

# *Applying Concurrent Training Methods for Total Athletic Development Lifts, Jumps and Sprints*

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# Total Athletic Development?

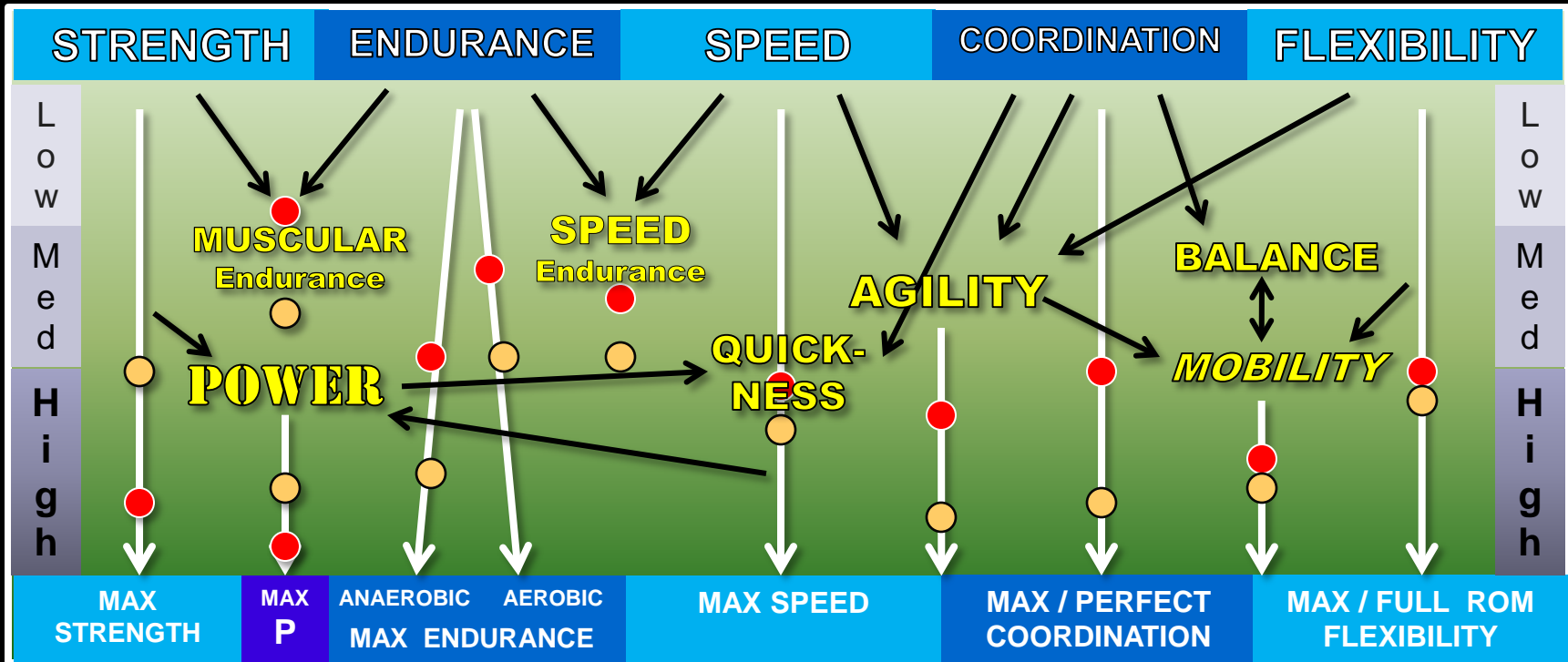
## What is Athleticism?

- the state of being an athlete
- a show of athletic prowess
- physically active and strong; good at athletics or sports  
- of, like, or befitting an athlete - involving the use of physical skills or capabilities, as strength, agility, power, speed, mobility or stamina.



# Biomotor Abilities

- what are the athlete's needs?



● = Football OL

● = Basketball G



# Strength is Individual

**Everyone's  
Not A Big Dog.**

**Everyone Can  
Become  
Stronger and  
Develop  
Athleticism.**

**Maximize  
Their Genetic  
Potential**



# Maximum Speed vs. Athletic Speed



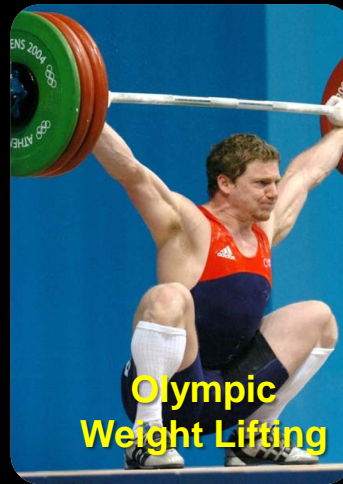
- **Maximum Speed – Track speed**  
(no tactical agility involved)
  - Product of Stride Length, Stride Frequency and Mechanics
- **Athletic Speed – Optimum sport specific speed:**
  - Acceleration & Deceleration
  - Footwork & Agility
  - Work Capacity
  - Determined by the sport, position, level and style of play.





