

Applying Concurrent Training Methods for H.S. Athletic Development Lifts, Jumps and Sprints

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Objectives

- Talk about developmental Stages
- Balyi and Hamilton's Athletic Long Term Development (ALTD) work
- Methods of Concurrent Training for Athletic Development
- Progressions

Early High School / Adolescent

- A young person who has undergone puberty but who has not reached full maturity; a teenager.
- Freshman and Sophomores: 14-16yrs old
- **Adolescence: The Last Step Before Becoming An Adult**

Stages

- “From early childhood to maturation, people go through several stages of development, which include pre-puberty, puberty, post-puberty and maturation. For each development stage there is a corresponding phase of athletic training” (Bompa).

Stages

- Research suggests “it takes 8-to-12 years of training for a talented player/athlete to reach elite levels. This is called the 10-year or 10,000 hour rule,” (Balyi and Hamilton, 2003; Ericsson).

'Peaking by Friday'

- However, despite the long path to greatness, “parents and coaches in many sports still approach training with an attitude best characterized as **'Peaking by Friday,'** where short-term approach is taken to training and performance with an over-emphasis on *immediate results,*” (Balyi and Hamilton, 2003).

Foundation

- If a house is built on a poor foundation it will have constant structural problems.
- If players never achieve a base level of athleticism, their athletic career ends prematurely.

Plateau Prevention

- “The reason why so many athletes plateau during the later stages of their careers is primarily because of an **overemphasis on competition instead of training during the important period in their athletic development**. The “Learn to Train” and “Training to Train” stages are the most important phases of athletic preparation. During these stages, we make or break an athlete,” (Balyi and Hamilton).

Balyi's Late Specialization Model

- **Stage 1: The FUNdamental Stage**

Age: Males 6-9/Females 6-8 years

Objective: Learn all fundamental movement skills (build overall motor skills)

Participation once or twice per week [in desired sport], but participation in other sports three or four times per week is essential for further excellence. (The OLD Soviet Model)

3rd – 6th Grades

- **Stage 2: The Learning to Train Stage**
Age: Males 9-12/Females 8-11 years
Objective: Learn all fundamental sports skills (build overall sports skills)
A 70:30 training/practice to competition ratio is recommended.

7th – 10th Grades

- **Stage 3: The Training to Train Stage**

Age: Males 12-16/Females 11-15 years

Objectives: Build the fitness/athleticism base, build strength towards the end of the phase and further develop sport-specific skills (build the “engine” and consolidate sport-specific skills)

Experts recommend 60:40 training to competition ratio...and the 40 percent competition ratio includes competition and competition-specific training.

10/11th - 12th grades

- **Stage 4: The Training to Compete Stage**

Age: Males 16-18/Females 15-17 years

Objectives: Optimize fitness preparation and sport, individual and position-specific skills as well as performance (optimize “engine,” skills and performance)

- The training to competition and competition-specific training ratio now changes to 50:50. 50% of available time is devoted to the development of technical and tactical skills and fitness improvements and 50% is devoted to competition and competition-specific training.

Senior – Collegiate years

- **Stage 5: The Training to Win Stage**

Age: Males 18+/Females 17+

Objectives: Maximize fitness preparation and sport, individual and position-specific skills as well as performance (maximize “engine”, skills and performance)

Training to competition ratio in this phase is 25:75, with the competition percentage including competition-specific training activities.

“Old athletes”

- **Stage 6: The Retirement/Retention Stage**

Objectives: Retain athletes for coaching, administration, officials, etc.

(Balyi and Hamilton, 2003)

Total Athletic Development?

