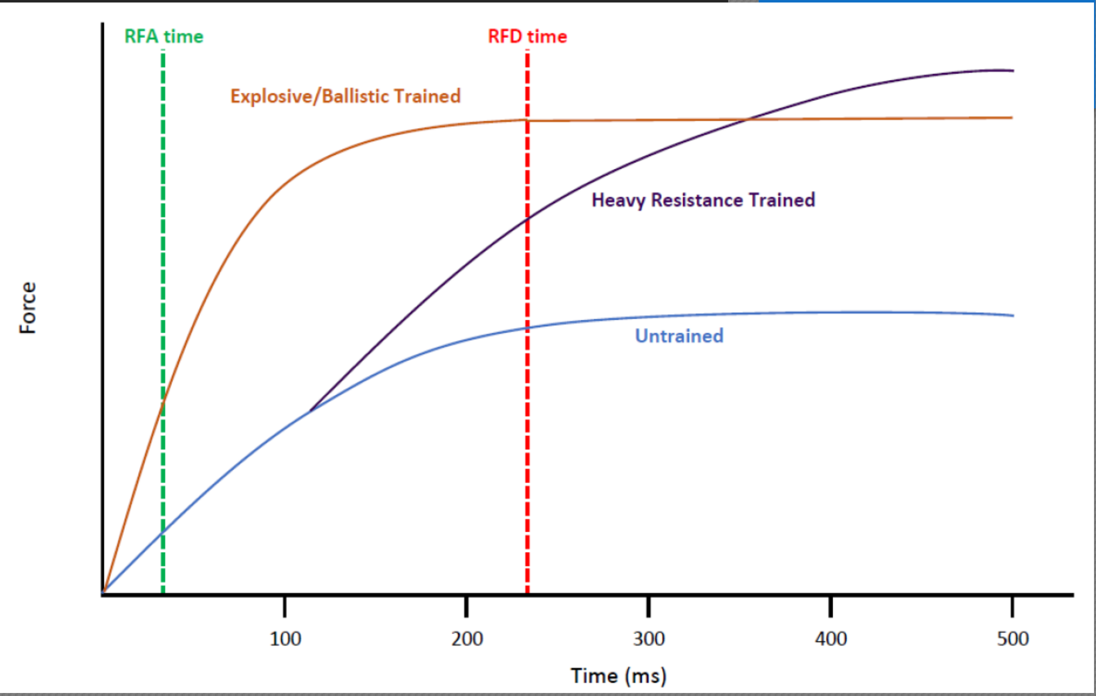


RFD Training Outcome

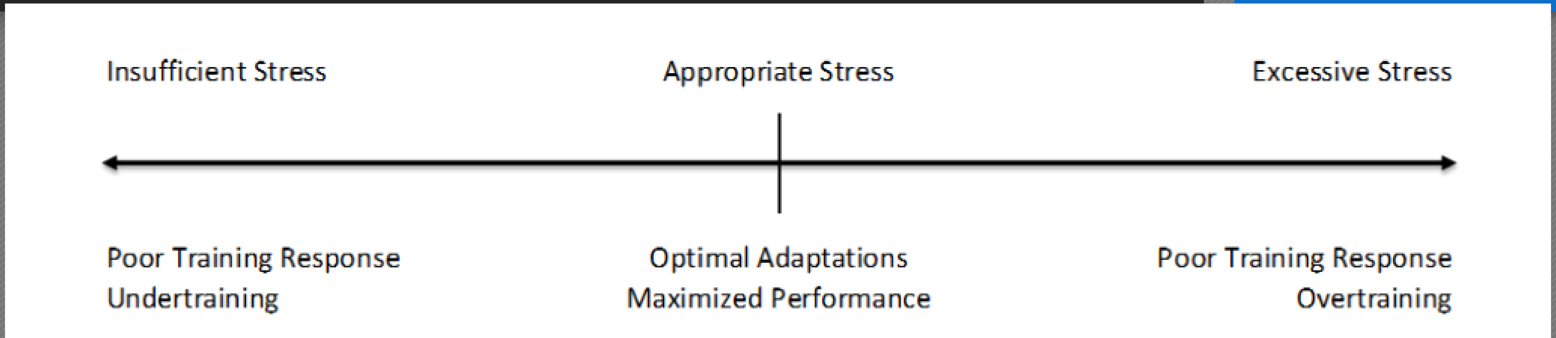


Rate of Force Absorption (RFA)

