

## *MTCCCA 400m Talk*

### Issues in Contemporary 400m Training

#### **1. Introduction**

- a. What's provided here on coachtube.com is a reproduction of the talk given at the MTCCCA '22 clinic but greatly expanded, enhanced, updated, and given more thoroughly
- b. This talk deals with major trends in advanced 400m training
- c. A lot of it is my own personal philosophy (bias)
  - i. Understand that my background is as a jumps coach
  - ii. I tend to think of 400m training as an extension of 200m and triple jump training, and therefore not having much similarity to 800m training or classic 800m training
    1. In short, I see more similarity in triple jump training than 800m training as it pertains to the 400m
- d. Some of what is presented here are things I've heard from elite 400m coaches
- e. While some of it is my interpretation of current trends
- f. Not going into too much specific programming but more talking about ideas/trends/issues/thoughts or just topics as it pertains to more current thinking in 400m training
- g. USTFCCA Terminology (Training Themes)
  - i. Training themes are themes that are used to categorize each training session, or basically each training day.
  - ii. There are three major themes that are used to identify each training day
    1. Neural: high intensity, explosive, neuromuscular training; sprinting, multijumps, multithrows, heavy or fast lifts, etc
    2. General: non-specific, restoration, recovery type days; typically general strength circuits, mobility routines, hurdle mobility, bodybuilding circuits, etc
    3. Extensive: sub-maximal track specific work; sprint drills, extensive tempo or intensive tempo, etc
  - iii. For example each day of the week would be labeled Neural, General, or Extensive and it's the coaches job to stick to that theme each day.
  - iv. These themes helped organize training throughout a day and week so that training is balanced and appropriate and recovery is ensured

#### **2. Principles over Workouts: Continued Intro**

- a. Thinking more about the adaptations and bigger concepts that are being addressed rather than the specific workouts
  - i. But see below for an example of an actual microcycle from Fall '22 and the other documents attached (Mesocycle 3 from Fall '21) to see weekly design/progressions
  - ii. Bigger concepts I see as principles/methods of how to either organize or progress training
- b. Too often coaches ask for workouts but it's not about that, it's about the **fundamental concepts that underly the workouts** or what led too or what will

come after key workouts. It's the reasoning/logic that matters more than the workouts themselves

- c. Organizing Concepts (examples)
  - i. *Extensification*
  - ii. *Balanced Approach*
  - iii. *Polarized Training*
  - iv. *Prioritizing Neuromuscular Development*
  - v. *Prioritizing Reactivity*
  - vi. *Force Production – Closure – Transmission*
  - vii. *Individualization*
- d. Any training program is a coaches **answer to the question** of how to make 'so and so' faster in the 400m
  - i. Ask yourself this question and what is required for the event and for specific individuals
  - ii. Why do you do what you do?
- e. Focusing on topics that seem to be gaining sway in contemporary circles in 400m development
- f. Topics
  - i. What happens in a sprint stride?
  - ii. Balanced approach
  - iii. Polarized microcycle design
  - iv. Progression > Periodization
  - v. Speed is primary and simplified uses of tempo
  - vi. Speed extensification**
  - vii. Bias towards early stages of the race**
  - viii. Stiffness/reactivity**
  - ix. Force production – force closure – force transmission**
  - x. Recovery/restoration**

### **3. What Happens in a Sprint Stride?**

- a. Focusing on elasticity, not necessarily energy system
- b. Overcoming inertia
- c. Reactivity/Stretch Shortening Cycle
- d. Hip-Knee-Ankle chain of events
  - i. Whip from the hip
  - ii. With the ankle stiff
- e. Joint coupling, force sharing, minimizing shear forces
  - i. Optimize force expression
  - ii. Minimize forces being misdirected/thwarted and lost or pulling muscles apart
- f. Solving degrees of freedom problem
  - i. Specifically from the hip
  - ii. Optimize force closure
- g. Swing leg retraction/switching/timing/coordination
- h. **Ground reaction forces**, transmit in minimal time
- i. Coordination as foundational, stable muscle allows use of bigger units