# Truths of Athletic Development

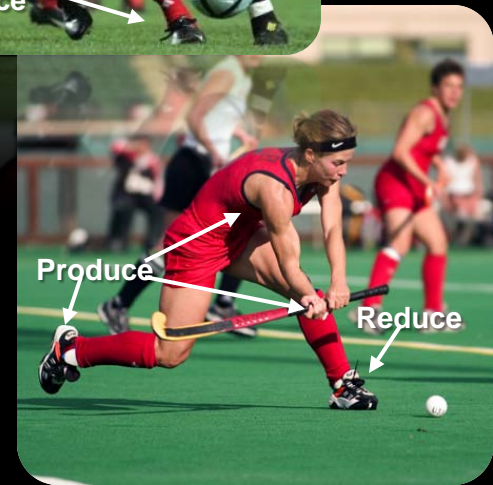
1. Exclusively lifting heavy, building big muscles, doing Olympic lifts, doing speed & agility drills, or plyos alone are not good enough, *you need to implement several methods of training to optimally develop sports performance.*



**PROGRAM INGREDIENTS**

# Truths of Athletic Development

2. In all sports that involve complete athleticism (sport speed, strength, power, agility, mobility) athletes who can produce and reduce high force at high speed throughout a game are at an advantage. (Plyos)



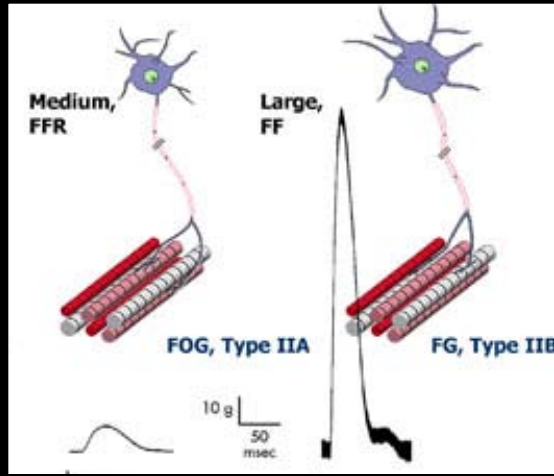
# Truths of Athletic Development

3. Speed of movement, strength and explosive power are related; athletes with higher power-to-body-weight ratios execute faster, and dominate athletics. (Plyos)





# Truths of Athletic Development



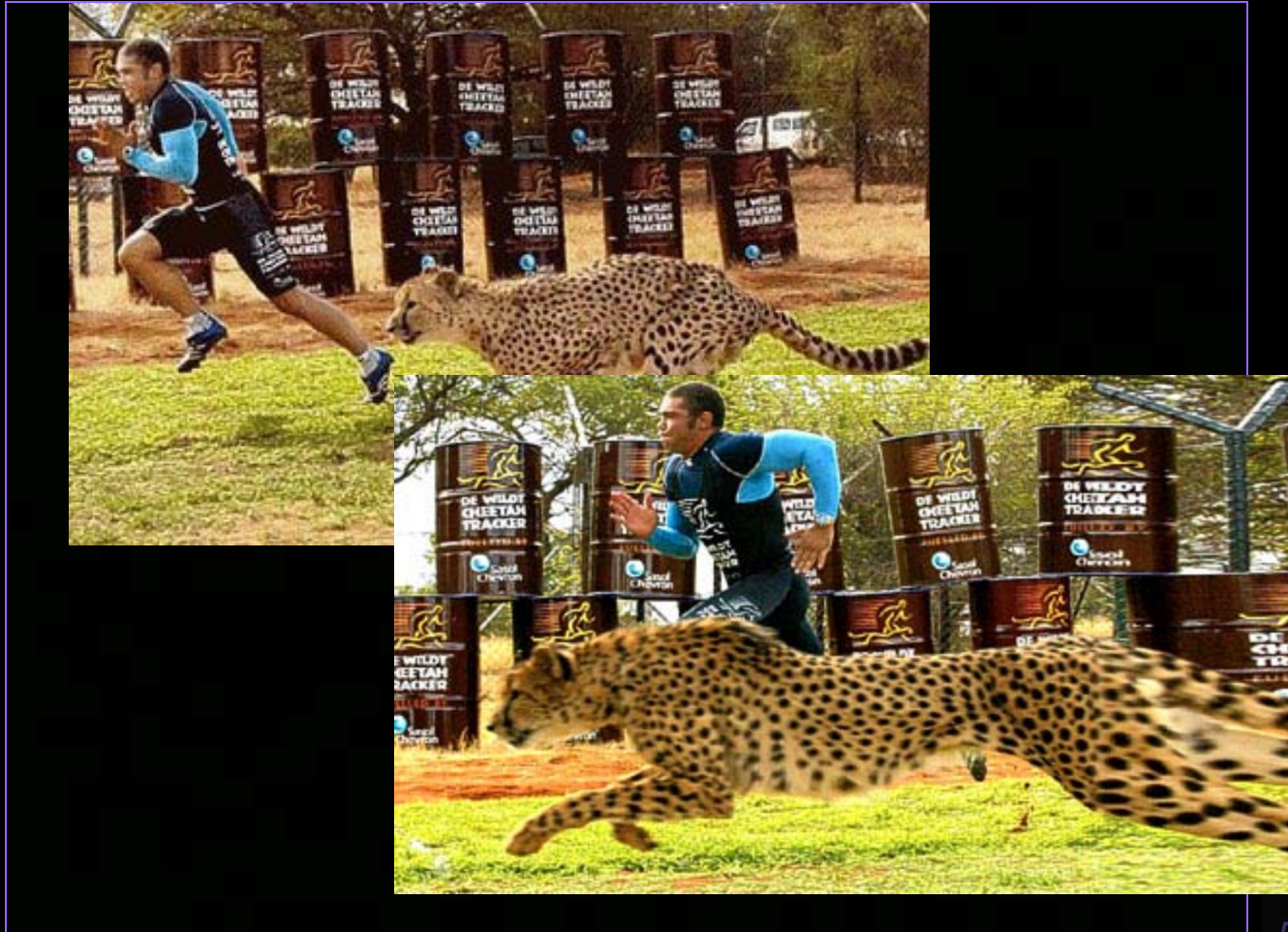
4. By doing the proper lifts, jumps and sprints *in a game-like metabolic state* you will increase the sport specific horsepower of your engine – **your fast twitch motor units.**