- Force absorption just as critical for athlete success
  - Reduced injury likelihood
  - Lower force production = slower athlete
  - Lower force absorption = injured athlete
- Must have ability to "throw on the brakes"
- Further enhances SSC power and efficiency
- Addressed through OC, AFSM (push-pull), and other "rapid eccentrics"
  - "pulling-in" on jumping leads to greater SSC utilization and efficient power



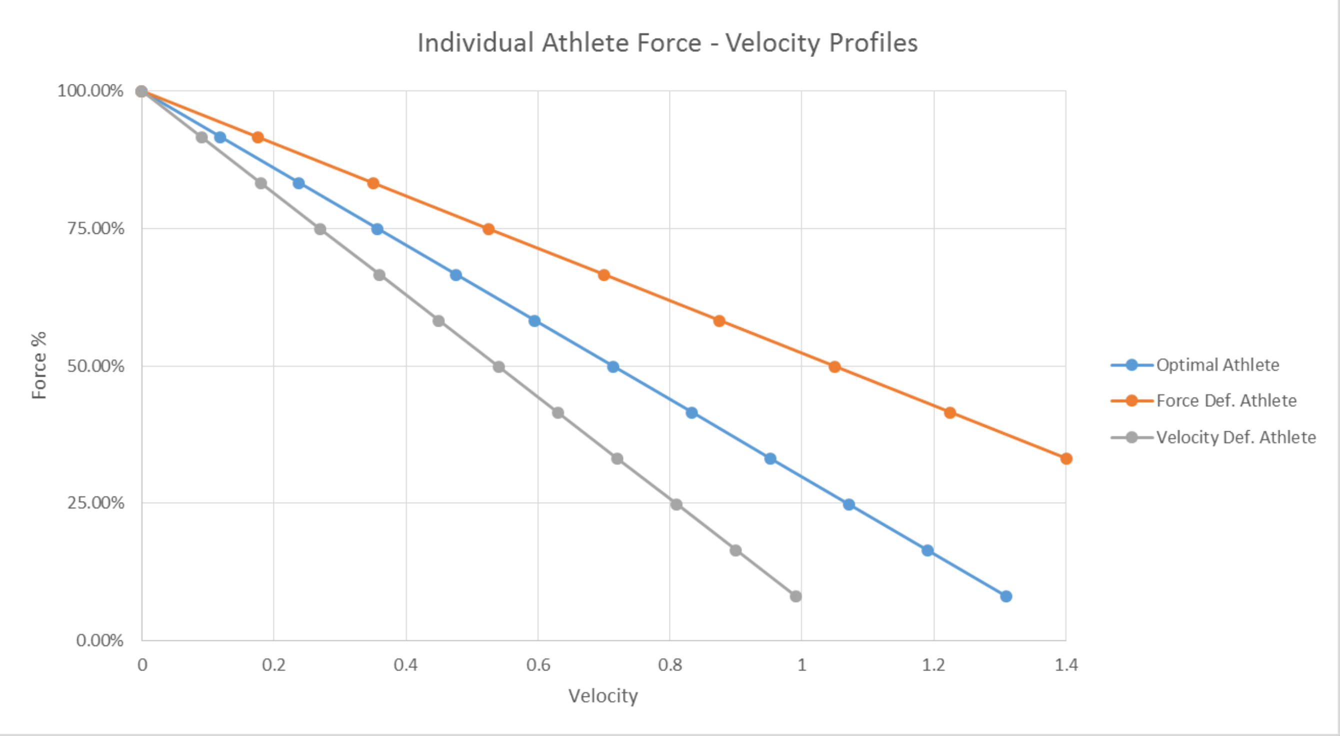
Athlete Individualization



- Know athlete's needs
- Ask the vital questions?
  - What are the requirements of their sport/position
    - O-line vs. DB
  - Are they "strong enough"? Relative and absolute?
  - Training age?
  - Response to previous training?
  - Why long-term tracking is beneficial
- Allows efficient programming on F-V curve based on needs

