

Sub-Maximal High Velocity Peaking Method

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The Spectrum of Athletes

- Athletes can be divided into being either highly *Reactive* or *Straining*
- Depending on the sport, the coach must analyze its competitive demands and decide which type of nervous system is optimal
- Do you want your athlete to strain like a Powerlifter or be as reactive as a Shot-putter?



The Reactive Athlete



The Reactive Athlete

Example:

- 2 shot-putters at the University of Minnesota
- Both had a 1RM Back Squat of 600
- Thrower 1 could execute his 1RM in 1.5 seconds
- Thrower 2 could execute his 1RM in 2.7 seconds(Both lifts measured concentrically)
- To someone who did not know either athlete's max, Thrower 1 would appear to be able to squat 650lbs
- Take home message: even though the athlete could do 600 in 1.5 seconds, it does NOT necessarily mean he will be able to squat more
- Why not?



The Reactive Athlete

- What did this mean for the throwers?
- The difference in nervous system accounts for everything
- Thrower 1 is highly reactive(a.k.a Explosive, fast twitch, 'wired')
- Thrower 2 is shifted more towards the straining nervous system
- As a result, Thrower 1 threw 8-12 feet farther than Thrower 2



Training the Nervous System



Case Study: Minnesota Thrower

- Athlete 1 comes to Minnesota benching 315
- It is decided he will only throw the hammer and abandon the shot put
- Upper body exercises were minimalized
- Olympic lifts, squats, and plyometrics emphasized
- 6 months later, bench press was retested to see if he had lost strength
- Result: Bench press increased to 365
- Training the nervous system in the lower body positively affected upper body strength



Example 3: Minnesota Hockey

- Took 6 athletes and trained at sub-maximal high velocity loads
- Loading varied from 25/30% -50%
- Athletes were chosen based on greatest need for speed and explosiveness
- Athletes had been in the Gopher strength program for 3 years, so strength levels were fairly high



Example 3: Minnesota Hockey

- 6 weeks spent developing a base
- Last 12 weeks of summer spent completing a High speed/ High velocity program
- At the end of the 6 week base period, strength was high, but at a lower velocity
- Example: 1 athlete could bench 285, but it was a strained, slow, effort
- At the end of this 12 weeks period, the same athlete benched 325 at a high velocity/speed
- The athlete effectively switched from a highly straining to a highly reactive nervous system



Training vs. Sport: Bridging the Gap

- Training usually occurs at a much lower velocity than it does in the actual competitive sport
- Ex: Shotput at release is around 14m/s; most Dynamic Effort bench speeds(50% of 1 RM) only reach around 0.8 - 1m/s
- Dynamic correspondence dictates that towards the competitive season, velocity must increase to make the nervous system more sports specific
- This system built with the ultimate goal of peaking



Antagonistically Facilitated Specialized Methods of Training

Squat Drop Jump



Antagonistically Facilitated Specialized Methods of Training

- What is it?
- Based on Sherrington's Law of Reciprocal Inhibition
- AFSM training is also centered on the research of one of the USSR's leading Sports Scientists, Leo Matveyev



Antagonistically Facilitated Specialized Methods of Training

- Quick Review: Sherrington's Law of Reciprocal Inhibition- In order for an agonist to contract, the antagonist must relax
- How does this apply to Matveyev's research?
- Matveyev found that one of the key differences between low and elite level athletes is speed of contraction and relaxation
- Elite athletes not only turn muscles on quickly, but they also relax them quickly!



