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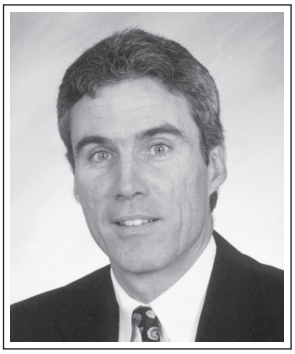
FROM THE EDITOR

RUSS EBBETS

TRUE GRIT



Gather any group of coaches and let the topic turn to "the one that got away" and the stories will flow. It's not that one coach is trying to one-up the previous coach it's just that the recurrent loss of talent is universal, it seems to happen to everyone to everyone's eternal disappointment.

I had a HS coach call me once whose recent grad decided to "get back into it" and had been jumping on his own. The coach told me the kid jumped 26'4" out at the HS pit. I asked the coach if he realized what he was saying. He paused a few seconds and then told me the guy actually jumped 27'4" but he was afraid if he told me that, I'd think he was crazy. He brought the guy over to have me watch him jump. He looked like a clone of Willie Banks. The guy said he wasn't feeling well and wasn't sure how he would do. I thought, "Here we go…" The guy warmed up, used a 10-step approach and popped a 25'10". I measured it. He said his leg hurt. I'd seen enough. We talked. To my knowledge he never competed again. He never went anywhere with this talent.

The management or development of talent has been a topic of discussion since the gladiators. A new concept pops up every so often that changes the way people think about doing things. It creates a paradigm shift that can significantly alter the way things get done or how the methodology of achievement is accomplished. Angela Duckworth's "grit" is such a concept.

If you are not versed in the back story of how the hoopla surrounding grit has emerged, it is worth a mention. Duckworth is a clinical psychologist who was contacted by West Point to see if she could pinpoint why some West Point cadets graduate and why others drop out. It bears notice that acceptance to the service academies is highly selective. All, read that as "all," candidates have an exemplary high school record that includes significant academic achievement, athletic prowess and budding leadership qualities through participation in the boy/girl scouts, student government or some other service opportunity in their home communities. Bottom line, we are talking about the "best and brightest," not slackers who spent their formative years in the detention hall staring at a white wall.

But the allure of early morning marches, push-ups and "sir, yes sir, may I have another?" may quickly wear thin and the thin gray line starts to get thinner. And this is a problem

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EDITORIAL COLUMN

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as the people who don't make the grade carry the "failure" stigma forever, even though just months before they were viewed as talented, gifted and brilliant. What happened? Or more accurately, why did this happen? And what can be done to stop the Academy from bleeding talent?

One of the changes the new cadets face is how to deal with setbacks, challenges and outright failure. One of the common denominators the incoming cadets share is a continual history of success. These people were class presidents, team MVP's and academic whizzes who have not earned these laurels by hanging out with the burnouts smoking cigarettes on a street corner. We're talking cadets who at 14-years-old had the next 50 years planned out in quadrennial segments, along with retirement plans A, B and C.

Upon arrival at West Point, one is ripped from one's past as you have 90 seconds to say goodbye to your family. The cadets are dropped into an alternate reality where directives are screamed to a population who may have never been reprimanded in their previous lives. Welcome to the brave new world. You're transported to an environment where the only thing certain is the impossibly demanding Firstie who takes his or her job just a little too seriously. In no time you are cursed with the uncertainty whether you should ping (double time), pop-off (answer in military lingo) or pray to Odin (Norse deity, protector of heroes who controls the elements). The slightest resistance can change hell week to hell-life.

But some do make it, in fact most do, and what Duckworth and her research team found is that the secret quality of those who do make it is grit also defined as perseverance or stick-to-it-iveness. Interestingly, there is nothing new here as anyone who has read *Think and Grow Rich* by Napoleon Hill will recognize the magic to Hill's classic from almost 80 years ago was persistence.

The challenge then becomes how can one teach or learn to be more persistent, more gritty? Can this be trained in? And if it can what are the necessary steps or methods to use when dealing with individuals vs. groups, men vs. women or the highly successful vs. the highly unsuccessful?

The advantage Duckworth has had over Hill is some 80 years of trial and error that are now confirmed with mountains of anecdotal stories backed up by boatloads of statistical data.

Grit can be measured with a simple 12-question multiple choice quiz downloadable from the Internet (Microsoft Word—GRIT Questionnaire. docx (wordpress.com)). The quiz is public domain and the analysis is included. The scale is 0 to 5 with 5.0 being the most gritty. This might be a worthwhile pursuit, especially with older athletes endeavoring to squeeze those last ounces of talent from a career, but it can also be formative for a newbie to illustrate that with a little more stick-to-it-iveness hurdles can be hurdled. Grit is seen by Duckworth as a skill that with diligence, some directed thought and conscientious application can change over time. Is it easy to do? Personal changes are rarely easy, if they were everyone would do them. Role models, directed practice and a never give up/find a way attitude all can help. Our sport is a goal-directed one and any coach with even the least amount of experience knows that behavioral changes, however slight can often make a profound difference on the physical manifestation of desired goals.

The loss of talent we have all seen is tragic in a sense. You hope for the best for your athletes and the thoughts of what could have been ultimately proves to be unproductive and wasteful. Someone else always comes along. Accepting this, the task then becomes to practice the right things, do the right things for the "next time" when the uncut diamond, the world beater shows up, Odin gives you the nod and the rest of the story is history.

TRAINING THE DUAL HURDLER

A look into the world of a coach who is confronted with the challenges and issues of designing a training program for the hurdler who wishes to compete in both the sprint hurdles and the intermediate hurdles.

BY MIKE THORSON, FORMER DIRECTOR OF TRACK & FIELD/CROSS COUNTRY AT THE UNIVERSITY OF MARY

We live in a world of specialization and track & field is no different. We are seeing fewer and fewer hurdlers who train and compete in both the sprint hurdles and the intermediate hurdles. Most are collegiate hurdlers and typically designate one of the races as their specialty by the time they reach the post-season.

Although a hurdler may select a primary event, that doesn't change the task that a hurdle coach will face if he is asked to design a training program for the **dual** hurdler. The challenges are numerous and they can be difficult. The coach is essentially being asked to teach toward two quite different models. But while there are many differences and some can be very problematic, there are also many commonalities in the training for the two events. One of the first tasks for the coach is to blend the correct amount of speed, speed endurance, and special endurance 1 and 2 into a total training package. First, let us review speed and speed endurance. An explanation of each and sample training sessions are included.

SPEED/SPEED ENDURANCE/SPECIAL ENDURANCE 1 & 2

##Speed Runs of 95-100% intensity over 30-60m or up to six seconds of running. Recovery is typically complete.

* Example: 4 x 40m blasts with spikes from blocks @100% intensity with 5-6 minutes recovery per rep.

##Speed Endurance Runs of 95-100% of maximum over 60-150m or 7-20 seconds of running. Recovery can vary between 2'-5' for reps and 8'-12' for sets.

*Example: 3 x 80m @ 95-100% intensity from a four-point stance with 4-5 minutes rest, 10 minutes recovery followed by 1 x 150m with spikes @ 95% intensity.

##Special Endurance 1 Runs of 95-100% of maximum over 150-300m or 20-40 seconds of running. Recovery is complete or near complete-up to 20'-30'.

*Example: 2 x 200m with spikes @ 95% intensity with 6 minutes recovery, 10 minutes recovery between set, 1 x 300m with spikes @

95-100% intensity.

##Special Endurance 2 Runs of 95-100% of maximum over 300-600m or 40 seconds of running or more. Recovery is typically complete—20'-30'.

*Example: 2 x 200m with spikes @ 95% intensity with 8 minutes recovery, 12 minutes recovery between set, 1 x 350m with spikes @ 95-100% intensity

Although some coaches are hesitant to "mix and match" energy training systems, we have long employed this method very successfully. It is an essential component in training the dual hurdler. A couple of workout examples used by the Marauders:

A. 2 x Flying 40m on the turn with spikes at maximum speed (5 minutes recovery) 2 x 150m with spikes @ 98%(6 minutes Recovery) 1 x 300m with spikes with hurdles 1-4 on marks from blocks at race pace

B. 2 x 150m @ 98% with spikes (6 minutes recovery) 1 x 300m @ 98% with spikes (10 minutes recovery) 1 x 200m @ race pace with spikes with hurdles 1-4 on marks

   Note: 98% equals maximum speed in a training setting

   Note: It is extremely important for the hurdler to run the correct "race pace" in the intervals with hurdles on the correct marks in order to obtain the proper hurdle rhythm and race distribution (Our goal is a 5% variance between the first and second 200 in regards to distribution, remembering that earmark from a clinic by Ralph Lindeman of the Air Force Academy some years ago)

DUAL HURDLER TRAINING CONSIDERATIONS

One of the most difficult tasks for the coach is assuring that the hurdler is obtaining the correct amount of speed endurance, and at the same time, is recovered enough to carry out the required speed and hurdle-specific training requirements for the shorter hurdle event. This is a difficult balancing act, especially with the athlete needing to be basically fatigue-free for the sessions where hurdle rhythm is trained.

This is compounded by the fact that much of the 400m hurdle training results in **velocity fatigue** that disrupts and diminishes the training of the correct motor patterns for the short hurdles. This can often lead to a coach instilling the incorrect or wrong motor patterns for the 100/110m hurdler. As biomechanist Ralph Mann says in "The Mechanics of Sprinting and Hurdling," hurdlers are oftentimes not meeting the demands of their race in training.