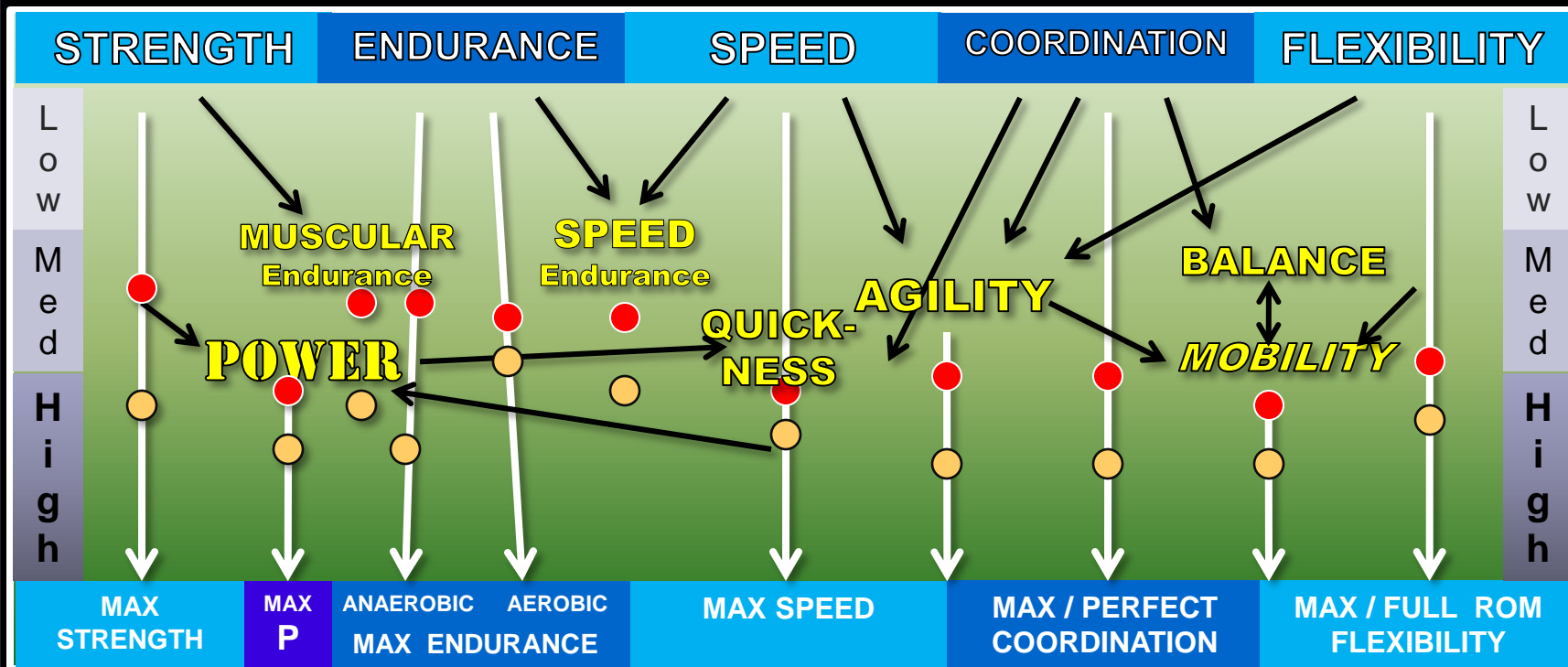
What is Athleticism?

- the state of being an athlete
- a show of athletic prowess
- physically active and strong; befitting an athlete - ***involving the use of Biomotor Abilities: Strength, Speed, Endurance, Coordination and Flexibility.***



Biomotor Abilities

- How should we develop these through the stages?



● = Stage 3

● = Stage 4



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 athleticism and 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.

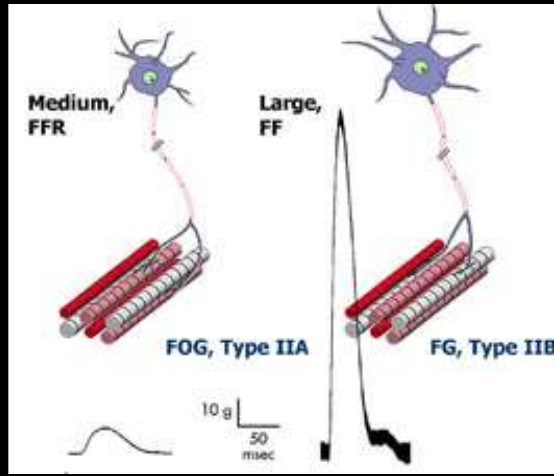


Truths of Athletic Development

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



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.