- j. How many times bodyweight?
  - i. Focusing on these elements orients how I program and think about training

#### 4. **Balanced Approach**

- a. Current trends are favoring **extremes**
  - i. Speed and nothing else
  - ii. Endless tempo training
- b. Best 400m programs do both speed and tempo, it's not an *either-or* discussion
  - i. It's all about how they progress on a macro level and how speed and tempo can compliment each other on a micro level
- c. Addressing all biomotor abilities is foundational in any sport and especially in 400m training (do self-audit weekly, and look for training gaps)
  - i. Strength
  - ii. Speed
  - iii. Flexibility
  - iv. Coordination
  - v. Endurance
- d. Balanced approach still wins out, but how it's administered may have slight differences today
  - i. Density factors in
- e. Balanced as in equaling out neural, general, and extensive training days through the week
  - i. With some exceptions, especially in-season
- f. One of the best ways to keep an athlete healthy and progressing, but progressing methodically
- g. **Securing adaptations through a balanced approach by never overlooking restoration**

#### 5. **Polarized Microcycle Design**

- a. **Clean theme** for the training day or session (neural, general, extensive)
  - i. Stick to the theme!
- b. Varying it, differentiating it day to day
- c. Common mistake to mix themes on each day
  - i. I hear a lot of coaches throwing tempo in on speed days as a 'finisher'
    - 1. Why not get an extra rep or two of sprinting instead and keeping thematically sound...
    - 2. Would rather keep a speed day a speed day and a tempo day a tempo day
- d. Common mistake to train only 1-2 ways, **body craves variety and progressions in different ways**
  - i. Tempo heavy programs basically make every single training day 'extensive'
  - ii. Speed exclusive programs typically do only neural and general, or neural and rest

1. Both overlook development of other biomotor abilities to a fault and long term athletic development

## 6. **Progression > Periodization**

- a. **Program one week at a time** instead of one mesocycle/phase at a time or writing the whole season out before it begins
  - i. Utilize 3-week meso's seems very effective with week 3 being deload/recovery week
- b. Just keep progressing one week at a time and always have 'methods' at your disposal to keep progressing
- c. Common mistake to progress too slowly and stick to 'phases' of training
- d. **Don't believe in peaking, only in progressing**
- e. Think of the ways in which you can progress all kinds of activities and add specificity over time
  - i. Ask yourself how you can get this activity to transfer to the event or closer to the event
    1. How you answer that question is how you come up with '**methods of transfer**' or **organizing principles/concepts**
  - ii. Range of motion, speed, force, extensification, volumes, time under tension...etc are all methods of progression

## 7. **Speed is Primary and Simplified Uses of Tempo**

- a. **Specificity is speed/power based**, tempo is just not specific enough
- b. However, exclusively doing speed is a fault
  - i. I asked a close friend of mine who I consider an elite 400m coach about current trends and he said that there are **extreme schools of thought developing in America and both are limited in their potential**
    1. Speed is most important but tempo is not to be neglected
    2. Both play a vital role and train different body systems
- c. **'Extensification' of speed is really the key driver**
  - i. Build acceleration into absolute speed into speed endurance
    1. Profound psychological effect on the athlete too
  - ii. **Takes a long time and a lot of consistency to build speed, power, strength, reactivity, etc**
- d. **Paired progressions**
  - i. **Speed and Multijumps**
- e. **To get faster over 400m you have to train a faster race model**
  - i. Less obvious than it sounds for some reason
    1. But coaches in difficult facility/weather conditions have constraints
  - ii. Very literal, very straightforward concept
  - iii. **Density patterns play a vital role here**
    1. **Indoor season example**
- f. Tempo is not the main thing
  - i. In my experience coaches attribute too much time and significance to tempo work
- g. It's complimentary only