The dual hurdle coach, too, is always in a battle of time constrictions, attempting to limit training sessions to two hours or less (our goal is actually 90 minutes) and always keeping foremost in mind that athletes can only be stressed at the highest levels for approximately **three minutes** per training session, again per Ralph Mann. The great coaches always have the big picture in mind, and are constantly monitoring the percentage of time their athletes are spending on the track, strength training and with regeneration /recovery.

A major issue that will confront the mentor of a combined hurdler is **regeneration.** Some coaches fail to remember that one of the basic laws of training is that **adaption takes place during recovery**. They neglect to build it in to their training cycles, thus missing a critically important training component for the dual hurdler's success. Additionally, many of today's athletes will need more recovery than in the past. The typical athlete that coaches work with today is most certainly a product of his/her environment and quite often cannot handle the

workloads and intensity of athletes from yester years without the proper, and oftentimes, more recovery.

Another major concern that needs to be addressed is the recovery/fatigue factor as it relates to strength training. It is very clear that the dual hurdler will need to have a modified strength training program. Our program typically will see our dual hurdlers lift only once per week (twice a week with the second session very light in some cases) during the competitive phase of the season with what we term basically a **maintenance** program. We rely very heavily on Fall hill work and functional training emphasizing plyometrics, circuit training, and core training to meet our strength requirement needs.

We believe, too, that the **best form of strength training** for a sprinter/hurdler is actual **sprinting.**

A training program like ours that is characterized by **low volume**, **high intensity** and **large amounts of recovery** will lend itself to success for the dual hurdler. The low volume training is especially helpful for the athlete who needs both speed endurance and fatigue-free training. The dual hurdle coach should always be mindful that the 400 Hurdles, as one coach so aptly put it, "is the only event that requires an athlete to perform a technical maneuver while in anaerobic distress."

That in itself presents a number of concerns for the dual hurdle director. Combining the need for endurance and quality speed and hurdle rhythm sessions that simulate actual competition may be the biggest challenge. The **"ideal"** training for the hurdler is actual **meets**…**competition.** Thus, an everyday goal of the coach is to mimic competition as closely as possible. And that can be extremely challenging.

Another obstacle that faces the coach is obtaining quality repetitions to build a race model for the 400 hurdles. It is further compounded if you train in a cold weather climate that forces the athlete to train indoors for up to five months out of the year (which sometimes can be the case for programs in the Midwest). That is one of the major reasons coaches from the Midwest include 400 Hurdle training in the Fall months prior to the indoor.

Speaking of indoors, the undercover season is a critical preparation period for the combined hurdler that many coaches bypass. Coaches should always be mindful of the old adage: "You are what you train to be." In addition to competing in the 60m hurdles, there are a number of indoor events that can prepare the athlete for the 10-barrier sprint hurdles and the intermediate hurdles when the athlete moves to the outdoor season. The 200m, 400m, 600m and the 4 x 400m relay are all events available to the hurdler indoors that can greatly contribute to the sequence and progression of training and, ultimately, success for

We have provided a number of actual training weeks to offer a peek into the training of the combined hurdler, with two weeks from the Fall training period, two from the indoor season and two from the outdoor campaign:

Week 6 (Fall Training Phase) October 10

Monday, October 10—2 x 2 x300m @ 800m pace in flats (2 minutes recovery/4 minutes set) 3 x 150m @ 95% with spikes (4) Strength Training
Tuesday, October 11—Hurdle Technique Med Ball Circuit--Orange
Wednesday, October 12—Recovery Circuit/ Barefoot Drills Abs, Strength Training
Thursday, October 13—Hurdle Technique followed by 1 x 350m @ 95% with spikes (10 minutes Recovery) 2 x 150m @ 90% with spikes (4 minutes recovery) Strength Training
Friday, October 14—Hills-2 x 50m, 3 x 100m, 4 x 150m Med Ball Circuit—Blue
Saturday, October 15—Rest
Sunday, October 16—Recovery—15 minutes Stationary Bike or Elliptical

Week 11 (Fall Training Phase) November 26

Monday, November 26—2 x 350m @ 95% with spikes (10 minutes recovery) 2 x 150m @ 95% with spikes (5 minutes recovery) Abs, Strength Training
Tuesday, November 27—Hurdle Technique Med Ball—Go Big Orange
Wednesday, November 28—Recovery— Stationary Bike-15 minutes, Barefoot Drills, Abs, Strength Training
Thursday, November 29—Hurdle Technique Med Ball Circuit—Little Marauder
Friday, November 30—4 x 300m @ 85% with flats (5 minutes recovery) Abs
Saturday, December 1—Rest
Sunday, December 2—Recovery—15 minutes Stationary Bike

Week 19 (Indoor Competition Phase) January 15

Monday, January 15—Hurdle Technique, Flying 30's Strength Training
Tuesday, January 16—1 x 300m-200m with spikes @ 98% (12 minutes recovery) Med Ball Circuit—Blue
Wednesday, January 17—Recovery—No warmup—Stationary Bike 15 minutes Easy Abs Strength Training (Light)
Thursday, January 18—Hurdle Technique Med Ball Circuit—Go Big Orange
Friday, January 19—Pre Meet Warmup
Saturday, January 20—South Dakota State, Brookings, SD (Competition)
Sunday, January 21—Recovery—20 minutes Elliptical

Week 21 (Indoor Competition Phase) January 29

Monday, January 29—Hurdle Technique, 1 x 350m with spikes @ 98% (12 minutes recovery) 2 x 150m with spikes @ 98% (6 minutes recovery) Strength Training
Tuesday, January 30—Recovery Circuit Abs Med Ball Circuit—Orange
Wednesday, January 31—Hurdle Technique, 1 x 200m with spikes @ 98% (10 minutes recovery) 2 x 150m with spikes @ 95% with 2 hurdles (random spacing) (5 minutes recovery) Strength Training (Light)
Thursday, February 1—Recovery—Warmup followed by 10 minutes Stationary Bike Med Ball Circuit—Little Marauder
Friday, February 2—Pre Meet Warmup
Saturday, February 3—NDSU, Fargo, ND (Competition)
Sunday, February 4—Recovery—Warmup, Light Accels with flats

Week 28 (Outdoor Competition Phase) March 19

Monday, March 19—1 x 350m with spikes @95% (12 minutes recovery) 1 x 300m with spikes at 95% with hurdles 1 & 2 on mark Strength Training
Tuesday, March 20—Hurdle Technique, Flying 40's on turn Med Ball Circuit-- Blue
Wednesday, March 21—1st Hurdle 400 H x 3, 1 x 300m with spikes @ 95% Strength Training (Light)
Thursday, March 22—Hurdle Technique Med Ball Circuit-- Orange
Friday, March 23—Pre Meet Warmup
Saturday, March 24—Black Hills State, Spearfish, SD (Competition)
Sunday, March 25—Recovery—15 minutes Elliptical

Week 30 (Outdoor Competition Phase) April 2

Monday, April 2—1 x 250m with spikes @ 95% (12) 2 x 200m with spikes with hurdles 1-4 on marks @ race pace (10) Strength Training
Tuesday, April 3—Hurdle Technique, 400H Shuttle Med Ball Circuit—Go Big Orange
Wednesday, April 4—1 x 300m with spikes with hurdles 1-6 (12 minutes recovery) 2 x 200m with spikes @ 95% (10 minutes recovery) No Strength Training
Thursday, April 5—Light Hurdle Technique Abs Med Ball Circuit—Go Big Orange
Friday, April 6—Pre Meet Warmup
Saturday, April 7—Al Bortke Invitational, Bismarck, ND (Competition)
Sunday, April 8—Recovery—20 minutes Stationary Bike

Note: As noted earlier, 98% is basically maximum speed in a training setting

the dual hurdler. The speed component and the speed endurance and special endurance 1 and 2 training required for those events will greatly enhance the success of hurdlers who compete in both events during the outdoor campaign.

It is very apparent that oftentimes very good indoor 60m hurdlers do not reach the same levels of excellence outdoors where they lack the necessary speed endurance over 10 hurdles. With the required training that competing in both hurdle events demands, that won't be the case with the dual hurdler. Most coaches will agree that the energy requirements for the sprint hurdles are basically the same as they would be for the 200m. The problems result, however, because coaches don't always train hurdlers as such.

Quite often indoors (and outdoors as well) our hurdle technique speed sessions are what we term "combined" hurdle workouts where we prepare hurdlers for both events. From a mechanical and technical perspective, there is a great deal of "carry-over" and the sprint hurdler is a better 400m hurdler as a result. And vice-versa. There is no question the 400 hurdle training will strengthen the sprint hurdler.

Our program certainly doesn't neglect the speed endurance energy systems for the 400 hurdles while competing indoors. Despite training on a 200m indoor oval, the dual event athletes will often do intervals that include hurdles. This not only aids the athlete in making adjustments, alternating and steering, but forces the athlete to hurdle in a "fatigued state" and learn how to manage fatigue that they will face in the outdoor one-lap hurdle race.