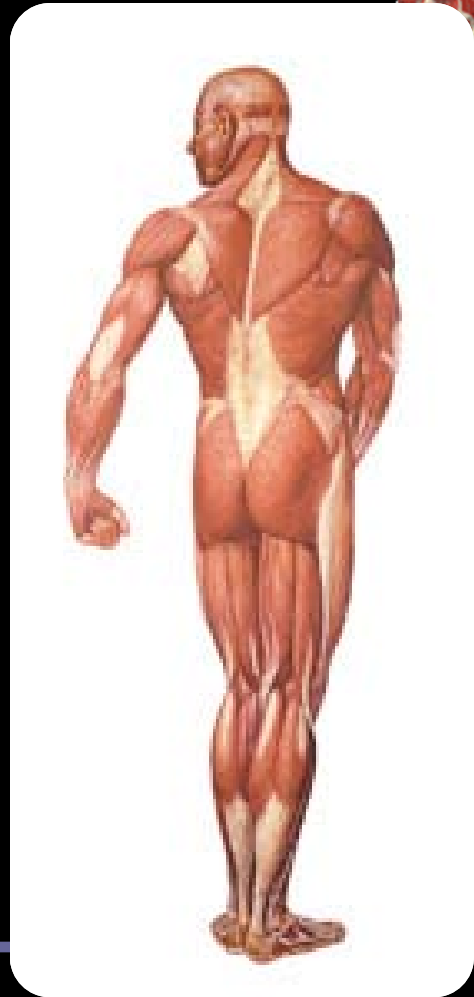
**Put A Bigger Engine In Your Car.**



More horsepower = **greater acceleration**  
& **deceleration** = greater athletic speed.



# Study this structure. Function?



# Rules of Productive Strength Training

(Lou Schuler and Alwyn Cosgrove, New Rules of Lifting)

1. The best exercises are the ones that use your muscles the way they're designed to work. Basic human movement.

Athletic exercises.





# Rules of Productive Strength Training

(Lou Schuler and Alwyn Cosgrove , New Rules of Lifting)

2. Exercises that use **lots of muscles in coordinated action** are better than those that force muscles to work in isolation.

Your sport doesn't isolate muscles neither should your training.

***Free weights are best.***



# Rules of Productive Strength Training

(Lou Schuler and Alwyn Cosgrove, New Rules of Lifting)

3. To build athletic performance you must build **strength**.

All the good things you want from strength training come from **building stronger, more powerful muscles.**