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.**



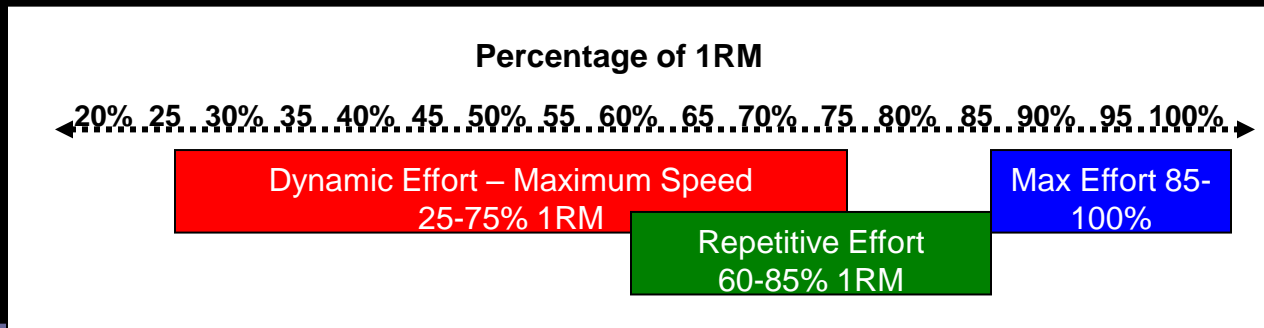
Concurrent Training

- 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



Concurrent Training example



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 and objects.**



What's Trainable

- for total athletic development?

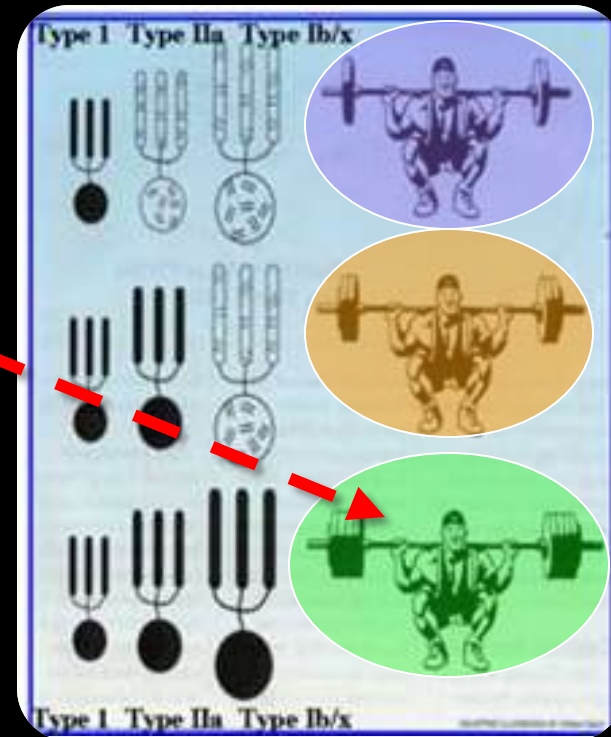
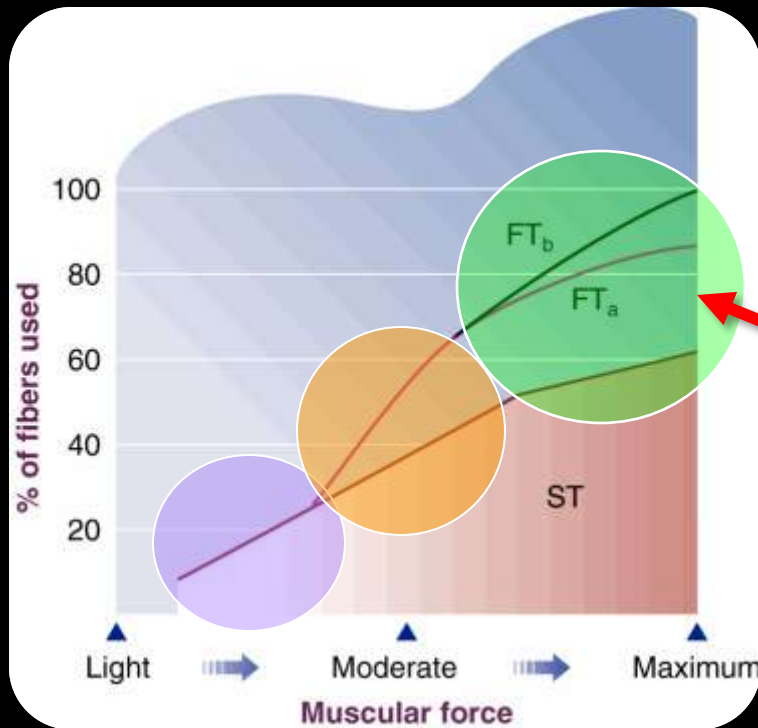
- **Leg Strength:**
 - The determining factor in speed <100m is leg strength/power.
- **Mechanics** is critical – a sprinter cannot be successful without sound mechanics. **That said, the most important factor is the ability to generate large amounts of explosive force.** Dr. Ralph Mann—one of the world's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