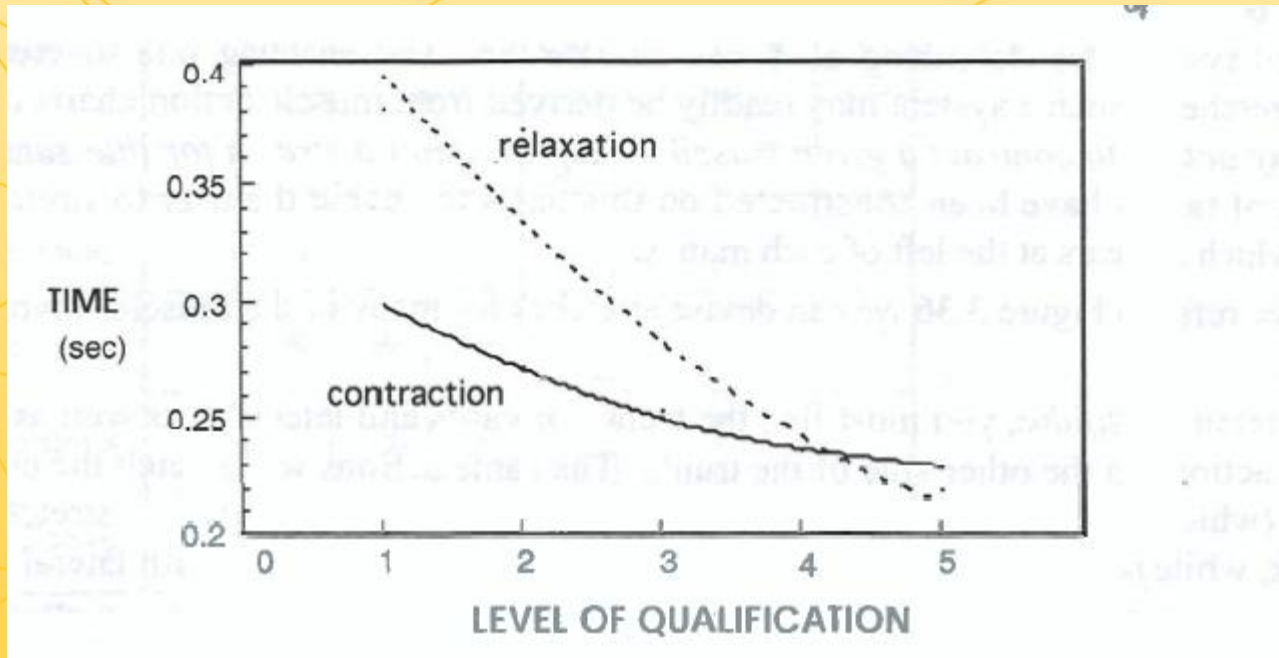
Antagonistically Facilitated Specialized Methods of Training

- Matveyev found that elite athletes could relax their muscles almost 200% faster than novice athletes
- Even Level 4 athletes(right below Master of Sport in the USSR system) were approximately 50% slower in relaxation speeds than Master's of Sport



Antagonistically Facilitated Specialized Methods of Training

Matveyev's Research



Level 1= Novice

Level 2= Class 3 Athlete

Level 3= Class 2 Athlete

Level 4= Class 1 Athlete

Level 5= Master of Sport

Adapted from *Supertraining, 6th Edition, Ch. 3*



AFSM: How to Apply

- We must utilize the Stretch Shortening Cycle(SSC)
- Why? Much higher levels of stored eccentric energy can be reapplied more forcefully towards the concentric movement
- So what do we do?
- Answer: AFSM Plyometrics
- It simple - Push and Pull or Pull and Push



AFSM Plyometrics

- Similar to traditional plyometrics(i.e. Squat jump)
- Key Difference: AFSM requires the forceful contraction of the antagonists, with simultaneous relaxation of the agonists prior to the movement's concentric action



AFSM Plyometrics

Traditional Squat Jump

Squat Drop Jump



AFSM Plyometrics: How to Coach?

- Athlete can be told to pull themselves into position using the hip flexors
- Once the athlete's feet hit the ground, cue them to drive off as forcefully as possible
- When watching the athlete, look at the joint's stiffness to determine if the athlete can withstand the powerful eccentric force while minimizing ground contact time
- If the athlete cannot maintain joint stiffness or has excessive ground contact time, readdress eccentric and/or isometric strength



AFSM Shock Training

- More similar to Verkhoshansky's shock/ depth jumps
- In application, athlete would stand on a box of at least 12 inches
- He or she falls off and pulls their body into the power position(back flat, knee joint of 45-60⁰)
- Joint stiffness is maintained and ground time should be as brief as possible
- After ground contact, athlete jumps onto a higher box(Could also use a Vertec or similar marker)



AFSM Shock Training Example

Drop Rebound Box Jump



AFSM High Velocity Strength Training

- External load use of approximately 55%
- Highly qualified/Elite athletes can use upwards of 75-80%
- For the back squat, athlete will pull themselves into position (Coach can set depth), and powerfully reverse the direction
- If using a Tendo, look for speeds near 1 m/s²



AFSM High Velocity Oscillatory Training

Single Leg Oscillatory Squat



AFSM: High Velocity Oscillatory Method

- Enhance the intermuscular coordination of opposing muscle groups
- Oscillatory contractions performed with 20-55% of 1Rm
- Range of motion is very small(4-6in.)
- Must contract and relax as quickly as possible
- Performed at either an advantageous or disadvantageous joint angle



AFSM High Velocity Oscillatory

- Bench Press
Advantageous and
Disadvantageous OC
- Hex Bar SL Deadlift
Advantageous and
Disadvantageous OC