It is critical that the coach of dual hurdlers **not over-drill.** There is no question that drills are extremely important. But only meaningful drills that serve an actual purpose and have the highest degree of transfer should be included on the training menu. Anything else is quite senseless and actually takes away energy that the hurdler will need for far more important training. Ludwig Svoboda, a hurdle coach from Czechoslovakia, said it best when he concluded that "many of the common hurdle drills develop a technique that is useless in maximal speed performance." As Vern Gambetta, a noted training authority and one-time track and field coach, often says, "Do the things in training that you need to do. Not what is nice to do." Keeping athletes "fresh" is of utmost importance. Maximizing energy and organizing the training to obtain the utmost benefits from

The following are two actual U-Mary hurdle technique training sessions that were what we term combined sessions, meaning sprint hurdles and the 400 hurdles were trained and developed:

Monday, January 22 Indoor Competition Phase Men and Women

1. Marauder Sprint-Hurdle Warmup
2. Hurdle Hops 5 Hurdles x 2 30" hurdles
3. Walking Lunge with eyes closed 2 x 10m
4. Accels 4 with spikes
1. 1 Step Hurdles 8 Hurdles x 2 30"
2. 2 x 30m from 4-point
3. Tempo Hurdles Women—3 Hurdles @ 30" x 3 @ 7.7m Men—3 Hurdles @ 36" x 3 @ 28 feet (8.53m)
1. 2 x Sled Pull with hand weights 20m (from 4-point)
2. 2 Hurdles from Start x 2 with hand weights W—30" @ 8.0m M—36" @ 29 feet (8.84m)
3. 2 Hurdles from Start x 2 W—30" @ 7.5m M—39"-36" @ 28 feet (8.53m)
4. 6 Hurdles from Start x 2 W—30" @ 8.0m M—39" @ 29 feet (8.84m) (TimeTouchdowns)

***__Shuttle__—2 Hurdles down and 2 hurdles back spaced 20m x 2 W—30" M—33" (3 minutes recovery)

***__2 x 200m__ with spikes with 4 hurdles spaced randomly @ race pace (6 minutes recovery) W—30" M—33"

***__Note:__ The discounted spacing measurements will differ per athlete and per program. They will change as the season progresses as the hurdler becomes faster and stronger

***__Note__: Men often use 33" hurdles in 400 hurdle training sessions opposed to the regulation 36, with less force and energy required for the 33 inch hurdle and less risk of injury

Monday, April 23 Outdoor Competition Men and Women

1. Marauder Sprint-Hurdle Warmup
2. Hurdle Hops (Lateral) 6 Hurdles @ 24" x 3
3. Standing Long Jumps 3 out/3 back
4. Walking Tuck Jumps 2 x 10m
5. Duck Walk with 2k med ball 2 x 10m
6. Accels 4 spikes
1. 1 Step Hurdles 6 Hurdles x 3 30"
2. 2 x Flying 30m on Straight (Time)
3. Tempo Hurdles W—2 Hurdles x 3 with hand weights @ 30" @ 7.7m M—2 Hurdles x 3 @ 36" @ 28 feet (8.53m)
1. 2 x Flying 20m (Straightaway) Time
2. 3 Hurdles from Start x 1 W—33"-30" @ 8.0m M—39" @ 29 feet (8.84m)
3. 8 Hurdles From Start x 2 W—30" @ 8.0m M-42" followed by 39" @ 29 feet (8.84m) (TimeTouchdowns)
4. Hurdle 1 from Start on the mark (400H) x 3 W—30" M—36" (Time)
5. 3 Hurdles from Start x 2 on the marks @ race pace W—30" M—36" for first hurdle, followed by 33" (Time Touchdowns)

####The weekly training sessions and hurdle technique plans are neither exhaustive nor definitive. They are a small glimpse into the training of a dual hurdler and are offered merely as a guide. The success of any coaches' training plan will always hinge on the timing and appropriate application of stimulus.

the amount of energy expended should be the goal of every coach of combined hurdlers. Utilizing all available time and managing the time restrictions are always a concern with any athlete, and certainly with the dual hurdler.

With this concept in mind, most outdoor interval sessions should be a combination of "open" intervals and intervals that include hurdles on the competition marks at the correct spacing. This not only enables athletes to train the energy systems that they will utilize in a race and obtain the needed endurance component, but work on the "race plan" in all types of weather. It is critically important to rehearse the race plan over and over and build a sense of confidence for the race model under all types of conditions.

We are reminded of the quote by University of Louisiana at Lafayette track & field coach Tommy Badon: "If you fail to plan, you plan to fail." Well said. The hurdle intervals will most certainly enhance **race distribution, planned changes in rhythm and aid in late race adjustments.** Those three variables should be of utmost importance for every coach who trains a 400m hurdler.

Again, this method of interval training works very nicely with our philosophy of low volume, high intensity and large amounts of recovery. An example of a workout session that we are referring to:

@@1 x 350m @ 98% with spikes with hurdles 1-5 on marks (12-15 minutes recovery) 1 x 300m @ 98% with spikes (10) 1 x 300m @ race pace with hurdles 1-4 on the marks (spikes)

SUMMARY

There are many challenges that await the coach who is confronted with the assignment of implementing a training program for an athlete who wishes to partake in both hurdle events. But as we have outlined, it is certainly very feasible. It does, however, require a very hard-working and dedicated athlete and an innovative, creative and well-organized coach who can maximize the different energy systems in sometimes unique ways. A year-around, global approach that builds upon each succeeding phase will ultimately prepare the athlete to be a successful dual hurdler, or present the hurdler with the option to choose one or the other by the championship season. As this article has shown, it is very, very doable, and it is being done very successfully by a number of athletes and coaches throughout the country.

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ADDRESSING THE CONFUSION WITHIN PERIODIZATION RESEARCH

This discussion is excerpted from the *Journal of Functional Morphology and Kinesiology*, 28 August 2020. The focus of the authors is on recent problematic developments in sport science, and more specifically, problems related to periodization research.

BY W. GUY HORNSBY[1], ANDREW C. FRY[2], G. GREGORY HAFF[3] AND MICHAEL H. STONE[4]*

INTRODUCTION

Over the last several years, disturbing trends related to sport science research and education related to the periodization of training have been noted by the authors of this article. Specifically, it appears that there is an increased push by researchers to promote "outside the box thinking". Certainly, questioning poorly supported dogma and popular belief(s) is at the root of the scientific process. However, for areas of research that have a solid underpinning supported by good scientific data and considerable previous work, appropriate appreciation and understanding should take place before a dismissal of these works occurs. This does not mean that previous findings cannot be challenged or cannot be further developed, as this is a key aspect of the scientific process. However, we believe that most accepted conceptual paradigms of basic and applied

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science, including sport science, are firmly rooted in logical reasoning and supporting evidence. We also believe that most good conceptual paradigms develop and evolve over time as a result of critical thinking, sound research (often painstaking), and a diligent search for clarity. As such, a central goal of this essay is to inspire future research.

A troubling current trend in academics appears to be an "everything we have been taught is wrong" attitude, carried out with an intent to create controversy, and this trend has spilled over into sport science research, particularly as it pertains to periodization. Perhaps some (much?) of these issues are related to/influenced by social media (of which we readily admit that we are not experts). Researchers are now more connected virtually, with others across the globe leading to constant commentary, for better and for worse. Several of the authors have been scientists for a long time (>30 years), and we unanimously feel that today's students and young scientists are developing in a climate that is too focused on self-promotion and too often misses the big picture.

Over the last several years, we have read many review and opinion papers [1–4] on periodization in which we feel the questioning is far too simplistic (e.g., questioning a referenced statement or using a circumscribed thought process more common in the basic sciences) and misses the breadth and robustness of the historical development of periodization (which is well beyond the scope of this discussion). Thus, we feel it is worth briefly considering the current climate of periodization research/commentary and addressing several aspects of a number of specific issues. Below are three primary issues related to periodization research followed by a brief commentary on a newer development within the field.

APPRECIATION OF HISTORY

Recently, it seems that a more commonly held belief has arisen that "older" research is out of date and less helpful than recently published research. This can result in authors selectively choosing references or statements; potentially missing important work; or worse, specifically choosing studies that fit one's personal narrative. It is particularly surprising how research in the areas of resistance exercise, strength-power development, etc., performed in 1970s, 1980s, and 1990s was perhaps the biggest "lift" in knowledge the field has experienced [5], and yet many authors only cite work performed in the last 15 years. As authors we have, on several occasions, been told by reviewers to replace a reference of an older study with a more current study or even provided the suggestion that a reference is "too old", apparently dismissing older work. It is worth noting that if only current research is valuable, that means that what we are doing today will eventually become obsolete and valueless. We believe an appreciation of historical work may be helpful for limiting the cyclical, "re-invention of the wheel" nature of some training and research practices.

A lack of appreciation of older literature may lead to improper citing of that older literature (when it is cited) or at the very least lead to misinterpretation of this research. Perhaps most importantly, there does not seem to be an appreciation for the development and evolution of ideas and concepts. We have been particularly dismayed at several recent papers that have used details from older references to dismiss entire concepts that evolved from these initial studies [1,2]. Additionally, we often read a basic statement regarding an aspect of periodization suggesting that it is relatively simplistic and straightforward information when in fact it is much more layered and complex [1–4].

IT IS WORTH NOTING THAT IF ONLY CURRENT RESEARCH IS VALUABLE, THAT MEANS THAT WHAT WE ARE DOING TODAY WILL EVENTUALLY BECOME OBSOLETE AND VALUELESS.

One example of a common oversimplification is the reference of Lenoid P. Matveyev (USSR) being recognized as the "Father" of periodization. While Matveyev did formalize the periodization conceptual paradigm, he clearly built on previous work and contributed to the evolution of the paradigm. The historical development of periodization has a long and rich history dating back several centuries to the ancient writings of Philostratus; Galen; Avorroes; and, more recently, L. Pihkala (1930s–1950s, Finland), L. Nadori (1940–1960s, Hungary), and N.G. Ozolin (1940s–1960s, Soviet Union). A few of the earliest texts, written in English, that describe breaking up the training plan into "periods" include books by Dyson (*A New System of Training*, 1946), Bresnahan and Tuttle (*Track and Field Athletics*, 1947), and Doherty (*Modern Track and Field,* 1963) [6,7].