Max Effort Rationale

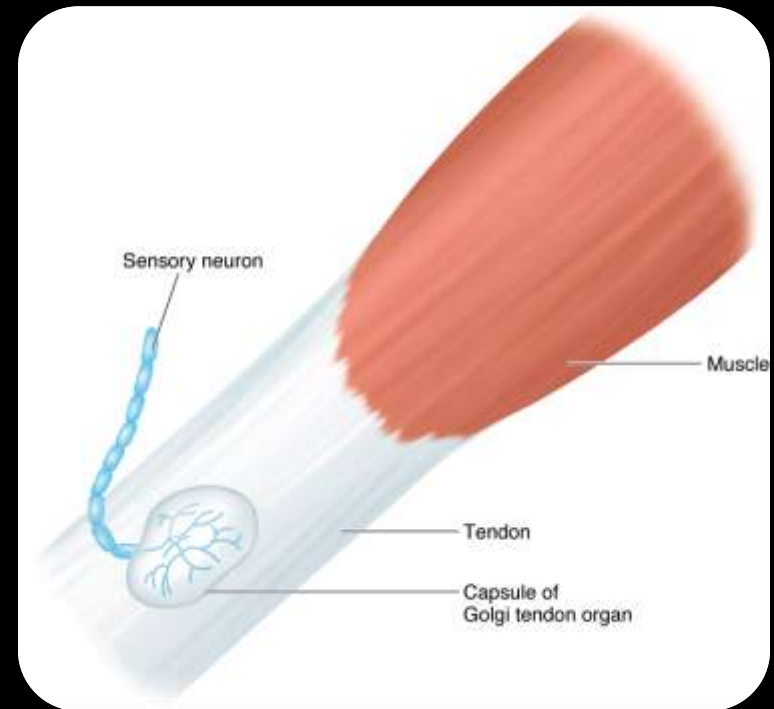
- the size principle

- 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!!



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)