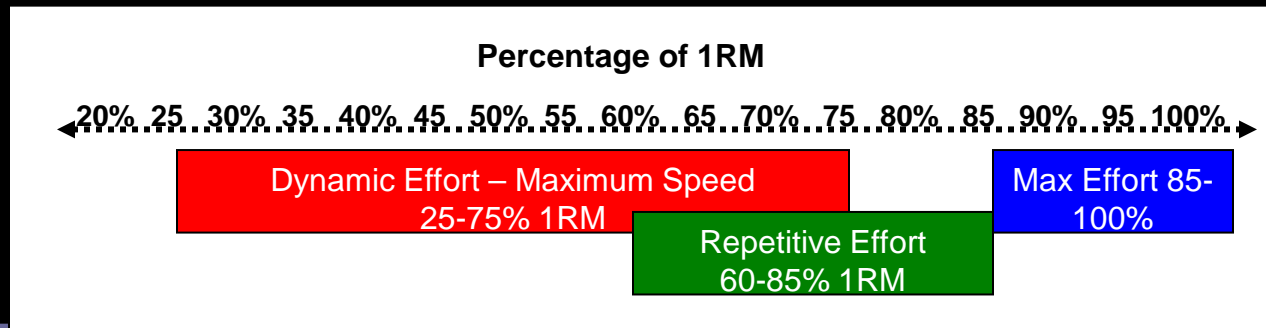
# Concurrent Training

- To train using multi-methods within one workout or one microcycle.
- Strength, Power, Hypertrophy, Speed and Agility can be progressively developed simultaneously in a concurrent multi-method program.



# Concurrent Training Methods

- The three methods for developing force and overloading the fast motor units are (Vladimir M. Zatsiorsky):
- **Max Effort – Maximum Strength** (Strong/Heavy reps)
  - 85-100% 1RM (Heavy)
- **Dynamic Effort – Explosive Strength** (*Speed reps*)
  - Submax Load at Max Speed (Explosive)
  - *Plyometrics – SSC activities, reactive/reflexive*
  - Overload/Resisted and Overspeed/Assisted Sprints
  - Speed, Agility and Footwork Drills
- **Repetitive Effort – Strength Endurance** (Burn reps)
  - Submax loads almost to failure (Fatigue)
  - Lactate tolerance training
  - Work capacity circuits: BlitzFit, Tabata, Brazilian, Fartleks, Cross Fit, 300's





# Equipment needed

- Power Rack
  - Pull-up bar
- 0-90 Bench (Decline-90)
- Barbell and Dumbbells
- Glute-Ham Bench
- Weight Sled
- Hurdles
  - Low and high
- Overload Harness or Belt
- Jump Stretch Bands
- 40+yd sprint area
- Cones
- Physio-Ball
- Foam Roller



- Plyo Boxes
- Medicine Balls



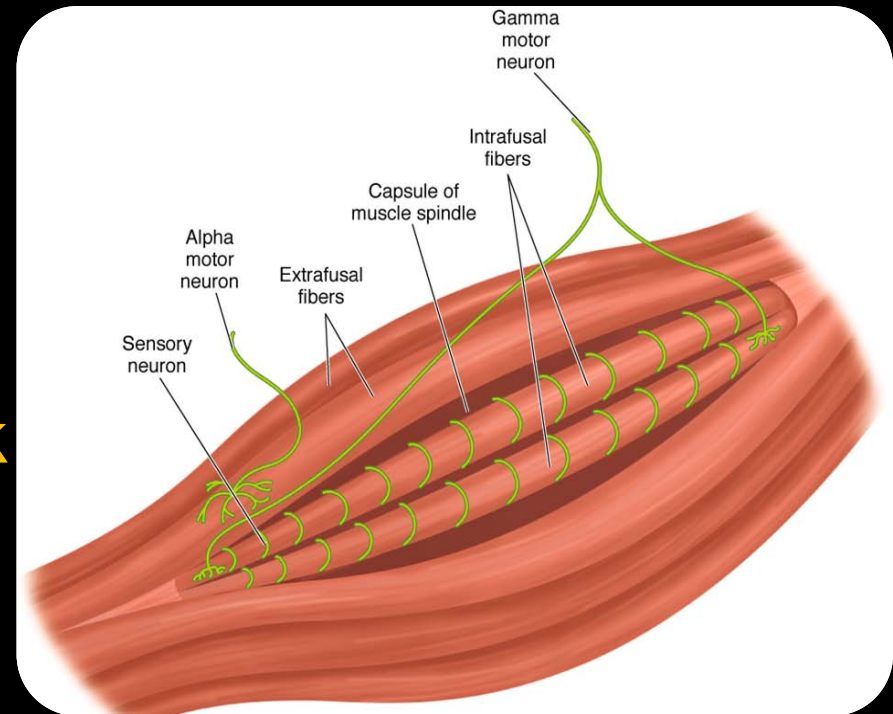
# What Is Plyometrics?

- High-velocity resistance training characterized by a ***rapid eccentric contraction followed immediately by a rapid reversal of movement w/ a concentric contraction of the same muscle***
- High velocity eccentric to concentric muscle loading, reflexive reactions, & functional movement patterns
- Plyo – means “to increase”    Metric – means “to measure”
- **Main purpose** – heighten the excitability of the nervous system for improved reactive ability of the neuromuscular system

# What's Trainable

- for total athletic development?