While these are only a few examples within the vast history that underpins the theory of periodization, it demonstrates that prior to Matveyev's seminal contribution to the topic there was in fact foundational work being completed [6]. For an incredibly in-depth look into the history of periodization (particularly for track and field.), we refer the reader to Bourne, 2008 [6].

Indeed, Matveyev's contribution to periodization, particularly his observational work on periodization monitoring of the Soviet track & field athletes preparing for the 1952 and 1956 Olympic Games, and later, his text describing an annual training plan (1965), cannot be underappreciated [8]. It is worth mentioning that Matveyev was observing athletes being coached by full-time coaches who were creating the training plans (not Matveyev), and likely the reason for the popularity and attachment (credit) to the traditional (or classic) model of periodization is due to the 1965 text, *Periodization of Sports Training*, [8] being translated into English. For this textbook and the periodization paradigm, many of the underlying mechanistic concepts had been previously developed by H. Selye, N.N.Yakovlev, and I.P. Pavlov [9].

CONSIDERATIONS FOR TRAINING STUDIES

Discussions on the importance of the applied nature of sport and thus aspects related to that understanding are well documented [10,11]. Too often in studies in which interventions are compared, the interventions do not occur in a manner reflecting real-world application. We appreciate the "tug of war" that sport scientists often face, trying to juggle internal validity (in an effort to control certain aspects) with real-world parameters. However, common efforts to control certain aspects of a study, such as equating volume when comparing two different training strategies (likely changing one or both programs from what typically occurs), or using a smith machine to control inter-subject technique differences, etc., should be well addressed in the limitations and practical application portion of a manuscript.

TOO OFTEN IN STUDIES IN WHICH INTERVENTIONS ARE COMPARED, THE INTERVENTIONS DO NOT OCCUR IN A MANNER REFLECTING REAL-WORLD APPLICATION.

When discussing short-term training studies (the duration of most training interventions) [12], it is important to consider that 2–3 months is only a blip in an athletes training life. Thus, periodization pioneer Yuri Verkhoshansky explains, in the highly influential sport training textbook "Supertraining" . . .

"Virtually any method of strength training will enhance the strength of a novice during the first few months, provided the intensity, in particular, is kept at a safe level. This is a major reason why it is misleading and counterproductive to apply the results obtained from scientific studies of less than six months' duration. It is also a major reason why relatively inexperienced coaches manage to have initial success with athletes . . . " [7].

We certainly appreciate how difficult long-term periodization studies are, such as [13–15], as most of our work, with a few exceptions [16,17], is rooted in semester length designs. We feel too often short term (6–10 week) training studies are simply viewed as "what worked better at developing performance adaption(s)?" (often carried out on untrained or minimally trained subjects) vs. a more in-depth context such as efficiency of training [17]; the amount of work (and thus, fatigue) necessary to maximize results; and timing and direction of training, a coaches ability to direct and control the training process at certain time points [18,19]. We continue to be surprised by the apparent disregard for highly ecologically valid athlete monitoring studies capturing trained athletes in real-world environments [16,19–21] (these are only a few in a long line of research). We fully understand the limitations of causation (no comparison group, a "non-normal" sample); however, we believe this is some of the most helpful information for coaches and sport scientists related to periodization as well as other aspects of training.

Another important consideration is the amount of detail related to the training that is performed. Mujika [22] has previously called for authors of training studies to report volume load and detailed information of the training prescription. This is critical, as many times based upon the training information provided it is virtually impossible to replicate the intervention conducted. We believe that journals should request that authors report how the training was verified (e.g., were the investigators observing? Were they strength coaches? Was it a sport coaches report? A self-report?). It is perhaps not surprising that direct observation is superior to reporting from subjects [23]. Additionally, it would be help-

ful for authors to state whether or not the training reported was the planned prescription, beforehand, or if the training was recorded as it was carried out.

Lastly, most training studies referred to as periodization studies are really programming studies (see discussion below), as the manipulation and comparisons of different strategies are usually dictated by differences in set-rep schemes, intensities, etc., and not by overarching timelines or adaptation-based fitness phases and goals.

THE DEVELOPMENT OF CONCEPTS

Training concepts (e.g., training theory) can be astonishingly multifaceted and complex. Sometimes in attempting to summarize basic, translational and applied science, the large amount of physiology that goes into training concepts (e.g., fitness–fatigue paradigm, General Adaptation Syndrome, etc.) is lost. Related to bullet point #1 (history), to truly appreciate an established training concept one must really know the historical literature. Additionally, for sport research it is also likely helpful to understand aspects well beyond the literature (coaching, training, sport, and history). For example, using a very specific issue, that is a relative component within a larger concept, and then dismissing the entire concept as a mistake: disregarding a mechanistic concept such as Selye's work on stress response because his original studies were not based on exercise as a paradigm and therefore suggesting that the General Adaptation Syndrome (G.A.S.) cannot be used conceptually in explaining the response to exercise and training [24]. Training concepts can be quite helpful for sport scientists and coaches, as they allow complicated information from multiple scientific disciplines to be synthesized for useful application [24,25].

IT IS QUITE COMMONLY ACCEPTED THAT TECHNICAL MODELS HAVE NUANCE AND "RANGES". THIS SAME DEGREE OF ACCEPTANCE DOES NOT SEEM TO HOLD FOR PERIODIZATION.

Perhaps a worthwhile analogy is the comparison of athlete skill to technical models of performance for various sport tasks (e.g., stages of sprinting or of the snatch exercise). The summarizing nature of a technical model (or a training concept) can almost assuredly be questioned and picked apart to some degree. For example, it could be pointed out that someone incredibly successful (e.g., a gold medalist) did not perform in the exact manner recommended by the technical model. Interestingly, it is quite commonly accepted that technical models have nuance and "ranges". This same degree of acceptance does not seem to hold for periodization [3,4].

PROGRAMMING DRIVEN TRAINING STRATEGIES

Lastly, we have read several articles and frequently observe discussions on social media incorrectly portraying the idea that block periodization (or traditional periodization for that matter) is stagnant and that the programming within the periodized plan cannot be modified if needed during its implementation. Recently, there has been an increased push to use a training strategy that is more in-the-moment-focused.

Many terms have been used to describe these programming centered training plans that involve a day-to-day organization template, for example, agile periodization, flexible periodization, and fluid periodization [26–28]. Instead of a long-term, detailed training prescription, this approach to training involves a format in which training is dictated by an athlete's alleged current state (e.g., readiness, and fatigue, which are often subjective), and to a large degree, based on a certain selection format, assembled session to session.

Conceptually, these training models are not periodization models and are actually programming models, thus including the term periodization is a misnomer [24]. This is because these flexible training models are driven by day-to-day and week-to-week programming decisions, often based on athletes' subjective feelings and not objective evidence or an overarching periodization strategy.

Periodization is a conceptual outline dealing with timelines and fitness phases; depending upon the goal of the training process, it creates time-direction of training volume, intensity, and task specificity factors [25]. Programming drives the periodization phases (makes the phases within the periodized plan happen) and includes exercise selections, loading parameters, rest periods, etc. [24,25]. However, using a periodization model allows substantial programming modifications to be made [25]. It should be noted that programming alterations should be made based upon valid

and reliable evidence concerning the state of the athlete, evidence that can be provided by a well-designed athlete monitoring process [29]. Indeed, programming alterations should be based on good data; a well-conceived, integrated long-term plan; and in most cases, be subtle.

Within U.S. collegiate sport and Australian professional sports, we continue to be surprised by how often we hear "periodization doesn't work for team sports" or the more general statement "periodization doesn't work for my situation." We have speculated that perhaps avoiding this long-term planning approach is due to how strength coaches are often placed in a servant type role to the head sport coach [30], and perhaps the idea is that these more flexible approaches allow the strength coach to work around the head sport coach.

We believe this thinking is flawed, in that (1) attempting to manage a more unpredictable situation with more unpredictability is a mistake, and (2) the programming within a periodized plan can be altered if need be, while being guided by the overall goal(s) of the given training phase. Or, as more eloquently stated by Bourne [6], "the use of periodization is synonymous with a scientific approach to training as coaches, scientists, and athletes attempt to gain maximal control over the variables affecting the adaptive process."

CONCLUSIONS

Recently, we (along with many colleagues) authored a letter to the editor (LTE) [31] addressing what we felt were issues in a recent article by Buckner et al. [2]. In the same issue of Medicine and Science in Sports and Exercise, Buckner et al. responded to our LTE [32]. For a much better picture of the overall discourse, we refer the reader to those papers, which address several important concepts of strength development [2,31,32].

ONLY THROUGH THE APPLICATION OF THESE TRAINING PARADIGMS WITH ACTUAL HIGH-LEVEL PERFORMERS CAN THE EXTERNAL/ ECOLOGICAL VALIDITY OF THE TRAINING METHODS BE PROPERLY ESTABLISHED.

Of particular note are some of the statements made in the follow-up by Buckner et al. [32] regarding periodization that we thought were worth addressing. We appreciate that skeptics are acknowledging the complexities of periodization, and this is an important step in understanding and interpreting the scientific literature. However, simple blanket statements seldom explain the intricacies of advanced training methods for high-level performance.

Although there is certainly much work remaining, characterizing the arguments as "everything is periodization", or that "periodization has not been well studied" or "appropriately studied", suggests an unfortunate lack of understanding of the topic. Additionally, an appreciation of the differences in training advanced and elite-level competitors with long training histories compared to the very forgiving population of untrained or novice individuals, who readily respond to almost any training stimulus, is essential for making sense of the available data.