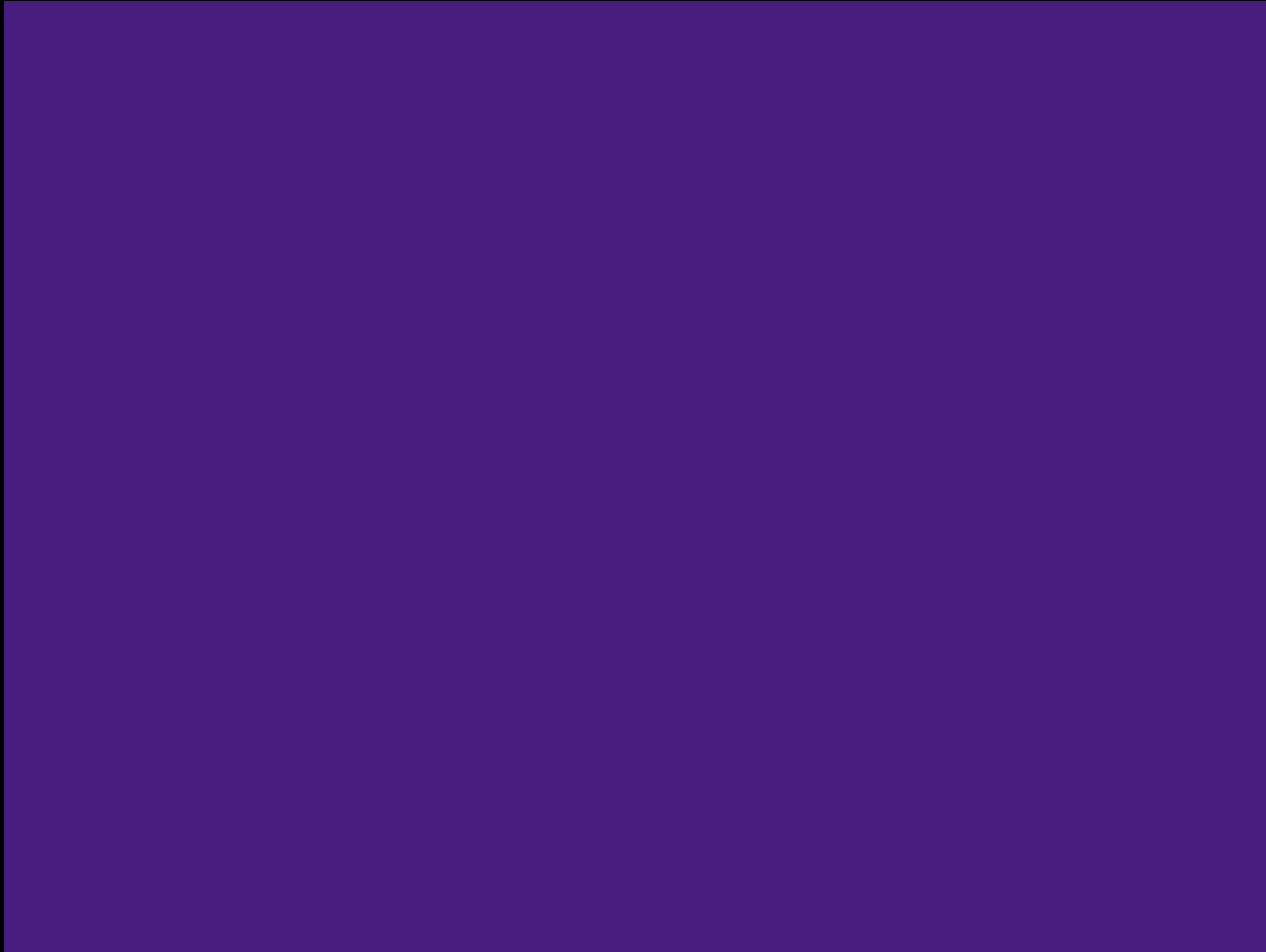


Mobility

Hurdle Over & Unders



No Hands Front Squat



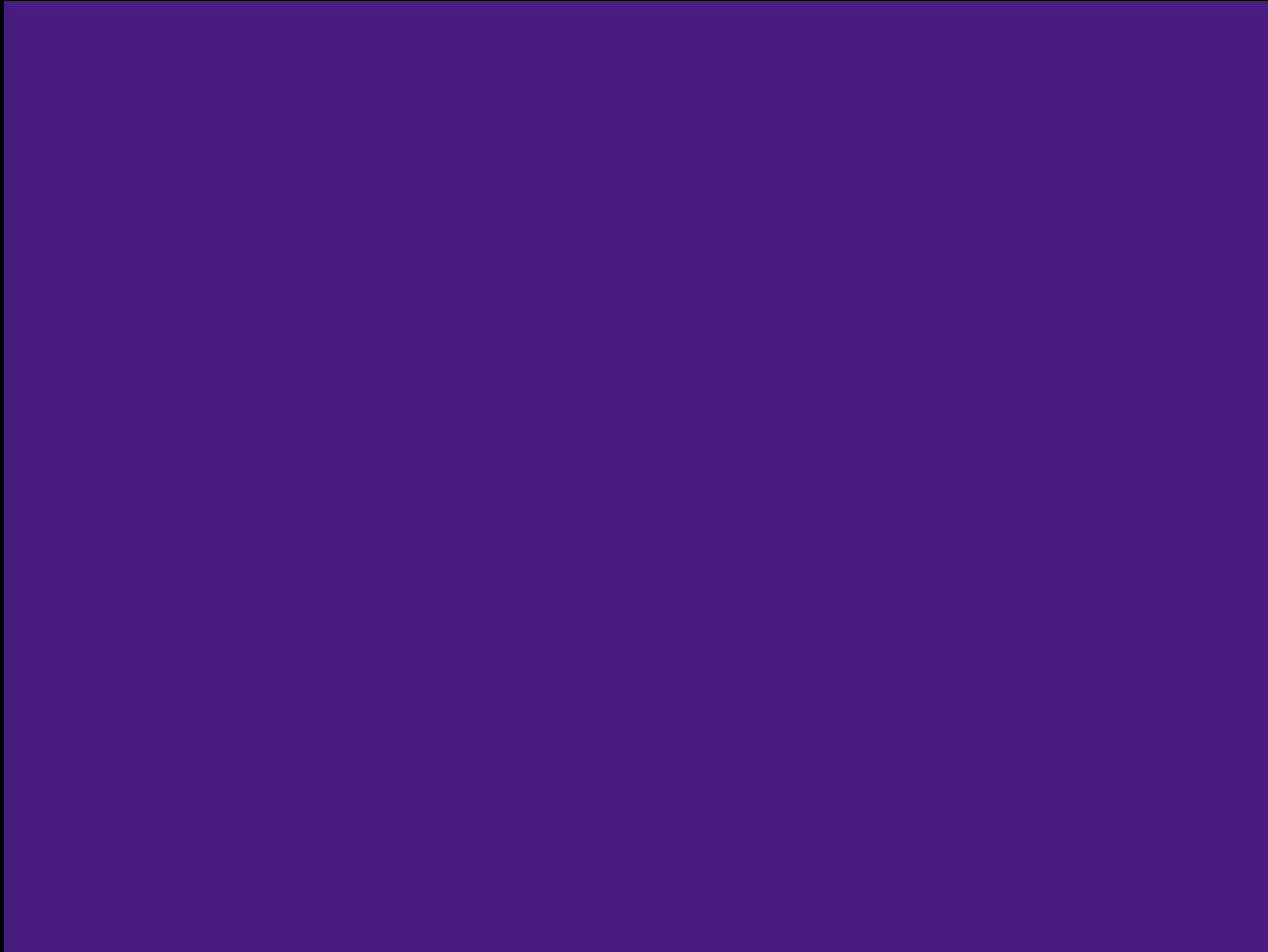
Front Squat



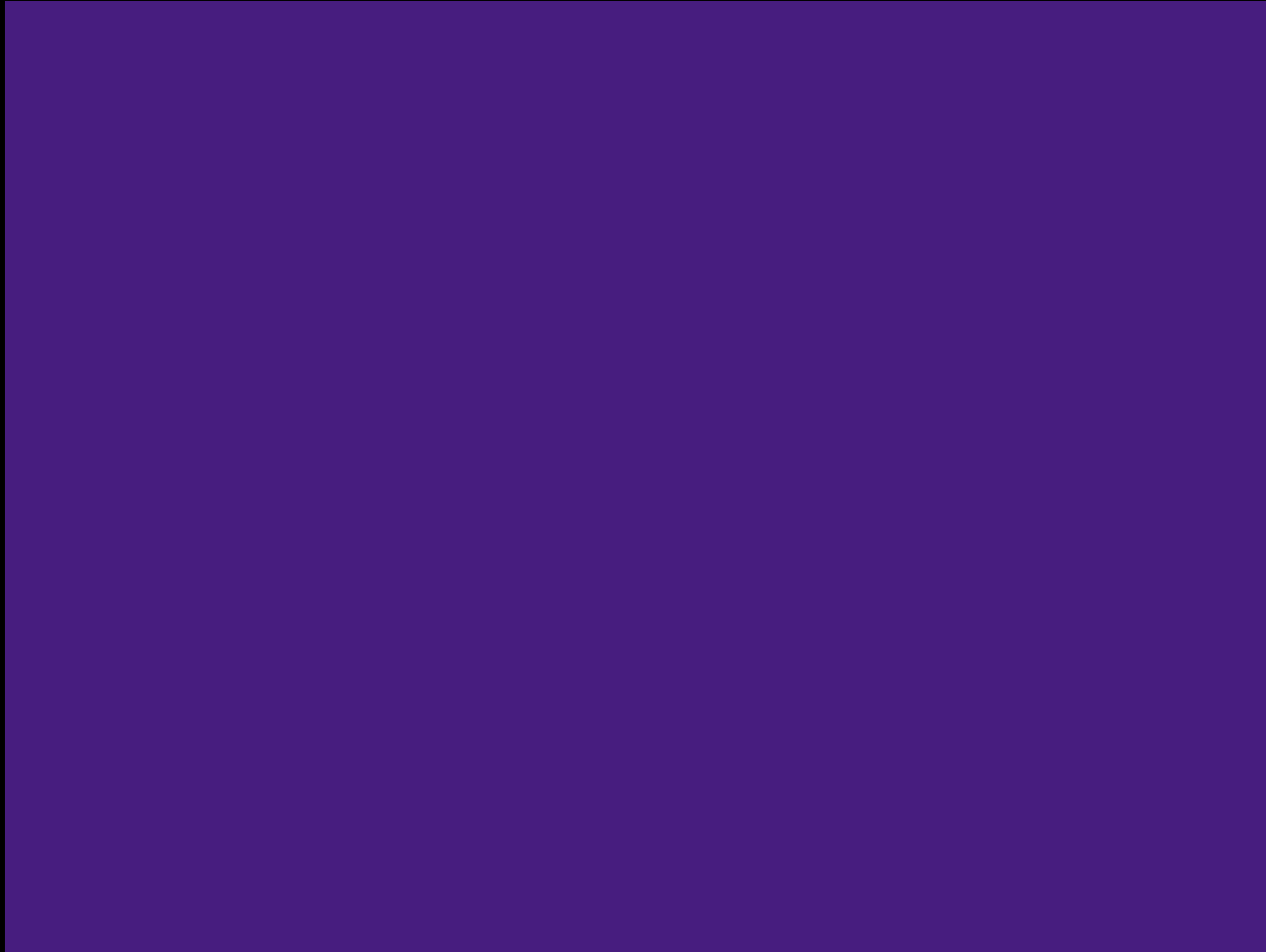
Back Squats



Barbell Split Squat



Bulgarian Split Squat