- Elastic Energy - Stretch Shortening Cycle
- A quick forceful eccentric/stretch will be followed by a quick forceful concentric.
  - Finger example
    - Voluntary contraction
    - SSC contraction
    - Combined contraction
    - Negative tension Combined contraction



Muscle spindle – myotatic stretch reflex

# Plyometric Terminology

- Jump - two legs to two legs
- Hop - right leg to right leg or vice versa
- Bound - right leg to left leg
- Skip - two foot contacts per foot.



# Plyometrics - Where Do You Begin?

- Lower Body- develop eccentric strength first
- Pursue elasticity and rebound with care
  - Be progressive
- Upper Body- don't start with bodyweight plyometric exercises. ( Push up etc.)
  - Med Balls
  - Fast Barbells

- As stretch loads are better tolerated, there may be an ability to create a stronger stretch reflex that results in ↑ power during the concentric phase

# Plyometric Misinformation – Don't believe everything you read.

- You need to be able to squat 2x's bodyweight? This only eliminates about 90 % of all the athletes I have ever coached.
- Don't do plyos with young kids! I jumped around my whole childhood.



# Good Plyos are Quiet Plyos

- Athletes who perform plyometric drills well are literally seen and not heard.
- Does the sound make a difference?
- Absolutely! Every noise you hear on a box, track or floor is being transferred to a joint somewhere.



# What's Trainable

- for total athletic development?



- Equal & Opposite Force
  - Apply force to the ground in order to project your body forward, backward, lateral, or vertical, or to project your opponent or a projectile away from or toward you.
  - **Teach your athletes to apply force to the ground.**



# What's Trainable

- for total athletic development?

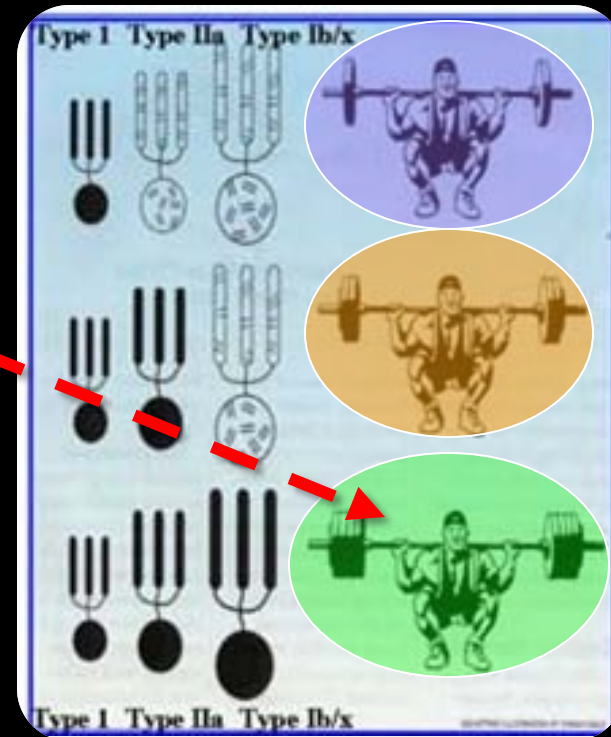
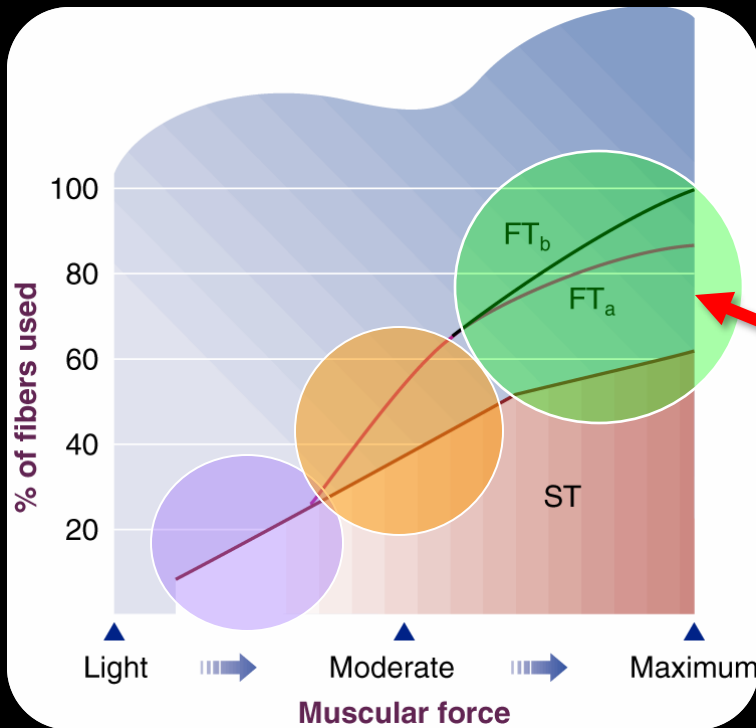
- **Leg Strength:**
  - The determining factor in speed <100m is leg strength/power.
- **Mechanics** is critical – a sprinter cannot be successful without sound mechanics. **That said, the most important factor is the ability to generate large amounts of explosive force.** Dr. Ralph Mann—one of the world's top authorities on biomechanics
- **Multi-joint Max and Dynamic Effort lifts** are the most effective at increasing strength and power.



