Training Theory
And
Methodology

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Training Theory and Methodology

• Based on:
  – Specificity and individualization
  – Train the athlete where they live
  – An understanding of and ability to challenge appropriately the dominant energy and other systems that affect positively, athletic performance
  – A working knowledge of:
    • The biological, physiological and biomechanical processes
    • Progressive loading
    • Sequencing of workouts
• The funnel method will not work
Training Theory and Methodology

• Demand excellence of yourself
• If you do what you’ve always done, your results will be what they’ve always been
• Being the best means going where others can’t or won’t
• If I have a good piano player and I want to make him great, I must add something. He is not an artist yet, not until everything becomes automatic – Professor Alessandro Calvesi

Training Theory and Methodology

• Physical adaptation training effect is dependent upon the volume, intensity and frequency of a particular training mode, and the length of time required for the neuro-muscular and/or functional adaptation is a function of the complexity of what is being trained.
• What you train for 6 to 8 weeks, you can hold for 6 to 8 weeks.
• Specificity is key in training. The coach must know the event and the demands of the event and train the event from the beginning of the training season to the end of the season.
Training Theory and Methodology

• With track events, it is about becoming progressively more aggressive. The coach needs to instill, coach, train and teach this to their athlete.

• Vital to the development of maximum velocity sprinting skills is a proper understanding by the coach and/or athlete of the following: there is a big difference between quality and intensity. Intensity is the percent of maximum effort, say 90% of Vmax (90% of 10 m/s = 9 m/s). Quality is a measure of the percent of perfection – even if not done at 100% of intensity. There is no excuse to do any work at less than 100% of quality, no matter what speed or intensity.

• Attention must also be paid to economy of effort of movement, monitoring style and relaxation.

Training Theory and Methodology

• The training process should involve the following elements, especially when looking to improve bio-motor abilities:
  – Stimulus
  – Adaptation responses
  – Stabilization
  – Actualization

• Coaches must allow enough time for stabilization after adaptation: sprinting and acceleration skills must be extensively rehearsed to bring athlete to new level at which point the coach can add speed and special endurance training; with actualization being the key to success, can the athlete produce top level performance 80+ percent of the time in training and then doing it in competition under any conditions?
When teaching acceleration: teach posture, position and rhythm. Then all you have to do is increase intensity. Acceleration should be trained from the beginning of the season. The more powerful an athlete gets, the greater force they can apply on touchdown, manifesting itself in greater torque at the ankle, knee and hip joints; with the physical results of this increased torque can be seen as stress fractures, tendonitis and over use injuries: coach implication—strengthen, develop and train the whole body.

Coaching is both a science and a skill. Proper movement stereotypes must be rehearsed constantly. The body is like a tape recorder, what you put on it is what it will play back. What you do in the weight room should match what you’re doing on the track. The aim of weight training should be strength gain without hypertrophy.
Training Theory and Methodology

• Train to improve coordination to insure optimum transfer to the event:
  – Intramuscular
  – Intermuscular

• Train movements not muscles

• Remediate daily
  – Eliminate deficiencies where possible
  – Manage them if necessary

• Training is cumulative – Think long term

• Once you know the rules, you can break them

Training Theory and Methodology

• Coaches of young and novice athletes have a great responsibility to provide a sound training regime with emphasis on establishing a sound conditioning base combined with a correct technical model

• The strength of muscles is directly related to the strength of our tendons, bones and ligaments

• Plyometric type exercises can be used in modified form to introduce gentle body weight exercises to the young athlete. It should be remembered however that growing bone is more elastic than mature bone, but has less bending strength. It therefore has a reduced capacity for load bearing

• Including young athletes in adult type plyometric activities is definitely not recommended
Training Theory and Methodology

- Whether a beginner or experienced, each coach must adopt a style of coaching that fits in with their own unique personality, a style that must have the respect of their athletes. This respect must be earned.
- Being a former athlete is, in itself not sufficient preparation for coaching. The coach must have knowledge.