The ability to implement scientifically-based training programs with populations of all training and performance levels, and to work closely in concert with the actual coaches and trainers, is certainly a critical part of the process. Unlike the researcher who is often simply searching for statistically significant results, or evidence of a recognizable training effect, the effective sport scientist, coach, and trainer strives for optimum performance results at competition time. Recognizing and developing all facets of successful performance is critical to achieve the desired consistent and long-term results, whether it is on the athletic field or in any occupation requiring high levels of performance.

Only through the application of these training paradigms with actual high-level performers can the external/ ecological validity of the training methods be properly established. This discourse on the topic of periodization certainly validates our long history of careful study of this complex topic, and we eagerly look forward to conducting many future studies related to periodization. Like with many research topics, those who produce the scientific data on the efficacy of periodization quickly appreciate the inherent challenges of this line of inquiry. In 1910, former U.S. President Theodore Roosevelt may have summed it up best in one of his most famous speeches given at the Sorbonne in Paris, France, where he cautioned against individuals who have "a readiness to criticize work which the critic himself never tries to perform" [33]. It is hoped that authors eager to produce numerous reviews and

commentaries on this and related topics can supplement their work with empirical research data from their labs, and we invite them to be part of the constructive effort to properly understand the science of periodization and programming.

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THOUGHTS AND APPLICATIONS OF GRIT IN A TRACK & FIELD WORLD

Angela Duckworth's work on grit and self-control has inspired our editor to think about applications to track & field. Duckworth, a professor of psychology at the University of Pennsylvania, is the author of *Grit: The Power of Passion and Perseverance*.

BY RUSS EBBETS, EDITOR, TRACK COACH

Grit has become somewhat of a franchise entity. Below are some ideas on how applying the principles of grit, such as skill acquisition, deliberate practice, role models and continuous development may bear fruits in a track and field setting.

WHAT IS TALENT?

Talent is potential. It is the ability to do something but not necessarily to have "it" done yet. American culture seems enamored with the concept of talent. This is the the person who is a natural and seemingly has the effortless ability to do something that the average person either can't do or can only do with great difficulty or practice. There is almost a magical component to talent. We see the natural athlete do something and are amazed that they can do "that." It reminds me of Doug Henning's quote about how he creates magic, "Make the difficult habit, make the habit easy and make what is easy beautiful." To a degree talent is magical.

THEN WHY DON'T ALL THE TALENTED PEOPLE SUCCEED?

It boils down to effort. One can have all the talent in the world but if one sits on his hands nothing will get done. And it becomes important that one not confuse effort for activity. The effort must be purposeful, working towards a goal, for things to be accomplished. Without purposeful effort one is like a ship without a sail, you'll be afloat but you'll never get anywhere.

ANGELA DUCKWORTH WAS BIG ON USING WORD DIAGRAMS TO LAY THE FOUNDATION FOR HER ARGUMENTS ON DEVELOPING GRIT. HOW DOES THE WORD DIAGRAM TALENT X EFFORT = SKILL WORK?

Skill could be defined as the ability to do things, to express things. In a coaching sense we can think of the ability to apply force correctly as with the technical execution of an event, speed actions, and again the refinement of techniques that are biomechanically efficient. But the skills can also be psychological. The ability to remain calm and effective under pressure is something that some have a natural "talent" for, but it is also a skill that can be honed with visualization, learning to control one's respiration rate and generally to control one's thought processes—self-talk.

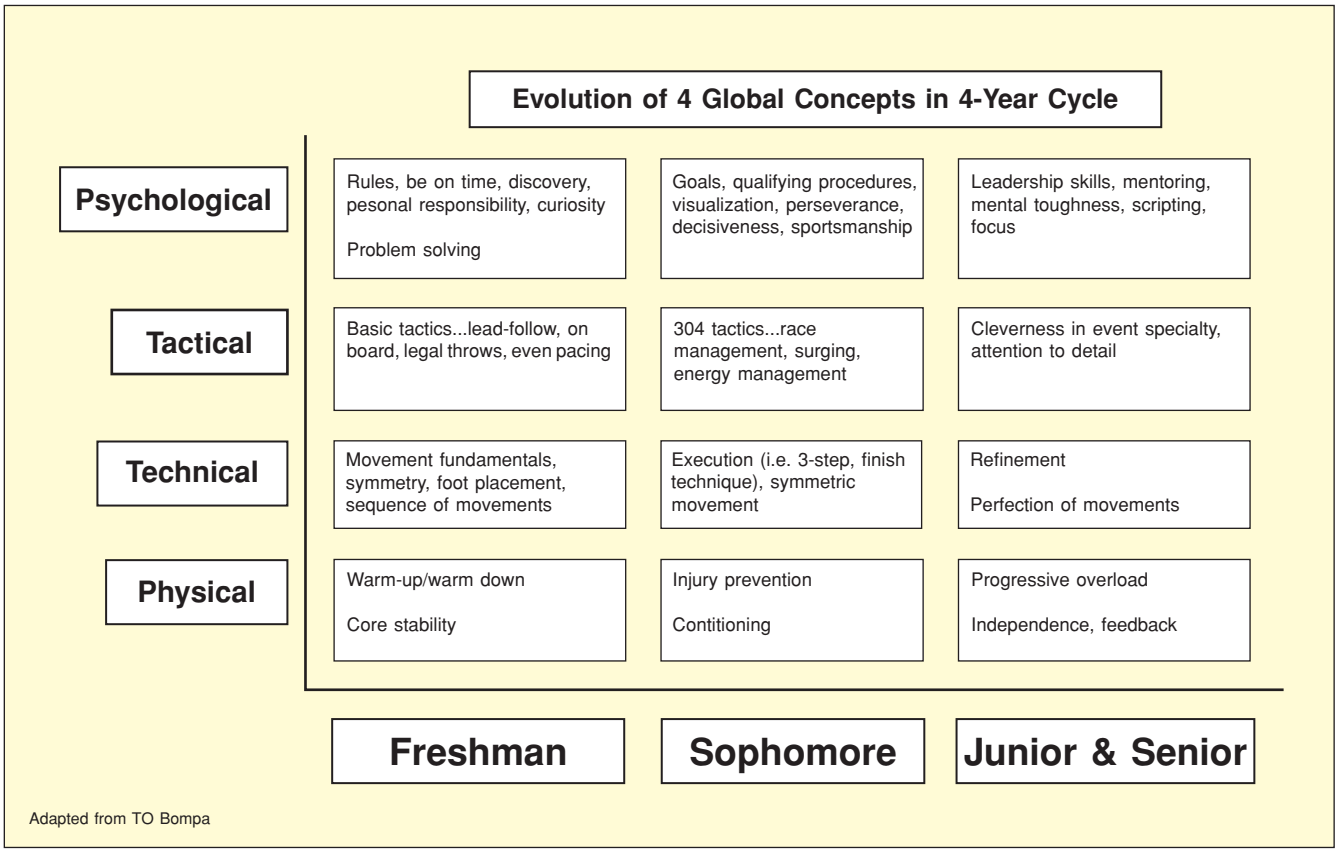
As one matures there is hopefully an increase in one's skill inventory so that one can better handle the challenges of greater responsibilities. I am reminded here of Matveyev or Bompa's four-year schedule for the development of physical, technical, tactical and psychological qualities (Figure 1). Although this is not in the Level 1 curriculum it was always positively received by the class when I offered it as a means to organize the development of skills over the course of an Olympic cycle or a typical high school or college career.

There are listed a set of desired skills that are to be mastered during year 1, year 2, etc. which present goals. An interesting thing about this grid is that the athletes who are in year 4 have the potential to model the desired skills that a year 1 athlete will be expected to develop. If this process is done correctly the series of physical, behavioral, psychological or leadership skills are continually exhibited within the coach's program that leads to achievement but also development of an achievement team culture.

SKILLS X EFFORT = ACHIEVEMENT

In a performance based environment achievement becomes the ultimate goal. We are not running a fitness class. With that in mind if the environment of the team is one of diligent refinement and application of the various skills that are deemed important there will be this sense of continual improvement. I think it is important that skills learned in the initial stages such as punctuality and cooperation and service to others are critical foundational values that a team should be built on. If these

Figure 1: Suggested 4-year plan for developing a distance runner. A specific plan could be devised for each athlete (i.e. 800m runner, jumper, thrower, etc.) with the specific tactics, strategies, goals and skills necessary for success in that event.



Adapted from TO Bompa

core values are deeply engrained the addition of the subsequent values and skills, however they are defined, can have a synergistic effect on both the individuals on the team and the culture of being on the team. I'd refer one to John Wooden's Pyramid of Success (Figure 2) for ideas.

HOW DOES THE CONCEPT OF *KAIZEN* FIT INTO ALL THIS?

Kaizen is a Japanese word that has been popularized lately to define the concept of continuous improvement. One cannot, does not "rest on one's laurels." There is always something that can be improved and work is done to that end. This is a Japanese business term that can be foreign in both a literal and figurative sense when applied to American business. In the U.S. most of our corporations are driven by the quarterly reports and the success or failure of these corporations is intimately tied to the quarterly report. In Japan they have long-term goals. I even remember reading that SONY has a long-term plan of 250 years into the future. I was stunned when I read that fact as it is highly unusual that any American company to even last 100 years. For those over the age of 50, think back to a time when transistor radios were all the rage—In spite of the crackling sound, spotty reception and being easily broken—and they were almost all "made in Japan." There was a time when "made in Japan" was a slur for anything cheaply build and not meant to last. That is not the case today where Japanese automobiles and technologies are now a standard of excellence. This was achieved through the concept of *kaizen*, continuous improvement that didn't happen overnight, but happened every night.