Athlete Individualization

- F-V profiling (if an option)
  - Determines slope of an athlete's production capabilities (17)
  - Train the "missing link"



Athlete Individualization – Autoregulation (In-Season)

- Jump mat testing
  - Quick and easy
  - Athlete grouping based on “fiber type” or individual basis
    - All about appropriate stress
  - Autoregulation article

University of Denver Men's Lacrosse Jump Testing (Just Jump - Hands on Hips) (Best of 3 Jumps)

Name	01/04/2015 (Baseline)	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13
Athlete 1	26.3	24.2	25.1	25.1	24.1	24.6	23.7	23.3	24	23.6	22	23.6	25.6	25.3
Athlete 2	27.5	26.5	25	27.3	27.1	26.8	26.5	25.6	25.9	26.3	25.8	27.7	27.9	29.7
Athlete 3	27.8	25.7	25.9	25.3	26.3	25	24.6	26.3	24.7	26.1	24.9	25.6	26.6	27
Athlete 4	24.3	22.1	23.3	23.9	24.8	23.9	25.1	22.5	22.6	23.1	24.1	23.8	25.1	26.1
Athlete 5	26	26.6	25.2	23.4	26.5	25.6	27.9	26.4	26	27.9	26.2	27.6	25.8	27.1
Athlete 6	22.6	22.4	23.4	22.1	21.5	22.7	23.1	23.8	21.8	22.1	22	22.4	22.8	22.9
Athlete 7	23	22.8	22.4	23.1	21.9	23	22.1	20.7	20.2	20.7	20.5	22.6	22.4	21.4
Athlete 8	25.6	22.4	23.5	23.5	24.6	24.6	24.7	24	24.2	24.9	24.4	23.6	24.3	23.3
Athlete 9	26.9	26	28.8	27	27.6	26.3	26.8	27.3	26.5	25.8	26	26.9	27.4	27.8
Athlete 10	20	20.9	22	21.9	21.5	22.3	22.7	20.7	19.8	21.4	22.7	21.9	21.8	23.3
Average Jump Height	25	24	24.5	24.3	24.6	24.5	24.7	24.1	23.6	24.2	23.9	24.6	25	25.4
Change From Baseline (%)		95.84%	97.84%	97.04%	98.36%	97.92%	98.88%	96.24%	94.28%	96.76%	95.44%	98.28%	99.88%	101.56%
Week to Week Change (%)			102.09%	99.18%	101.36%	99.55%	100.98%	97.33%	97.96%	102.63%	98.64%	102.98%	101.63%	101.68%

Power Training Manual

Pre — Pre-Training, Multi-Dimensional Warm-Up

Block 1 — Lower Body Warm-up

Order	Exercise	Sets		Reps/Duration	Load	Notes
A	Hex Bar Deadlift	1,1,1	x	5,3,3	50-80%	Warm-Up

Perform A as a Warm-Up for Heavier Sets

1:00 Minute Rest Between Sets

Block 2 — Lower Body Power

Order	Exercise	Sets		Reps/Duration	Load	Notes
A	Jump Mat Vertical Testing	AMAP	x	2	BW	Max Height Jump
B	Hex Bar Deadlift	AMAP	x	1,1	65-70%	Cluster Singles
C	JOP Plyo	AMAP	x	3 EA		SL Deceleration, Low Impact

Perform A-C Simultaneously until 5% Drop in Vertical Jump

10 Seconds Rest Between Cluster Repetitions; 1:30 minutes between Rounds

Block 3 — Upper Body Warm-up

Order	Exercise	Sets		Reps/Duration	Load	Notes
A	Bench Press	1,1,1	x	5,3,3	50-80%	Warm-Up
B	Mini-Band Scap Wall Walks	3	x	10 EA	Green	