Training Theory and Methodology

- It is important for coaches to have their own technical model for the various skills and events in track and field. The coach must constantly update his/her knowledge so that their technical model continues to develop.
- The coach must be able to recognize deviations from the technical model and introduce successful measures to eliminate the faults.
Training Theory and Methodology

• Effective athletic development is based upon the principle of the development of fundamental movement skill before specific sport skill (i.e. improve the athleticism of your athletes)

• All training programs must follow the principle of progression. Weight lifting must start with the learning of sound techniques.

Training Theory and Methodology

• Regular strength training for athletes can begin at an early age, although the nature of the strength training must be suited to the age and development of the athlete (chronological vs. training). It is appropriate for the young developing athlete to be concerned with body weight resistance exercises, low weight/high repetitions exercises and skill exercises with light barbells. The young athlete should not be exposed to lifting heavy weights nor should he/she be subjected to high volume regimes.

• Once the athlete begins to mature and after the pre-pubertal growth spurt, intensity and volume can be increased in line with the athletes development.
Training Theory and Methodology

• There is no such thing as muscle memory
• You can’t endure a capacity you don’t have
• Know what you’re doing, why you’re doing it and the affect it will have
• Don’t allow short term tactics to affect long term strategy
• A person is born with only so much genetic ability: the challenge for the coach is; how to maximize, develop as much of that genetic ability as possible

Training Theory and Methodology

• Warm – Up
  – Purpose
    • To prepare for work
      – Mentally
        • Focus
        • Concentration
      – Physically
        • Increase Core Body Temp
        • Increase Muscle Temp
        • Lubricate Muscle Sheath
    • In essence the goal is to achieve an optimum temperature level at the core of the muscle tissue not at the superficial level, combining this with mobility for tendon stretch
Training Theory and Methodology

• Warm – Up cont.
  – In short, pre-performance warm-up is to prepare the body for vigorous physical activity, hence the need to recruit as many of the relevant muscle fibers as possible and facilitate the neural pathways for the specific action of the event: The warm-up exercises therefore mainly target the prime mover muscles specific to the event.

Training Theory and Methodology

• Warm – Up cont.
  – Static Stretching
    • Objective should be to achieve the optimum active range of movement specific to the needs of the event: optimum active, not maximum muscle lengthening should be what we are trying to achieve with our static stretching program.
Training Theory and Methodology

• Warm – Up cont.
  – Static cont.
    • Does not necessarily prevent injuries
    • Temporarily weakens muscles, reduces the speed and strength of contraction
    • Reduces neuromuscular coordination and stretch reflex activity
    • Interrupts blood flow to nerves and muscles
    • Static Stretching can cause an athlete to lose the elastic recoil which is very important in dynamic, explosive activities (ex. sprinting)

Training Theory and Methodology

• Warm – Up cont.
  – Static cont.
    • Has a sedative effect on the CNS and the effects can last more than an hour; can create a ‘flat-tire’ effect on the working muscles. The athlete no matter how well conditioned will feel a sense of dullness, a lack of ‘spring’ caused by a temporary reduction in elastic recoil and neuromuscular coordination. This is detrimental to performance in all events and is why static stretching should never be done just before an explosive or dynamic session or competitive event
Training Theory and Methodology

• **Warm – Up cont.**
  – **Dynamic**
    • Dynamic stretching contributes to the preparation of the muscles by facilitating the relevant neural pathways provoking more responsive stretch reflex and elastic recoil, and contributes to the overall arousal level of the system in preparation for performance: initially more closely resembles a rehearsal of the elements of the event gradually moving from low to high intensity and velocity.

Training Theory and Methodology

• **Warm – Up cont.**
  – **Dynamic**
    • **Elements**
      – Movement
      – Continuous
      – Varied (Can include stretching type exercises)
      – General to Specific
      – Low Intensity to High Intensity
Training Theory and Methodology

• Acceleration
  – 3 Parts
    • Reaction
    • Starting (up through transition phase)
    • Pick-up (up to max velocity; 30m-60m)

Training Theory and Methodology

• Acceleration cont.
  – Should be trained from beginning of training
  – Efficient acceleration over the longest possible distance is influenced by the position of the body as the athlete leaves the blocks
  – Approximately 65% of the total 100m result can be accounted for in the acceleration portion of the race
Training Theory and Methodology