WHAT IS DELIBERATE PRACTICE AND WHAT ROLE DOES REST PLAY?

Deliberate practice is attention to the task at hand. It is a highly focused time where the athlete, or learner, is intensely focused on what he/she is doing. If it is something he is trying to learn or master it can require both a tremendous amount of mental and physical work. Why deliberate practice requires a proscribed rest period is that the intense focus can be mentally exhausting which in turn requires one to "take a break" to rest and recharge before returning to the task to achieve further mastery.

ONE CANNOT, DOES NOT "REST ON ONE'S LAURELS." THERE IS ALWAYS SOMETHING THAT CAN BE IMPROVED AND WORK IS DONE TO THAT END.

WHY IS THE HABIT OF PRACTICING AT THE SAME TIME EACH DAY IN THE SAME PLACE IMPORTANT?

To me this speaks to why there is a decided "home court advantage" in sports. The home court has similar sights, sounds, smells, lighting, travel times, bathrooms and water fountains, and that takes those seemingly trivial concerns off the radar screen. This is a technique that writers have long used to produce their daily word count. The writers use the same place, at the same time with "distractions" that become so familiar as to become invisible. For the athlete the same place allows one to focus more intensely on the task at hand, and not use valuable mental energy distracted by worry or trying to figure out where the necessary equipment can be found to complete a practice.

The downside of the "same place" all the time is that sometimes the arrival at a new venue, a hostile venue can be disconcerting. I am reminded of the famous scene in the movie *Hoosiers* where the basketball team enters the state championship arena (Butler College) and all the "hicks from the sticks" stare up at the ceiling and around the arena, never having seen a building so big. What does Gene Hackman, the coach, do? Gets out a tape measure, measures the height of the basket rim and measures the distance to the foul line. What does that do? It totally refocuses the team with the message – the rims are the same height, the foul line is the same distance, all we need to do is focus on basketball and the result will be the same.

WHAT ROLE DO ROLE MODELS PLAY?

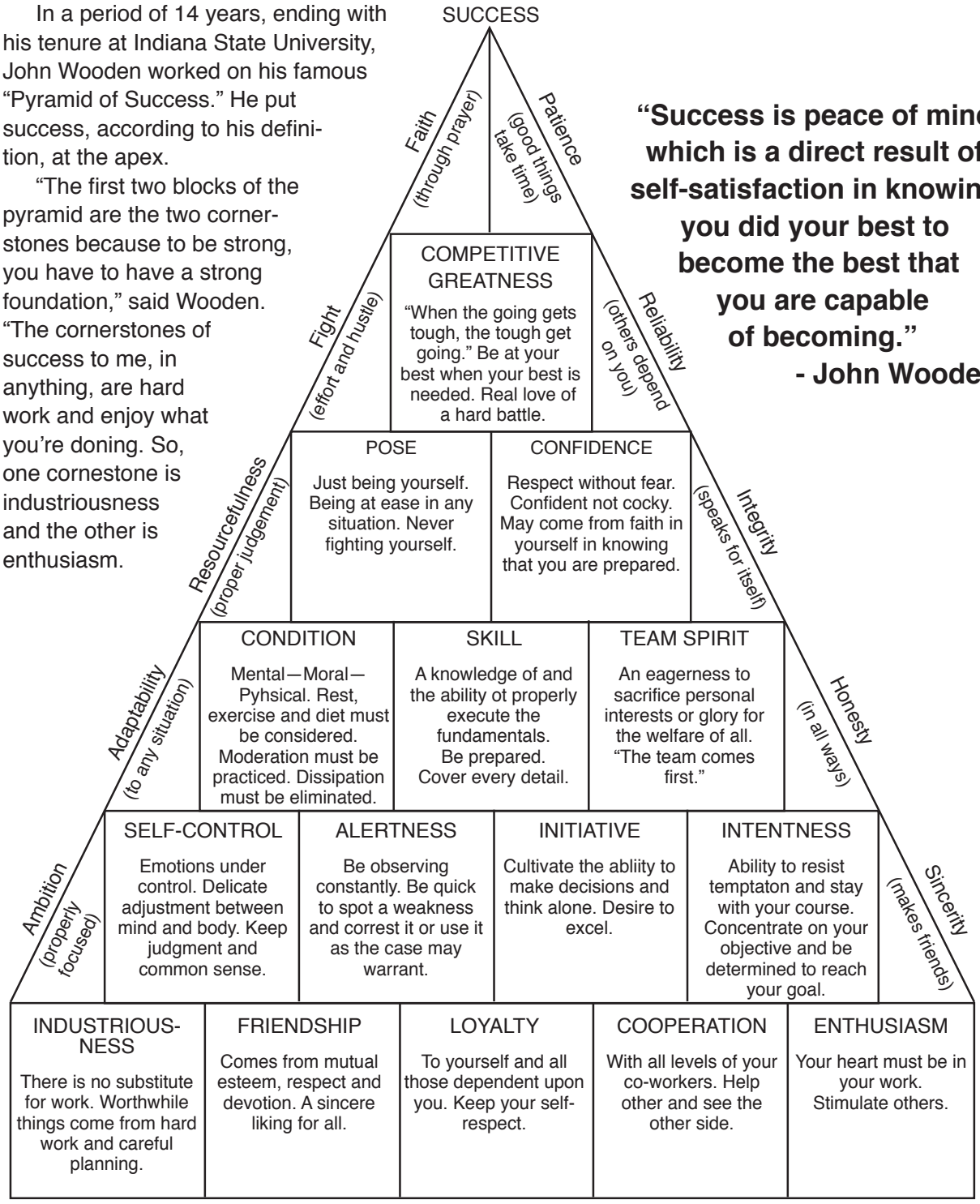
Role models are important for several reasons. For the novice or upcoming athlete a role model can essentially "light the path" to show the newbie that it has been done before and can be done again. For the more experienced athlete, even a world champion, a role model can prove to be inspirational in that that individual no doubt overcame some setbacks and has succeeded or succeeded again with the proof that it can be done. Even though the challenges the role model faced may be significantly different the fact that they rose to the challenge, gave themselves permission to succeed, and entered the challenge with an optimistic mindset can be

Figure 2

John Wooden's Pyramid of Success

In a period of 14 years, ending with his tenure at Indiana State University, John Wooden worked on his famous "Pyramid of Success." He put success, according to his definition, at the apex.

"The first two blocks of the pyramid are the two cornerstones because to be strong, you have to have a strong foundation," said Wooden. "The cornerstones of success to me, in anything, are hard work and enjoy what you're doning. So, one cornestone is industriousness and the other is enthusiasm.



"Success is peace of mind which is a direct result of self-satisfaction in knowing you did your best to become the best that you are capable of becoming."

- John Wooden

something the current champion can learn from. One final aspect of a role model that may be worth using as a model is how the role model handles the pressures of responsibility and greatness. Is it with dignity and grace or do they shirk the responsibility? The values, mannerisms, their opinions nowadays with tweets and Instagram posts, in effect lay the groundwork for those who will follow and will be emulated for better or worse.

WHY IS HAVING HOPE NOT A GOOD STRATEGY?

Hope is not a solid strategy because it shifts the burden of responsibility. If I were to solely rely on hope and were unsuccessful at my desired task I could say it wasn't really my fault as God or some other deity let me down. The thought, "If it is to be, it is up to me," becomes critical as one proceeded though life. Is there luck involved? Certainly, but then there is the old adage that the harder one works, the luckier one gets. It reminds me of Cromwell's famous supposed encouragement from the 1600's, "Trust in God boys, but keep your powder dry."

WHAT IS POSITIVE SELF-TALK AND WHY IS IT IMPORTANT?

We all have "thoughts" that filter in and out of our mind. Sometimes it is things like, "You can do this!" or "I am ready and prepared for this!" While other times one can slip into negative thoughts such as, "What am I doing here?" Or, "Why is this happening to me?" It goes back to *focus* and what one is trying to achieve. With positive self-talk there is an expansive awareness where one is ready for the opportunity and looking for things to happen, an opportunity that can lead to a successful outcome. With negative self-talk, one is closing down, is in an intimidated stance, essentially withdrawing from the experience. I am reminded of Stephanie Brown-Trafton's preparation for the Beijing Olympics where her father had a panoramic picture made of the Olympic stadium where she could throw each day in her garage. When she got to the actual stadium, she had in effect been there (the Beijing Olympic Stadium) many times before. She knew why she was there and had the smallest details memorized so that all she had to do was what she had practiced, at her "home" practice area. And she nailed the first throw and forced the rest of the field to play catch-up, which they never did.

WHAT IS THE DIFFERENCE BETWEEN A VIRTUOUS AND A VICIOUS CYCLE?

Poverty is said to be a vicious cycle. There is a lack of opportunity that fosters a limited view of the world and the opportunities of the world. Certain pathways "out" are either not valued or not available which in turn limits opportunities. Poor decisions and hanging with the wrong people, alcohol and illicit drug use all can change the trajectory of one's life downward in a day. There is much frustration and disappointment and a repeated belief that "one's efforts don't matter." If there are any "successful" role models they are more often possessing smart survival skills in their ability to work the system, hustle or somehow function on the fringes of the law. The bigger problem is that these issues become generational and the cycle of poverty is repeated time and again.

HOPE IS NOT A SOLID STRATEGY BECAUSE IT SHIFTS THE BURDEN OF RESPONSIBILITY.