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.



1/4-1/2 Squat



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.



What's Trainable

- for total athletic development?



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

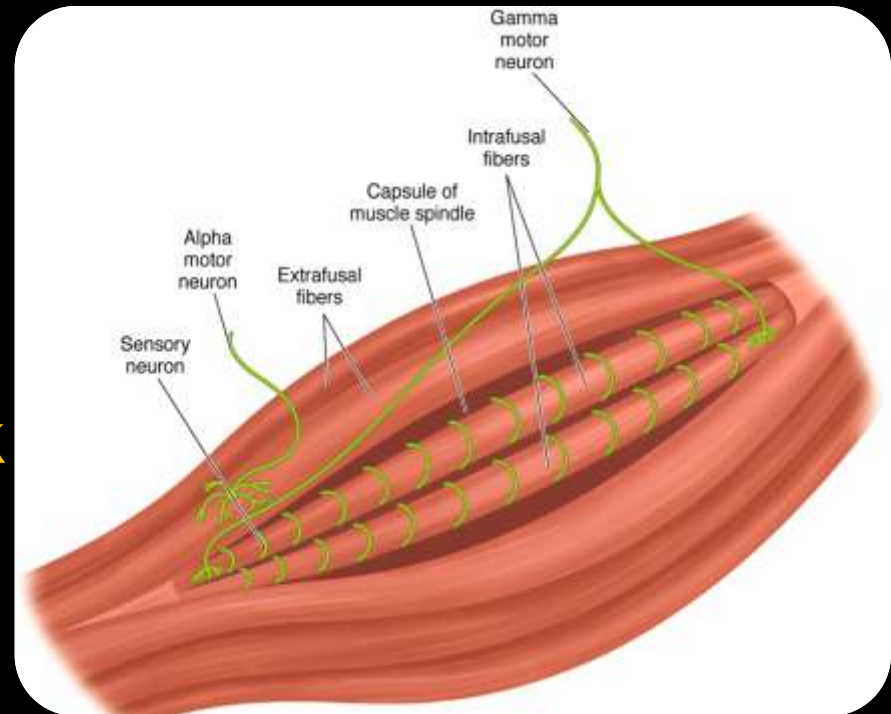
- **Dynamic Effort**



What's Trainable

- for total athletic development?

- 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

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

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?

