

# 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!



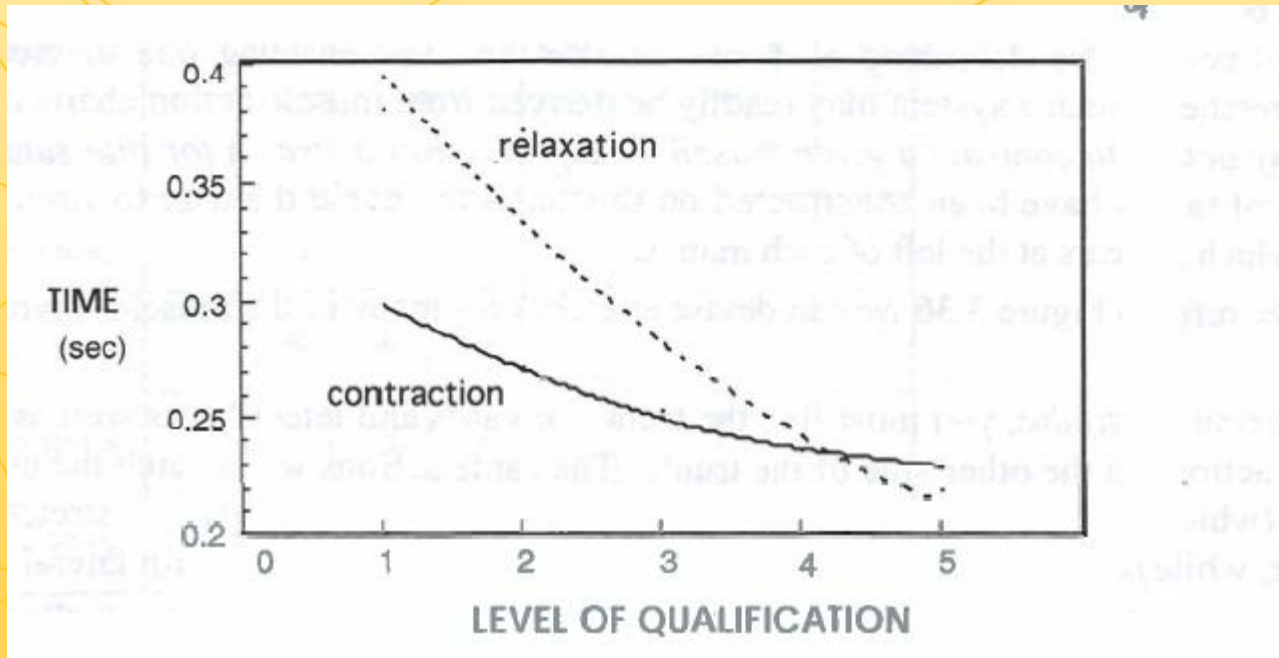
# Antagonistically Facilitated Specialized Methods of Training

- 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*, 6<sup>th</sup> 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



# 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 45-60<sup>0</sup>)
- 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/s<sup>2</sup>



# 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
- 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](#)
- [Leg Press](#)
- [DB Single Leg Squat](#)
- [Hex Bar Single Leg DL](#)
- [Glute Ham OC](#)



# Exercise Demonstrations

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

For more exercises, visit  
[www.XLAthlete.com](http://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



# 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



# 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\*\*



# 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



# Any questions?

- [Sample Program - Download](#)