# Max Effort Rationale

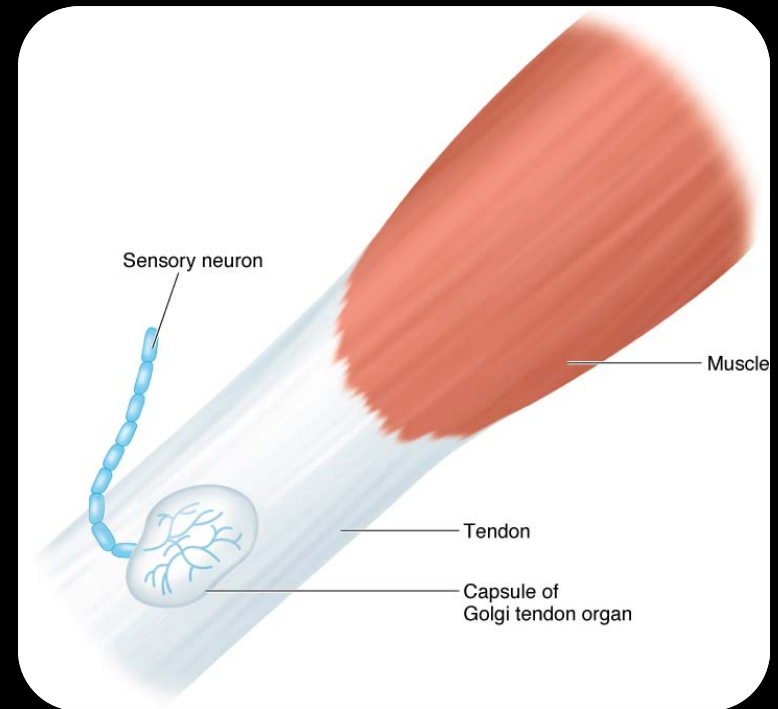
- the size principle

- Used to recruit high threshold Fast Twitch Motor Units (FT fibers)



# Max Effort Caution

- If you're failing on heavy reps you're activating your GTO's and you are slowing your progress toward strength gains.
- On Max effort sets your goal is to train close to the GTO's threshold without exceeding it.
  - **Make It Hard Without Failing.**
  - Teach your Body to Succeed, Not Fail.
  - Strain!!



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# Max Effort Caution

- Successful Max Effort training produces an inhibition response of Golgi Tendon Organ activation.
- Max effort sets should only be used once a week per muscle group.





# Top Strength Exercises

- Squats (front, deep, parallel, ½, box)
- Deadlifts (sumo, conventional, Hex bar, RDL)
- Presses (bench press: flat, incline, decline, board press, floor press, military press, dips)
- Pulls (pull-ups, chin-ups, bentover row, pulldowns, seated rows, upright rows)



# Mobility

## Hurdle Over & Unders



# Back Squats



# Target ROM Training

- The output force or torque that any muscle can produce changes with joint angle.
  - the greatest force usually being possible after the joint has passed through the midpoint of the movement.
- With full ROM training **the overload stimulus is only being realized at the weakest point along the range of motion.** This means that the stronger points are being under loaded.



# 1/2 Squats

(Br J Sports Med, 38:285-288, 2004)

- Norwegian researchers showed that Maximum strength in half squats was highly related to sprinting ability (0-30m and 10m shuttle run) and vertical jump height.



# 1/4-1/2 Squat





# What's Trainable

- for total athletic development?



- Impulse Production
  - The brief execution times of most athletic movements require **high rates of force development.**

- **Dynamic Effort**



# What's Trainable

- for total athletic development?

- Impulse Reduction
  - Quick stops and changes of direction require **high rates of force reduction** (*eccentric and isometric strength*).



# Fast Lifts vs. Slow (2-0-2 vs. 1-0-X)

*The American Journal of Sports Medicine, March-April 1998 v26 n2 p221(10)*

- *Fast Squats compared to slow squats:*
  - *In the long jump, the **fast group was superior in total-body vertical and absolute power.***
  - *In the vertical jump, fast training affected the ankle and hip more (e.g., average power), and **slow training mostly affected the knee (average, torque).***
  - *Although both slow and fast training improved performance, faster training showed some advantages in quantity and magnitude of training effects.*



# Explosive Compensatory Acceleration Training

- According to Newton's second law (**Force = mass × acceleration**), an increase in acceleration will increase muscle tension and enhance the training effect of any resistance exercise.