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



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



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

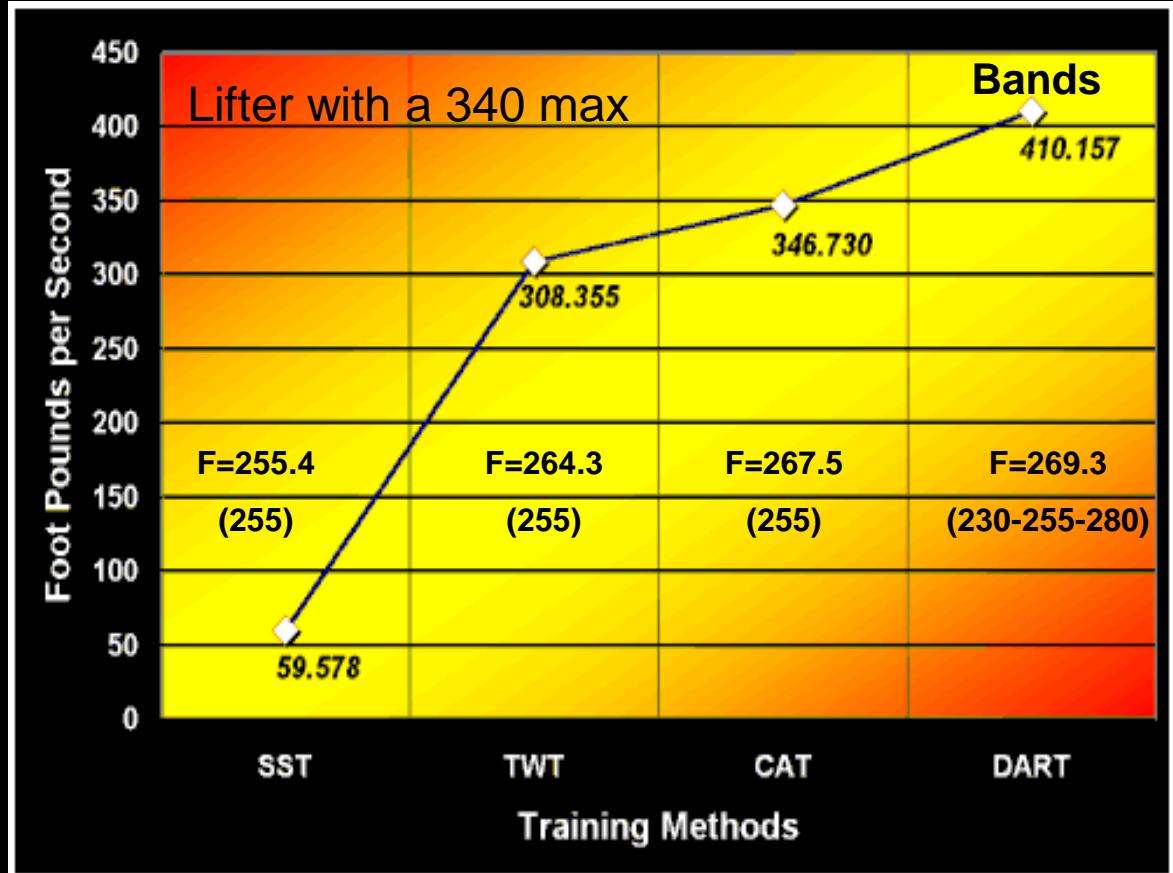
Graph {ft.lbs/sec} lifting a 75% load

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)

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

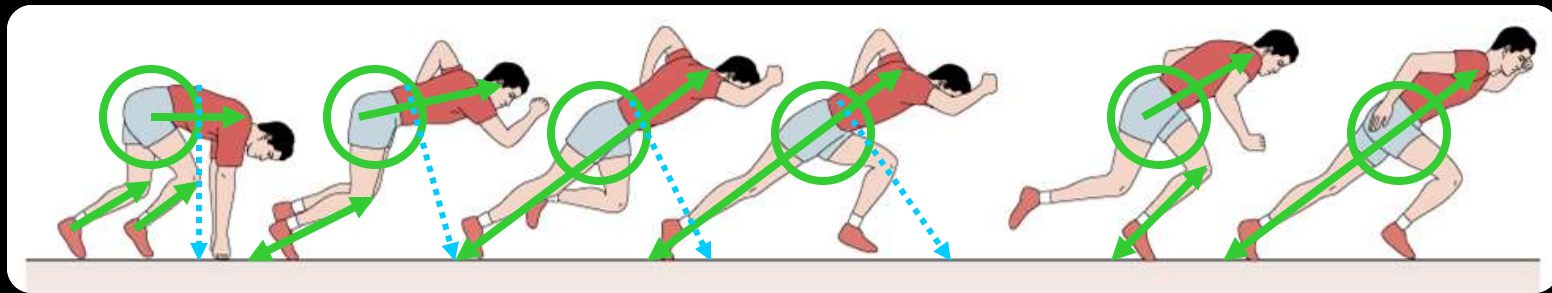


- Step-ups, Lunges and Single Leg Squats
- Weighted Sled Sprints and Drags
- Agility and Speed Training
- Alternating Step-up Jumps/Hops
- Harness or Band Overload Sprints
- Skips, Bounds, and Single Leg Jumps
- Banded Hip Flexion and Extension
- Banded Abduction and Adduction
- Single-Arm Dumbbell Work

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.



Dynamic Effort example

Dynamic Effort
Leg Day

Band Pull and Press



Broad Box Jumps



Depth Jumps



Concurrent Overload Guidelines

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

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

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

Thank You

- Please contact me for more information.
- Greg Werner e-mail werneraga@jmu.edu
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- Or www.jmusports.com