On the other hand, a virtuous cycle is one where a culture of success is woven into the moral fabric of an institution, city, team, culture, country, family, or person. The next generation is expected to carry the baton and repeat the acts of the past. Reverence is given to those who have come before. I had a college teammate who became a Navy SEAL and spent his whole career as one. One thing that always struck me was when he talked about the U.S. Marines and the utter respect he had for them. He told me he loved to see them show up, as whatever job they were to do would be done quickly, efficiently and completely. It is something that is trained into the DNA of a Marine to do that.

Another example would be the system Greg Popovich has created with the San Antonio Spurs. In college track & field there any number of programs in all three NCAA divisions that, year after year, produce excellent teams.

It is simplistic to simply say that these teams succeed due to favorable aid packages or nice facilities. There is something more, a tradition of excellence that that offers team members something to aspire to that not only helps them shine as individuals, but at the end of their career, their accomplishments reflect positively on the coaching and guidance those programs have afforded these athletes.

WHY ARE CORE VALUES IMPORTANT?

We come into life without an instruction manual. We also come into life with varying degrees of parental competence and experience. Our extended families also can play a major role in our development whether it is the current generation or something that has been passed down through the generations. Core values help create a network that can direct behaviors. If you need ideas, I'd suggest you review John Wooden's Pyramid of Success or see what Phil Jackson did with Michael Jordan's teams at Chicago in the Netflix series The Last Dance. Even Herb Brooks and the 1980 Olympic hockey team had values (it is worth re-reading E.M. Swift's Sports Illustrated article, "A Reminder of What We Can Be" from 12/22/80 for details). The psychological qualities Brooks tested for (rather die than lose) in the 300 question "test" referenced in the movie "Miracle" was essential to select a team he felt he needed to beat the Soviets. This article will give one a deeper understanding of the cruel scene of "one more" and the dramatic final scene when Brooks refused to change his line as the seconds wound down in the semifinal game against the Soviets to the disbelief and consternation of Tikhonov, the Soviet coach.

Core values give those involved something to believe in and aspire towards. If you were to trace the methods and teachings of Lydiard, Cerutty, Igloi, the Finns with *sísu*, the East Africans, and even trace it to the successful collegiate programs and the "systems" that are used which are more than simple recruiting. There are standards, traditions behaviors that are adopted, modeled and carried on. These programs never seem to have to rebuild, they simply reload.

HOW CAN CONTINUOUS IMPROVEMENT BE ACHIEVED?

I think this has to become an accepted goal by the participants. Initially there will be a steep learning curve as the newbie finds out about "the system" but once that is achieved there becomes a continual challenge of finding the nuances of the sport. I think of my father in this case. He was a high school valedictorian, collegiate scholar but also the top collegiate golfer on the East Coast. He became a professional golfer while many of his friends from college went the doctor, lawyer route. I used to wonder why he chose the path he did and eventually came to see that more than just hitting a little white ball with a stick there was always the continual challenge of mastering the winds, the weather, the greens and one's self to produce the "perfect" round that kept him challenged on a daily basis. I am sure it is the same with musicians and their instruments and the endless possibilities music allows them. That is one of the challenges of coaching track & field. Nowadays most programs have throws, jump, sprint specialists with less crossover knowledge than was necessary 30 years ago. Needless to say, the technical demands of the different jumps or throws can be significant enough for one to keep finding nuances for years and years.

HOW CAN ONE ESTABLISH GRIT?

This becomes the $64 dollar question. I think there needs to be some stability in a program for a period of time. If one were to look at the most successful coaches, most would agree, the development of their successful programs was the result of years of trying to develop the culture they desired before things "clicked." Mike Krzyzewski at Duke made four Final Fours (in five years) before he finally won the NCAA Championship. John McDonnell of Arkansas coached there 12 years before he won his first of 40 NCAA titles.

I referenced earlier the four-year development pattern of Bompa or Matveyev, the Four Global Concepts. That chart has been helpful to coaches (and athletes) to get a visual of how one can progressively develop and athlete's physical, technical, tactical and psychological qualities over time, over a four-year period that will insure as possible the athlete's integration into the system. It may not be perfect, but it does give map of sorts for both parties so that there is an understanding of the expectations that become goals and guiding lights that serve for decision making and career direction.

From the Mailbox

In the last issue of *Track Coach*, David Bussaberger wrote a follow-up to his article in the Summer 2020 issue. In Part 2, Bussaberger chronicles the technical innovations of early fiberglass era vaulters and offers his perspective on the vaulting techniques used widely today. While I enjoyed reading both articles, I must respectfully disagree with Bussaberger's promotion of individualized style in the fiberglass era.

Without a doubt, fiberglass opened the door to a new era in the pole vault. A bending pole allowed athletes to clear bars higher than ever before. This transitional period began with apparent technical contributions from renowned vaulters, like George Davies, John Pennel, Kjell Isaksson, and Bob Seagren. A rapidly rising WR delivered excitement, as well as controversy. In his article, Bussaberger correlates advances in bar clearance with technical innovations from the early fiberglass era vaulters, but a closer analysis reveals a sobering truth about these performances.

While bar clearances and grip heights increased, push-off numbers remained largely similar to the pre-fiberglass era. Push-off is the difference between an athlete's top hand grip height and their bar clearance, and provides a reasonable indicator for technical efficiency. Minimal change in push-off suggests that athletes jumped higher because fiberglass poles allowed them to grip higher, and not because they moved their hips relatively higher above their grip than athletes had in the past, before fiberglass. I agree with Bussaberger that the first fiberglass vaulters experimented greatly with technical changes, as they adapted to their new instruments, but a holistic interpretation acknowledges that fiberglass produced little improvement in movement efficiency--push-off. (You can learn more about push-off in the article I wrote for *Track Coach*'s Fall 2020 issue.)

Does Bussaberger's reference to technique mean the Plant phase into Takeoff, or just Off-the-Ground, or both? Regardless, an ill-defined scope ignores what's most important in pole vaulting—a sequenced, proficient execution of each phase. For example, a good Pole Carry is a necessary prerequisite for the Run, just as the Run is a prerequisite for a good Plant; and so on and so forth. The best vaulters are not always the best technicians. When bar clearance is 80% runway speed, the fastest strongest athletes can get away with a lot of technical deficiencies in their jump. Technical differences may exist between the best vaulters, but we serve all vaulters, beginner or advanced, better by accepting their differences may derive from deficiencies, instead of proficiencies.

Personal style should not be some elusive manifesto for every young vaulter. No athlete jumping over 5.50 meters wakes up one day and says, "I've decided my style will combine Sam Kendricks' rockback with Mondo Duplantis' double-leg tuck!" Personal style should be an afterthought—a byproduct earned from years of developing pole vault's fundamental skills. It is the last accommodation for maxing out your genetic potential in speed and strength, and most of us never get to that level.

Sergey Bubka did. He achieved athletic stardom for breaking the WR numerous times and for introducing the Petrov Model, which would become a widely accepted pole vault technique used today. In Bussaberger's article, he suggests the Petrov Model may have some mechanical flaws. I appreciate the skepticism, but I think Bussaberger misses the mark on what's salient about Coach Vitaly Petrov's technical model. Petrov's main contribution was a free take-off, which requires the athlete to leave the runway before their pole tip contacts the back of the plant-box. Petrov simply coached his athletes to jump up in a vertical event. However, if we remember Petrov for anything at all, then it should be for his uncompromising emphasis on fundamental pole vault skills, regardless of technical model. When you observe an athlete coached by

Petrov, like Bubka or women's WR holder Yelena Isinbayeva, it's easy to observe their nearly textbook example. Petrov coaches the five phases—Pole Carry, Run, Plant, Takeoff and Off-the-Ground--in sequence, and he does it sublimely. That is what Vitaly Petrov should be remembered for!

Where Bussaberger might call the Petrov Model an individualized style, I call it good pole vaulting. Do not make a technical model your Holy Grail. An individualized style will merely excuse bad habits and odd quirks. If you must learn from elite vaulters, then look to those who show mastery in the five phases, like Russian vaulter Anzhelika Siderova. Now that's textbook technique! She's extremely consistent, and wins often. Could she be better? Sure, but personal style is unrelated. She's just a masterful technician of her event. Like Siderova, Bubka and Isinbayeva, you should develop pole vaulting skills that will remain relevant no matter how far you advance.

Noah Kaminsky is a pole vault coach in New York City. He supports the Public School Athletic League with meets and clinics.

DAVID BUSSABARGER RESPONDS

(1) According to Dick Ganslen in the *Mechanics of the Pole Vault*, the highest recorded push-off achieved by a rigid pole vaulter was 3'-4" by Ron Morris gripping 13'. Note that Dutch Wamerdam only achieved a modest push-off of 2'-½" with a very high grip (for rigid vaulters) of 13'-11". An important point with hand grip on fiberglass poles is that it has increased very gradually over a long period of time. In the early 1960s, at the beginning of the fiberglass era, George Davies (the first man to break the WR with a fiberglass pole) and John Uelses (the first man over 16') both gripped only 13'-7". Davies' best push-off was 2'-11" and Uelses' best was 3'-2". In 1966 John Pennel set a WR at 17'-6¼" gripping 14'-6", which translates into a 3'-8¼" push-off.

As fiberglass vaulters kept raising their grips and adapting to stiffer and stiffer poles (both factors required significant changes in technique to accomplish), push-off distances continued to improve. In 1972 Bob Seagren cleared a WR 18'-4¼" with a 15'-1" grip , a push-off of 3'-11¼". In 1987 Joe Dial set an AR of 19'-6½" gripping 16'-1", a push-off of 4'-1½. Sam Kendricks, the king of the push-off, has achieved a push-off of about 4'-5" using roughly a 16' grip. This exceeds Morris's best push-off by about 1'-1", a huge improvement. The writer speculates that push-off distance in fiberglass vaulting still has room for further improvement.