AFSM Training: Word of Caution

- AFSM training can be very strenuous on the CNS - Advanced handle well
- Track the amount of contacts
- Elite athletes may need more(30-50) whereas novice athletes may need only 20
- Keeping 6 seconds of rest between jumps will ensure that quality is upheld
- Do not progress to AFSM training unless the athlete has developed a general level of strength



Tri Phasic Undulating Model

Load	Day 1	Day 2	Day 3
Heavy	85-90%	92-100%	75-82%
Light	65%	75-80%	45-55%
Sub Max High Velocity	35-40%	45-50%	25-30%

	Day 1	Day 2	Day 3
Volume	Medium	Low	High



Sub-Maximal High Velocity Day

- Used near the competitive season as a peaking method
- Utilizes very light loads from 25-50% in order to move at higher velocities
- Higher velocity movements are more closely associated with most sporting actions



Sub-Maximal High Velocity

- McBride et al. compared peak power at 3 different intensities(30%, 60%, 90%) of 1RM Squat among powerlifters and Olympic weightlifters
- Each performed a squat jump at each intensity
- Peak power was greatest at 30% and 60%



Relaxation: the Missing Link

- Relaxation is paramount in facilitating the subsequent contraction of the agonist muscles
- The issue is NOT how fast can the athlete contract, but rather how fast can he or she *relax*
- AFSM will bridge the gap between novice and elite athletes by increasing intermuscular coordination and decreasing time to relaxation and contraction



Exercise Demonstrations

- DB Bench Press
- DB Incline Bench
- Bench Press
- Iso Back Ext+ DB Row
- DB Shoulder Press
Oscillatory-
Disadvantageous



Exercise Demonstrations

- [Lateral Delt Rebound Drops](#)
- [Bicep Curl Speed Drop](#)
- [Bicep OC A](#)
- [Bicep OC D](#)
- [DB JM Press](#) - Full
- [Leg Press OC](#)
- [DB Single Leg Squat](#)
- [Hex Bar Single Leg DL](#)
- [Glute Ham OC](#) - More Reactive Athlete
- [Glute Ham](#) - More Endurance Athlete



Exercise Demonstrations

- [Single Leg Back Squat](#)
- [Speed Switch Lunge](#)
- [Speed Cycle Jump Lunge](#)
- [Squat Drop Jump](#)
- [Glute Bar Lifts](#)
- [Hurdle Hop](#)
- [Reactive Page](#)

For more exercises, visit
www.XLAthlete.com



Accelerated Method of Training for Plyometrics

- Allows for faster turnover rate of the muscles
- Teaches the body to move faster and higher than it normally is capable of (Overspeed)
- Unloads the body in the bottom, thereby allowing the tendons to complete a powerful concentric using a load lighter than their bodyweight
- Increases the explosive capacity of the Stretch Shortening Cycle and beneficial joint stiffness qualities



Accelerated Method of Training for Plyometrics

Assisted Band Split Lunge Jump

Assisted Band Squat Jump

Mimic Speed of Sport - This Method Evolved
Single Leg Versus Double Leg



Timed sets

- Benefits Include:
 - Energy System Specificity
 - Built in capacity for competition(Who can get the most reps?)
 - Increases work density/capacity: Can the athlete complete more reps in a fixed period of time?



Timed sets

- Can be performed to improve various qualities(i.e. strength, endurance, etc..)
- **Strength** : 5-3-7 or 7-5-10
- **Speed strength**: Same intervals used for strength but lighter loads
- **Strength endurance**: 15-10-17 or 25-17-32
- **Endurance/work capacity**: 25-17-32, 32-25-40



Sets for Time in Undulated Model

Triphasic Loading For Timed Sets	Day 1 – Loading Volume-Medium Load - Medium	Day 2 – Loading Volume- Low Load - High	Day 3 – Loading Volume- High Load -Low
Strength Athlete	5 Seconds	3 Seconds	7 Seconds
Strength Athlete	7 Seconds	5 Seconds	10 Seconds
Strength Endurance	15 Seconds	10 Seconds	17 Seconds
Endurance Strength	25 Seconds	17 Seconds	32 Seconds
Endurance	32 Seconds	25 Seconds	40 Seconds
Endurance	40 Seconds	32 Second	47 Seconds



Timed Sets

- These numbers corresponds to the Tri Phasic Model
- Example: a strength timed set may utilize 5 sec. sets on Mon., 3 sec. sets on Wed., and 7 sec. sets on Friday

- Specific examples:

Shot put: 5-3-7sec up to 7-5-10 second model

Distance swimmer: 32-25-40

Hockey: 15-10-17 7-5-10

- * *Note within work capacity, peaking, and endurance, there is lots of variability/adaptability**



Hang clean	T	80 - 90	1	0:0:0:0:5:10
Rest 90 BB/HR 105				
Hang clean	T	80 - 90	1	0:0:0:0:5:10
Rest 97 BB/HR 105				
Hang clean	T	80 - 90	1	0:0:0:0:5:10
Rest 110 BB/HR 105				
Hang clean	T	80 - 90	1	0:0:0:0:5:10
Rest 120 BB/HR 105				
Hang clean	T	80 - 90	1	0:0:0:0:5:10

Single Leg Squat	T	50 - 55	4	0:0:0:0:5:10
Pair w/				Oc + 1
20% Bwt Speed St Up	5		4	
20% Bwt Speed St Up				

DB BENCH	T	40 - 45	3	0:0:0:0:5:10
Rest 75 BB/HR 105				Oc + 1
DB BO Row	T	35 - 40	3	0:0:0:0:5:10
Rest 75 BB/HR 105				OC
Glute Rack Band Push	T		3	0:0:0:0:5:10

DB Shoulder Press	T	20 - 20	1	0:0:0:0:5:10
Rest 75 BB/HR 105				Oc + 1
Band Lat Pull	T	\$N/A .. \$N/A	1	0:0:0:0:5:10
Rest 75 BB/HR 105				Chin Grip
JM Press	T	40 - 50	1	5sec oc+1

Single Leg Squat OC

DB Bench OC

Dumbbell Bent Over Row OC

DB Should Press Oc



Hang Snatch	T	60 - 65	1	0:0:0:0:7:10
Rest 90 BB/HR 105				
Hang Snatch	T	60 - 65	1	0:0:0:0:7:10
Rest 97 BB/HR 105				
Hang Snatch	T	60 - 65	1	0:0:0:0:7:10
Hang Snatch	T	60 - 65	1	0:0:0:0:7:10
Rest 110 BB/HR 105				
Hang Snatch	T	60 - 65	1	0:0:0:0:7:10
Rest 120 BB/HR 105				
Hang Snatch	T	60 - 65	1	0:0:0:0:7:10

Hex Deadlift	SN	260	310	3	WU/5,3,1
					Push/pull
Hex Deadlift	T	75 - 95	4		0:0:0:0:7:10
Rest 90 BB/HR 105					no touch
20% Bwt SQ Jump	6		4		Drop/Reactive
Rebound Box Jump	3	*N/A .. *N/A	4		Small/ Big

Bench Press	T	75 - 85	3	0:0:0:0:7:10
Rest 75 BB/HR 105				
DB BO Row	T	25 - 30	3	0:0:0:0:7:10

Hip Flex Iso Prone	T	*N/A .. *N/A	3	0:0:0:0:7:10
Rest 75 BB/HR 105				Oc
DB Shoulder Press	T	20 - 20	3	0:0:0:0:7:10
Rest 75 BB/HR 105				2oc d + 1
DB Tri Ext	T	15 - 15	3	0:0:0:0:7:10

Incline Side DELT Raise	T		3	0:0:0:0:7:10
Rest 75 BB/HR 105				
ANT TIB BND	T		3	0:0:0:0:7:10

Hang clean	T	80 - 90	1	0:0:0:0:5:10
Rest 90 BB/HR 105				
Hang clean	T	80 - 90	1	0:0:0:0:5:10
Rest 97 BB/HR 105				
Hang clean	T	80 - 90	1	0:0:0:0:5:10
Hang clean	T	80 - 90	1	0:0:0:0:5:10
Rest 110 BB/HR 105				
Hang clean	T	80 - 90	1	0:0:0:0:5:10
Rest 120 BB/HR 105				
Hang clean	T	80 - 90	1	0:0:0:0:5:10

Single Leg Squat	T	50 - 55	4	0:0:0:0:5:10
Pair w/				Oc + 1
20% Bwt Speed St Up	5		4	
20% Bwt Speed St Up				

DB BENCH	T	40 - 45	3	0:0:0:0:5:10
Rest 75 BB/HR 105				Oc + 1
DB BO Row	T	35 - 40	3	0:0:0:0:5:10
Rest 75 BB/HR 105				OC
Glute Rack Band Push	T		3	0:0:0:0:5:10