- h. Should be utilized to execute sound mechanics as well
- i. Can't sprint everyday so useful to utilize submaximal speeds as a change of pace
- j. Also useful as a **bridge** to progress into speed endurance work
  - i. **I like to think of training in terms of opposing ends then gradually wedding them together**, ie progressing them into one another
- k. Great backup option as well
- l. Useful in the sense of **'time under tension'**
  - i. Without longer tempo reps, 400m sprinters may be intimidated to sprint for long durations
  - ii. The furthest I'll likely go on a tempo rep is 45s-50s for grass run, and 350m on the track but not opposed to longer if the progression takes us there!
- m. **Duration runs (timed grass tempo runs)**
  - i. Short to long is effective
    - 1. And effective in just about everything
  - ii. **Timed grass runs are a nice piece**
    - 1. Softer surface, timed runs nice polar opposite to spiked up speed training on the track
      - a. **Alterity is a critical aspect of sound microcycle design**
        - i. Tempo heavy programs violate this
        - ii. Speed exclusive programs violate this
        - iii. Sound programming is balanced
- n. Keeping tempo as tempo (Polarized Training)
  - i. Make sure the tempo reps are long enough where they aren't sprinting and they are staying in a tempo-based zone

## **8. Speed Extensification**

- a. Simple and enormously effective approach
- b. **Short to long** makes sense to me logically in just about everything
  - i. Long to short programs have certainly been successful but doesn't compute for me
- c. I like the idea of **constructing a 45 second 400m 10m at a time** and it gives the sprinters huge confidence
  - i. Similar to progressing short approach jumps for horizontal jumpers
- d. Building, constructing, piecing together a huge personal best through the whole season
- e. Profound psychological effect on the athlete as they undergo this process through the season

## **9. Bias Towards Early Stages of the Race**

- a. Majority of the race is not under extreme lactic duress
- b. As opposed to the more common bias towards latter stages of the race
  - i. Which relies almost exclusively on improving the final ~100m of the 400m
- c. I like thinking of the long sprints as a set up game, much like in jumps training
- d. Training for a specific race model
  - i. Makes faster early portions of the race less demanding by virtue of training for it

1. Normalizing
2. Therefore, pushing energy system usage further into the race ie hyper-specific 'conditioning' but adds up the more you do it
- ii. Lactic shock dependent on the speeds in which it occurs?
  1. Obviously yes, but this has implications on how you train for the 400m and what's going to be most effective
- iii. Psychological factors
- e. Energy system development could be more effective in an **'indirect'** way
  - i. Reactive Strength
  - ii. Misaligned contacts or poor stretch shortening cycle capabilities means greater muscle recruitment and therefore energy system fatigue sooner
    1. Also leads to greater strain on muscles due to shear forces pulling muscles apart or in weird directions

### **10. Stiffness/Reactivity**

- a. Reactive Strength
  - i. Stretch shortening cycle
    1. Ability to rapidly shift from eccentric to concentric contraction
  - ii. Ability to transfer internal forces externally (Production-Closure-Transmission)
    1. Strength is multi-faceted
    2. In my experience I think coaches have no problem increasing absolute strength but largely neglect reactive strength
    - 3. Ratios are critical**
- b. Becoming a bigger topic today
- c. Training for the **force delivery system!!!** So hugely neglected in track and field and predominantly in 400m training where it's arguably most important
- d. Better ankle stiffness means more bounce on each step
  - i. Better rebounding ability can add 1cm-2cm per step and/or decrease GC times
  - ii. MSF better delivery time
    1. Mass specific force or amount of **force expressed** in relation to bodyweight
- e. Better co-contractions equals better force channeling
  - i. Eliminate energy leaks
  - ii. Forces distributed across more muscles optimally and less energy system usage
- f. Better reactivity means less energy system usage
  - i. Strength/energy utilized later in the race can be due to loss of leverage or mischanneled foot strikes
  - ii. Less elasticity means more muscle fiber recruitment
    1. Must rely on strength literally but will fatigue out quicker
  - iii. Channeling
    1. Muscle recruitment required to a greater degree with misaligned contacts
    2. Standing jump example
      - a. Stand in a wide stance then jump

- b. Stand with feet and shoulders aligned then jump
  - i. Which is higher?