• **Sprinting**
  – Most important factor in any running event
  – Research suggests that speed capacities develop 3-4 times slower than strength capacities and up to 23 times slower than endurance capacities
  – Should be trained all year
  – Speed reserves is the most important performance factor in events from 400m and longer

Training Theory and Methodology

• **Sprinting cont.**
  – **Sprint Race Components**
    • Reaction time
    • Block clearance
    • Acceleration to max velocity
    • Speed maintenance
    • Deceleration
Training Theory
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Q&A

Acceleration
And
Sprint
Biomechanics
Acceleration Biomechanics

Acceleration Biomechanics cont.
The objective in the sprint start is to generate as much force as possible as quickly as possible, backwards and downwards against the starting blocks to propel the athlete away from the starting line.

Mark position
- Straight arms, shoulders tall
- Be careful of head position

Set position
- Front knee angle min. of 90 degrees
- Front shin angle approx. 65 degrees
- Load both blocks and stay loaded
Acceleration Biomechanics cont.

• Set cont.
  – In set position, stay in neutral position: shoulders directly over hands, this allows for a faster hand movement, initiating a more rapid acceleration movement after starting signal. If shoulders are pushed ahead of hands, applying more pressure to fingers, slower hand movement and poor initial drive angle are the result.

Acceleration Biomechanics cont.

• Starting signal
  – Initial movement must be purposeful and violent
  – “Cue”
  – Force application on blocks
  – Arms begin to split with movement
  – Project body out and up (body angle)
  – Low heels (push mechanics)
  – Full extension off of front block
Acceleration Biomechanics cont.

- Starting signal cont.
  - A fast backward drive of arm opposite the front leg (reaction arm) is very important: backward drive of elbow initiates the front leg backward thrust against the block and if backward arm drive is fast and full, it will ensure powerful movement and a full leg extension against the block.

Sprint Biomechanics
Sprint Biomechanics

• Sprinting action
  • 4 parts to cyclic motion
    – Support phase
    – Drive phase
    – Recovery phase
    – Prepatory phase

Sprint Biomechanics cont.

• Sprinting action cont.
  – In order to overcome inertia, you must apply force; V,H,L
  – SL, SF govern: maximize or optimize
  – Distance of foot placement from CM
  – Front side mechanics, backside mechanics
Sprint Biomechanics cont.

• Sprinting action cont.
  – Knee bend on toe off
  – Fig. 4, knee to knee at TD
  – Arm position, front and back
  – Lower leg on toe-off should travel low to high not high to low

Sprint Biomechanics cont.

• Sprinting action cont.
  – Implications
    • Poor backside mechanics
      – Contact preparation is too late
      – Continue pushing past vertical on contact produces prolonged straight leg on recovery
        instead of a quick recovery leg
      – Increased stride time
      – Reduced stride frequency
Sprint Biomechanics cont.

• Sprinting action cont.
  – Implications
  • During Vmax sprinting, contrary to the model of keeping a 45 or even a 90 degree angle for the entire arm swing motion, 100,200m sprinters need to open the arms on the back swing to allow for complete stride extension: arm action controls the rhythm and range of motion on the leg stride: short arm action leads to reduced leg extension

Acceleration
And
Sprint Biomechanics
Q&A
Hurdling

- Train hurdlers similar to the training for comparable sprint events (use hurdles)
- You can’t run fast with the hurdles unless you can run fast without them
- Perfect movements statically before dynamically
- Specific endurance is decisive in hurdling performance
- Two important factors that must be overcome in hurdle performance improvement
  - Maintenance of velocity during hurdle stride
  - Requiring loss velocity after touchdown
Hurdling

• Sprint hurdles
  – The start
    • Eight steps most usual and efficient
    • Consistency on acceleration mechanics
    • First step should be close to same spot every time
    • Position of lead leg on take-off
  – Hurdle clearance
    • Highest point just prior to hurdle
    • Slight bend in lead leg knee
    • Body position, male/female
    • Aggressively pull trail to front after stretch

Hurdling

• Sprint hurdles
  – Touchdown
    • Drive lead leg down with hamstring when foot passes hurdle bar
    • Stay aggressive to next hurdle
    • Low hands, low knees, shuffle
  – Long hurdles
    • Take-off, clearance, landing
    • Stride pattern
    • Curve running
Hurdling
Q&A