# Dynamic Effort Rationale

## Power Output

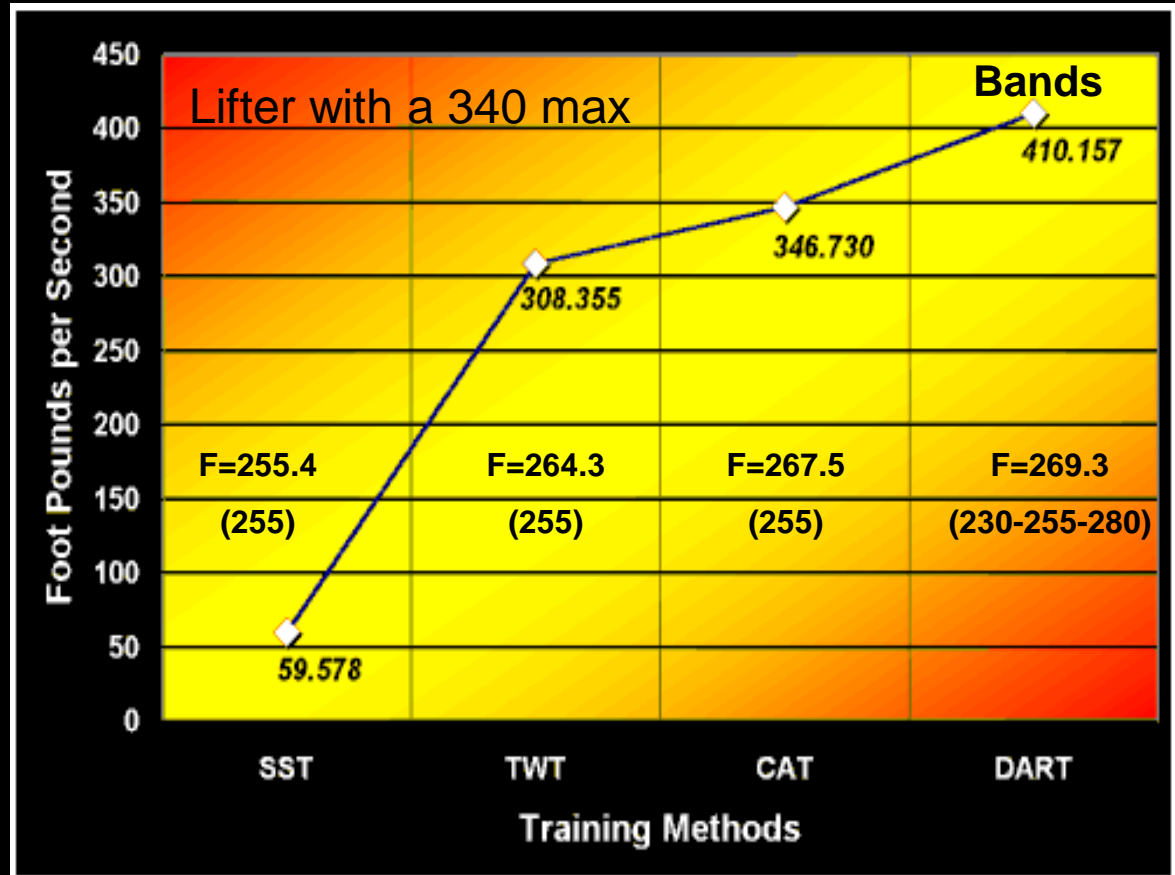
Graph {ft.lbs/sec} lifting a 75% load

**SST** = super slow training, 255, 5-0-5

**TWT** = trad. weight training, 255, 2-0-1

**CAT** = compensatory acceleration training, 255, 2-0-X

**DART** = Dynamic Accentuated Resistance Training, 230-255-280, 2-0-X



Mike Berry, Power-Up USA, Inc., ([www.strengthcats.com](http://www.strengthcats.com))



# Lifts: Power Cleans





# Jumps: Power Squat Tuck Jump



# Lifts: Dynamic Clapping Pull-ups



# What's Trainable

- for total athletic development?

- Joint extension and flexion while sprinting are unilateral and reciprocal.
  - Triple extension: **driving force**
  - Triple flexion: **recovery force**
  - Arm actions: **reciprocal counterbalance force**
- Force application while doing the traditional squats, cleans, presses and jumps is bilateral.
  - **Unilateral work is very important and must be implemented in addition to the traditional bilateral work.**