3. Garden hose versus pressure washer

**g. 400m is a long duration reactive event**

**i. My personal fundamental thesis on the event that has certain training implications**

**h. Multijumps microdosed over an entire season can have a profound effect**

- i. Big neural drivers don't need heavy doses, it's the consistency that's lethal (in a good way)

**11. Force Production – Force Closure – Force Transmission**

- a. Variation on triphasic training
- b. Effective way to think about neural training
- c. Can combine this with force-power-speed paradigm and/or concentric-isometric-eccentric structure of training as well
- d. **Hip Lock allows for translation of forces accurately**
- e. **Minimize shear force and optimize force sharing to channel forces into ground effectively and reduce forces from pulling muscles apart**
- f. Think of making the body's ability to produce force, then the body's ability to channel or direct forces optimally, and transmit it reactively
- g. This is largely how I think of neural training as a whole and come up with progressions of training for each individual
- h. Force production
  - i. Static lifts, Olympic lifts, active jumps, multithrows for example
- i. Force closure
  - i. Technical execution, coordination-based strength, special strength (loaded drills, specific isometrics) for example
- j. Force transmission
  - i. Sprinting of course, but also reactive strength training or ballistic lifts, and definitely multijumps or reactive jumping activities

**12. Recovery/Restoration**

- a. Variety > Progression
  - i. Pool, games, mobility
  - ii. General strength, bodybuilding/plate circuits
  - iii. Massage, manual therapy, name a 3-letter acronym 😊
  - iv. Include lots of backward, lateral, and rotational movements
- b. Stacking recovery days
  - i. Useful method to ensure multiple quality speed days within a week
  - ii. Great for more advanced athletes but can certainly work well for beginners
- c. Keep your recovery days a recovery day
  - i. Make sure the theme is 'general' and 'not specific'
  - ii. In my experience a common mistake is to have large volumes of tempo running on recovery days
- d. But you can still work hard on 'recovery days'
  - i. Make sure the theme holds
  - ii. And try to minimize pounding on the legs

- iii. Can still execute very high levels of general strength or conditioning with no injury risk and great health benefits
- iv. Useful methods for high injury prone and developmental athletes





**New Mexico TF Men's Long Sprints** *This is just an example of a week of training from earlier this fall solely for providing context on programming and training organization*

**Mesocycle 3 – Week 2 (Oct 24-30, 2022)**

1. **Monday, October 24:** *Neural The multijumps at the start of practice were based on individual needs and progressions. I write the ranges and series of activities because each athlete will have individual prescriptions. Weights on the sleds are individualized as well along with starting positions, intensity, and volumes. In the weight room power cleans will be prescribed as either derivatives or full OL's based on developmental level. I think copious reps of block starts are extremely effective. I feel like programs general don't do enough. I like keeping horizontal jumps in the program the entire year since there's so few huge horizontal force activities one can do.*
  - a. *Warm Up 1b*
  - b. *Multijumps*
    - i. Standing LJ (WV), or Single Leg Standing LJ, or Standing TJ
  - c. *Technical Execution*
    - i. Blocks to 10m
  - d. *Resisted Runs (Acceleration Development)*
    - i. 5-10 x (1 x 20m Sled, 1 x 30m Tape Acceleration)
  - e. *Coordination*
    - i. 1/1-2/2 x 6 Hip Hinge off Box into Plate Punch
  - f. *Multijumps*
    - i. 15-20 x Hip Hinge NCM Vertical Box Jumps and/or Hurdle Hops
  - g. *Multithrows*
    - i. 10 x UHF (Heavy)
  - h. *Special Strength*
    - i. 1/1 x 50s Ankle Spring ISO (Ball of Foot, Low Position, Knee Past Toe)
  - i. *Weightlifting*
    - i. Power Cleans
    - ii. Hip Lift + Single Leg Vertical Box Jumps
    - iii. Ancillary Lifts
    - iv. Multithrow Complimentary

**2. Tuesday, October 25:** *Extensive This was our final intensive tempo session in grass prior to moving onto the track. I like pairing longer duration isometrics with tempo to compliment the time under tension. I like easing them into the workout so they may start at 70% then 75... and work up to 80% to ensure the intensities are appropriate and the volume is secured.*