Perform A & B Series Simultaneously for 3 Sets as a Warm-Up for Heavier Sets

1:00 Minute Rest Between Sets

Block 4 — Upper Body Power

Order	Exercise	Sets		Reps/Duration	Load	Notes
A	Bench Press	4	x	2,2	65-70%	Cluster Doubles
B	One Arm Med Ball Pass	4	x	5 EA		Use Hips

Perform A-B Simultaneously for 4 Sets

25 Seconds Rest Between Exercises; 2:00 minutes between Rounds

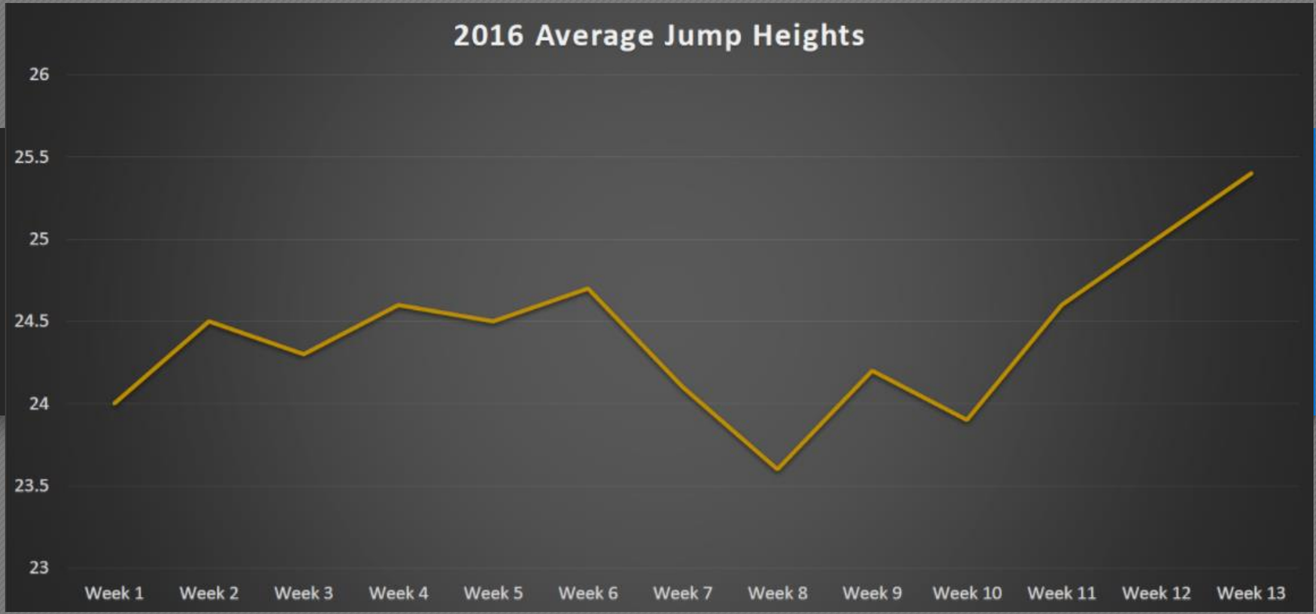
Block 5 — Lower Auxiliary Power

Order	Exercise	Sets		Reps/Duration	Load	Notes
A	DB Step Up	3	x	5 EA	65-70%	
B	Split Stance Cable Rot. Row	3	x	5 EA		
C	DB RDL	3	x	5		

Perform A-C Simultaneously for 3 Sets

30 Seconds Rest Between Exercises

Conclusion



- Create usable strength for athletes
  - Strength lays foundation, but not end goal for elite athletes
- Complete quality programming
  - Energy system development early in off-season
  - More specific to requirements of RSA sports
  - Maintain velocity by minimizing fatigue
- Understand your athletes needs on an individual/group basis
  - Autoregulate to attain desired stress/adaptation
  - Prepare athletes to WIN, at macro and micro levels
- Keep your goal, the goal
  - On-field performance and efficiency
  - Maximize power at desired velocity
  - Work general to specific

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