# Dynamic Unilateral force work



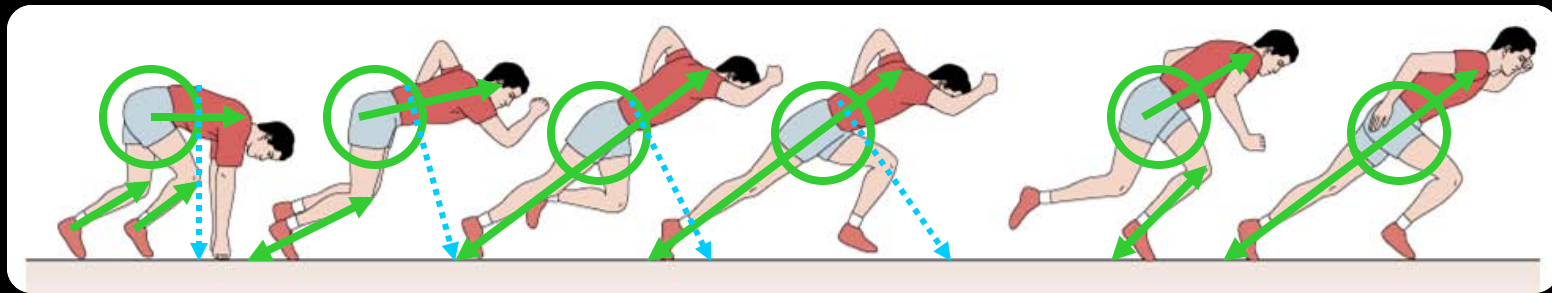
- Step-ups, Lunges and Single Leg Squats
- Weighted Sled Sprints and Drags
- Agility and Speed Training
- Alternating Step-up Jumps/Hops
- Harness or Band Overload Sprints
- Skips, Bounds, and Single Leg Jumps
- Banded Hip Flexion and Extension
- Banded Abduction and Adduction
- Single-Arm Dumbbell Work



# What's Trainable

- for total athletic development?

- Acceleration Posture and alignment
  - Optimal directional forces - shin targeting the specific direction you desire to move.
  - **Acceleration lean**: shoulders in front of your hips, hips in front of your knees, and knees in front of your toes.
  - Force generated from triple extension.
  - **Deceleration lean**: bend, opposite of acceleration.





# Band Pull and Press



# Broad Box Jumps



# Depth Jumps



# Targeted Overload Guidelines

<b>Effort</b>	<b>Sets</b>	<b>Reps</b>	<b>Overload Intensity</b>	<b>Rest between sets</b>
<b>Max Effort</b>	<b>4-7 sets</b>	<b>1-4 reps</b>	<b>85-100% 1RM</b>	<b>1-3 minutes</b>
<b>Dynamic Effort</b>	<b>3-6 sets</b>	<b>2-6 reps</b>	<b>25-75% 1RM</b>	<b>1-2 minutes</b>
<b>Repetitive Effort</b>	<b>2-3 sets</b>	<b>6-15 reps</b>	<b>60-85% 1RM</b>	<b>1-2 minutes</b>

# Sample Max Effort Cycle

Week	Sets	Reps	Overload Intensity
1	4	3-4	85% 1RM
2	6	2-3	90%
3	8	2	92.5 - 95%
4	10	1-2	95%

- Change the primary exercise each cycle (every four weeks or more)
- Adjust your intensity every cycle according to your strength increases
- On the second cycle, add 1 set each week except on week 4
- On the third cycle, add 1 set each week except on week 4
- After three cycles (12 weeks) take a week off (active rest)



# Dynamic Effort Cycle

Week	Sets	Reps	Overload Intensity
1	4	4-6	65% 1RM
2	5	3-5	70%
3	6	2-4	75%

- Change the primary exercise each cycle (at least every three weeks)
- Adjust the intensity each cycle according to your strength increases
- On the second cycle, add 1 set each week (5,7,9)
- On the third cycle, add 1 set each week (6,8,10)
- On the fourth cycle, repeat the same sets as the third cycle (6,8,10)
- After four cycles (12 weeks) take at least one week off (active rest and GPP)

# Repetitive Effort Cycle

- Do repetitive effort work on your assistance and auxillary exercises every workout.

Week	Sets	Reps	Overload Intensity
1	2-3	10-15	70% 1RM
2	3	8-12	75%
3	3-4	8-10	80%

# 4 Week rotation/cycle

	Max	Dynamic	Repetitive
Week 1	85-87.5%	65%	70%
Week 2	87.5-90%	70%	75%
Week 3	90-92.5%	75%	80%
Week 4	92.5-95%	60%	75%

# Sample Training Frequency

	<b>3 days M-W-F</b>	<b>4 days M-T-Th-F</b>	<b>2 days T-Th</b>
<b>Monday</b>	LB Plyos Speed & Footwork Max Effort Squat/Deadlift	Speed & Overspeed Plyos Max Effort Bench Press	
<b>Tuesday</b>		Footwork & Agility Max Effort Squat/Deadlift	Plyos Speed & Footwork TB Weights
<b>Wednesday</b>	Agility & Speed End Max Effort Bench Press		
<b>Thursday</b>		Overload Speed Dynamic Effort Bench Press	Plyos Agility & Speed End TB Weights
<b>Friday</b>	Plyos Footwork & Overload Dynamic Effort Squat/Deadlift	Plyos Agility/Cond Dynamic Effort Squat/Deadlift	

# Thank You

- Please contact me for more information.
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- Website <https://orgs.jmu.edu/strength>
- Or [www.jmusports.com](http://www.jmusports.com)