- a. Warm Up 1b
- b. Intensive Tempo (Grass)
  - i. 45s-40s-40s-35s (5 mins) (80%)
- c. Special Strength
  - i. 60s/60s x Bench Core Holds (Front, Back)
  - ii. 40s/40s x Hamstring ISO
  - iii. 40s/40s x Copenhagen ISO
  - iv. 60s/60s x SL Glute Bridge ISO
- d. Hurdle Mobility
  - i. 3/3 x Walking Over-Under Sideways
- e. Cool Down

**3. Wednesday, October 26:** *General Lots of variety in here with core stability, med ball, mobility, and endocrine fitness work. Variety is crucial. Other things we do on Wednesdays are hurdle mobility, general strength circuits, plate circuits, games/relays, and we cycle through a multitude of different med ball, GS, Plate, HM, Coordination, special strength, Mobility, etc etc type activities so training never gets stale. On general days variety is more important than progression.*

- a. Warm Up 2b
- b. Med Ball
  - i. 15/15 x Single Leg Toss and Catch Forward
  - ii. 15 x Hut-Hut-Hike
  - iii. 15 x Back Hyper Toss
  - iv. 15 x Ankle Toss
  - v. 15 x Hamstring Toss
  - vi. 15/15 x Adductor Toss
  - vii. 15/15 x Abductor Toss
- c. Coordination
  - i. 3 x 6/6 SL Snatch
  - ii. 3 x 6/6 Good Morning Variations
  - iii. 3 x 6/6 Kneeling Hip Lock
  - iv. 4 x 6 Quad Nordics
- d. Special Strength
  - i. 60s/60s x Bench Core Holds (Both Sides)
- e. Coordination
  - i. 3 x 30 Hanging Leg Raise
  - ii. 4 x 4 Deadfishes
- f. Weightlifting
  - i. Bodybuilding Circuit
  - ii. Mobility Series

iii. Endocrine Fitness

4. **Thursday, October 27:** *General Note that we stacked two general days in a row Wednesday and Thursday with plenty of variety. We typically keep the pool workout on Thursdays all fall and cycle through a series of different workouts and occasionally do relay races for fun. We have a separate document with all our pool workouts, bike workouts, and all various forms of circuits.*
  - a. *Pool Workout*
  
5. **Friday, October 28:** *Neural Either 24" or 30" on the depth jumps depending on the athlete. Prefer to time the ground contacts if possible. Note that the absolute speed work was not fly's but complete 50m sprints. Unfortunately, we don't have timing gates and I wanted to work on transitioning from acceleration into absolute speed, an often overlooked aspect of speed training. From this session we progressed into 70m's and then into race modeling. Note the vertical emphasis on the throws and jumps that compliment the upright sprinting.*
  - a. *Warm Up 1b*
  - b. *Technical Execution*
    - i. *Wickets*
    - ii. *Blocks*
  - c. *Absolute Speed Development*
    - i. *4-8 x 50m*
  - d. *Multijumps*
    - i. *15-20 x Depth Jumps*
  - e. *Multithrows*
    - i. *3 x 5 NCM Vertical*
  - f. *Coordination*
    - i. *1/1-2/2 x 10 MV Switches (WB or HW)*
  - g. *Weightlifting*
    - i. *Hang Cleans*
    - ii. *TBDL Jumps + Pogos*
    - iii. *Ancillary Lifts*
    - iv. *Multithrow Complimentary*
  
6. **Saturday, October 29:** *Extensive Long steady 180m-190m hill that we utilize throughout the fall. Tempo uphill is a really nice way to play tempo training, by virtue of it being uphill they can't hit huge speeds, it's in grass, and they can just have fun competing. This is a consistent workhorse session we do on Saturdays in the fall. We have leader boards for fastest reps and fastest complete workouts for motivation.*
  - a. *Warm Up 1b*
  - b. *Resisted Runs (Intensive Tempo)*
    - i. *4 x Netherwood Park (80%) (8 mins)*
  - c. *Cool Down*