DB Shoulder Press	T	20 - 20	1	0:0:0:0:5:10
Rest 75 BB/HR 105				Oc + 1
Band Lat Pull	T	*N/A .. *N/A	1	0:0:0:0:5:10
Rest 75 BB/HR 105				Chin Grip
JM Press	T	40 - 50	1	5sec oc+1

Squat Jump	▼	80 - 85	2	2% - Tendo	
PW/ 25 Rest BB					0:0:0:3
Dual Action Bar Rows	T	\$N/A .. \$N/A	2	Speed/Drop	
PW/ 25 Rest BB					0:0:0:7:10
Leg Press Calf Raise	T		2		0:0:0:0:7:10

Hex Deadlift	T		2		0:0:0:0:5:10
PW/ 20 Rest BB					Iso
Cuban PRSS INC F8	3		2		0:5:0:0
					no touch
Hex Deadlift	T	100 - 115	2		0:0:0:0:7:10

Single Leg Squat	T	40 - 45	3		0:0:0:0:7:10
PW/ 20 Rest BB					OC-D
Hip Flex Prone	T		3		0:0:0:0:7:10
PW/ 20 Rest BB					OC-D
Lat Pull Chin Grip	8	125 - 135	3		0:0:0:0:7:10

DB BENCH	T	25 - 30	3		0:0:0:0:7:10
PW/ 32 Rest BB					oc-D
GH HYPR Incline	T	\$N/A .. \$N/A	3		0:0:0:0:7:10
PW/ 36 Rest BB					oc-A
DB Shoulder Press	T	15 - 20	3		0:0:0:0:7:10
DB Tri Ext	T	15 - 15	2		oc-D
PW/ 18 Rest BB					0:0:0:0:7:10
Lat Pull Down	T	50 - 60	2		0:0:0:0:7:10
PW/ 18 Rest BB					
Band Push Back	T		2		0:0:0:0:7:10

Hex Deadlift	▼		2		0:0:0:0:5:10
PW/ 21 Rest BB					Iso
Dual Action Bar Rows	T	\$N/A .. \$N/A	2	Speed/Drop	
PW/ 21 Rest BB					0:0:0:0:17:10
Leg Press Calf Raise	T		2		0:0:0:0:17:10

Squat Drop Jump	T	\$N/A .. \$N/A	2		0:0:0:0:5:10
PW/ 27 Rest BB					
Cuban PRSS INC F8	3		2		0:5:0:0
Hex Deadlift	T	85 - 105	2		0:0:0:0:17:10

Single Leg Squat	T	30 - 40	2		0:0:0:0:17:10
PW/ 32 Rest BB					
Hip Flex Prone	T		3		0:0:0:0:17:10
PW/ 32 Rest BB					
Lat Pull Chin Grip	T	55 - 65	3		0:0:0:0:17:10

DB BENCH	T	20 - 25	2		0:0:0:0:17:10
PW/ 32 Rest BB					
GH HYPR Incline	T	\$N/A .. \$N/A	3		0:0:0:0:17:10
PW/ 32 Rest BB					
DB Shoulder Press	T	20 - 20	3		0:0:0:0:17:10
DB Tri Ext	T	15 - 15	2		0:0:0:0:17:10
PW/ 18 Rest BB					
Lat Pull Down	T	55 - 65	2		0:0:0:0:17:10
PW/ 18 Rest BB					
Band Push Back	T		2		0:0:0:0:17:10

Tri-phasic Loading Guidelines

Triphasic Loading For Timed Sets	Day 1 – Loading Volume-Medium Load - Medium	Day 2 – Loading Volume- Low Load - High	Day 3 – Loading Volume- High Load -Low
Above 80 Loading	85-87.5 %	90-100%	80 %
Reps	1-2 Reps	1 Rep	3- Reps
80- 55% Loading	65 – 75%	77.5-80%	50 – 60%
Reps	1,2,3 Reps	1-2 Reps	5 Reps
50-30% Loading	35-40 %	50%	25-30%
Reps	Ideal Time	Below Ideal Time	Above Ideal time



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Full Range of Motion vs. Oscillation

- Full range of motion is given priority during general preparation phases(ex: early-mid off season)
- Full range of motion still utilized as competition season nears, but not as much
- Oscillatory exercises phased in closer to the competitive season
- Why? It is better to implement high velocity strength training with 30% loads in order to peak the athlete



Charting progress

- Benefit of timed sets, in addition to specific energy system development, is the ability to always attempt to set new PR's
- Athletes at Minnesota all have boxes on their workouts to indicate how many reps were performed during a set
- Next workout, they attempt to move faster in that given timed set to achieve more reps
- Must Train Fast



Any questions?

- [Sample Program – Download](#)
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