Finally, there is a reasonable amount of evidence to suggest extremely high hand grips seen in recent fiberglass vaulters reduce push-off efficiency. For example Sergey Bubka and Renaud Lavillenie both grip/gripped about 17' and both achieved 3'-10" push-offs, very good, but many other vaulters with lower grips have better push-off distances.

(2) Coach Kaminsky claims that differences in technique seen among top vaulters probably derive from deficiencies in execution instead of proficiencies (a variation of an argument commonly used by Petrov supporters). This is, in effect, defaulting to the negative versus the positive. Why couldn't at least some of these differences possibly be advantages? Secondly, what real world or empirical evidence is there for this opinion? A case in point is taking off underneath (the toe of the takeoff foot is ahead of the vertical plane of the top hand as the vaulter takes off). This is commonly assumed to be a flaw in execution by a great many people involved in vaulting. However, In Shawn Francis's new book, *The Pole Vault Tool Box—There Is More Than One Way To Pole Vault*, he cites well known biomechanist Dr. Peter McGinnis's study of the takeoff points of large numbers of elite male vaulters. McGinnis used a special timing mechanism to determine the vaulter's takeoff point, the details of which I will not go into here. He found that the takeoff points of the vaulters he studied varied from a very deep 18" under to 2" to 3" "outside" (The toe of the takeoff foot is 1" to 3" behind the vertical plane of the top hand as the vaulter takes off).

Most notably he found only one vaulter who took off out, Dmitri Markov, a 6.05 vaulter. All the rest took off under to varying degrees. So, from a scientific point of view taking off under has to be a valid variation, even a preferred variation with fiberglass poles. This is not an opinion, but rather a scientifi-

cally proven fact. Also note that new WR holder Mondo Duplantis typically takes off about 18" under.

(3) My point in regards to individual style is simply that when initially developing a young vaulter's technique some consideration must be given to the vaulter's physical tendencies and characteristics. For instance, should the technique of a 6'6"/195lb vaulter be developed in the same way as a 5'-8"/145lb vaulter? Or should the technique of females, with a lower center of gravity, develop their technique based on that of male vaulters? Of course the vaulter's technique may be modified over time to improve performance, but that is not what I am addressing.

(4) What Coach Kainsky and Petrov consider to be fundamental skills is not what I consider to be fundamental skills. Petrov promotes a highly specific and standardized method of vaulting that includes the exact execution of all aspects of the vault. I advocate a much more varied approach to what I think are the basics of good technique.

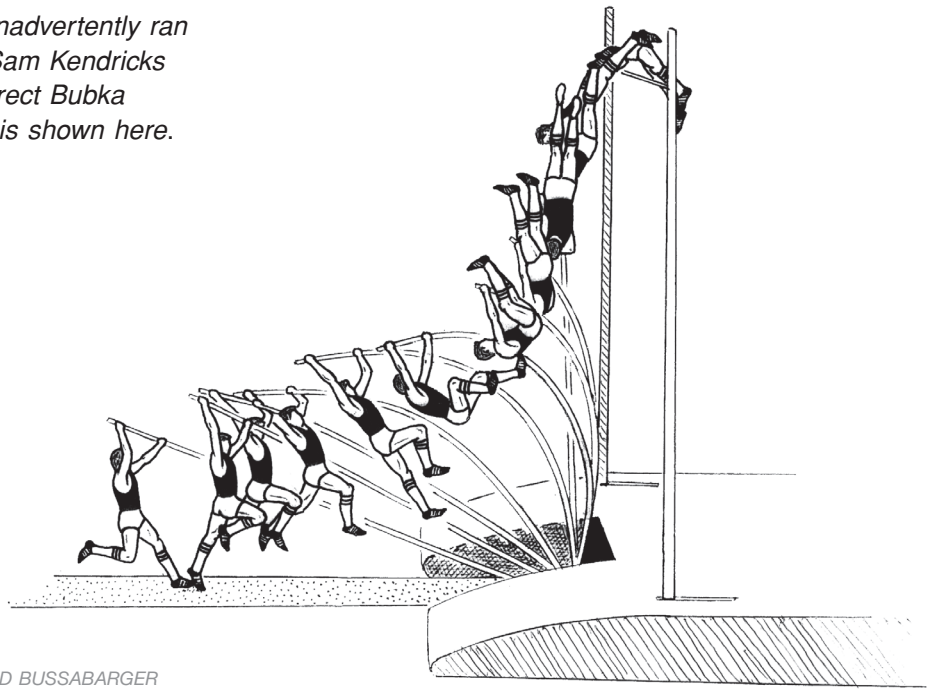
(5) Although Isinbayeva, who was developed into a WR setter by a different coach than Petrov, had superficially similar technique to Bubka, her technique differed from his in several important ways (most notably she did not have a free takeoff as Petrov defines it). So, in my view she had her own individual style.

(6) You mention Siderova as having textbook technique (I assume your idea of textbook technique is derived from the Petrov Model). I have closely analyzed her technique and if any women has a highly individualized style of her own, she has. To say otherwise is to render the term "individualized style" meaningless.

(7) I never said the Petrov Model is another individual style. The definition of the term model is telling here. In this context it means to use something as an example to follow, as in a standard model. In contrast, for my purposes the term "style" can be defined as a way of doing something. Thus you can have many individual styles but only one standard model.

Correction from *Track Coach* #234, Page 7459 article "The Evolution Of Fiberglass Vaulting Technique" by David Bussabarger

In the article we inadvertently ran an illustration of Sam Kendricks instead of the correct Bubka illustration, which is shown here.



ILLUSTRATIONS BY DAVID BUSSABARGER

1988 Olympic champion Sergey Bubka (Ukr), 19'8¼" (6.00), 1985

USATF COACHING EDUCATION

USATF CALENDAR OF SCHOOLS – SPRING/SUMMER

https://www.usatf.org/programs/coaches/calendar-of-schools

April 23-26	Level 1 Zoom #2021-16 (Central Time)
May 14-17	Level 1 Zoom #2021-19 (Mountain Time)
May 21-24	Level 1 Zoom #2021-20 (Eastern Time)
June 4-7	Level 1 Zoom #2021-22 (Pacific Time)
June 11-14	Level 1 Zoom #2021-23 (Central Time)
June 25-28	Level 1 Zoom #2021-25 (Eastern Time)
July 9-12	Level 1 Zoom #2021-27 (Pacific Time)
July 16-19	Level 1 Zoom #2021-28 (Mountain Time)
July 19-23	Level 2 School (Zoom)
July 23-26	Level 1 Zoom #2021-29 (Eastern Time)
July 30-Aug 2	Level 1 Zoom #2021-30 (Eastern Time)
Aug 6-9	Level 1 Zoom #2021-31 (Central Time)
Aug 13-16	Level 1 Zoom #2021-32 (Pacific Time)
Aug 20-23	Level 1 Zoom #2021-33 (Eastern Time)
Aug 27-30	Level 1 Zoom #2021-34 (Central Time)

USATF

USATF LEVEL 2 SCHOOL SET FOR JULY 19-23, 2021

USATF Coaching Education is pleased to announce the summer USATF Level 2 School is set for July 19-23, 2021. The course will again be conducted on Zoom. USATF members with a current Level 1 certificate and a minimum of three years coaching experience (track & field, cross country, club or personal run coach) are eligible to apply. The USATF Level 2 School provides an in-depth education in a singular event-group and the knowledge to write a comprehensive training plan. Individuals can choose to enroll in Endurance, Sprints/Hurdles/Relays, Jumps, Throws or Youth Specialization. Enrollment will be limited to 50 per discipline. Early application is advised for placement in first-choice event-group.

Program details can be found on the USATF Calendar of Schools and applications are anticipated to open the week of April 5th.

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Upon approval, your new certificate will be awarded on USATF Campus and valid until December 31, 2024.

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Don't lose your Level 1 Coach status and eligibility to complete future USATF Level 2 Schools and satisfy USATF Coaches Registry requirements.

The process is further defined, including a Frequently Asked Questions (FAQ) resource, at the following link.

https://www.usatf.org/programs/coaches/recertification

INTRODUCING THE SCIENCE OF LONG JUMPING ON USATF CAMPUS

Men's and women's long jumping performances have not improved for over 20 years. According to Igor Ter-Ovanesian, coach of 1981 world record holder Galina Chistyakova, the problem can be traced to poor technique development of long jumpers due to uninformed coaching (cited by *Locatelli, 2011*). This new course attempts to provide coaches an understanding of some basic science of long jumping and is authored by Dr. Christine Brooks, Level 2 Sports Science Coordinator.

The following topics are addressed in the online course:

- How the brain learns, controls and stores long jump movements
- How to select the jumper's most effective takeoff leg
- How a jumper can accomplish the appropriate horizontal speed and vertical lift during the takeoff phase
- The role of visuospatial awareness in achieving an accurate foot placement on the board

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The Emerging Female Grant is provided by USATF and provides a select number of minority, women track and field coaches the opportunity to attend USATF Coaching Education Level 1 or 2 Schools. Grants are valued at the respective course tuition or registration fee.

Criteria

- Identify as a minority, female coach
- Be a current member of the USATF Coaches Registry
- Provide a resume of coaching background/experience
- Provide a letter of recommendation or three references

Applications for Emerging Female Grants will be accepted on a rolling basis until funds are expended and reviewed on the first (business) day of each month. Application a minimum of 30 days prior to the start date of the requested program/school is advised. No grant funds will be awarded retroactively.

Apply at: https://www.usatf.org/programs/coaches/grants

VERIFY YOUR STANDING ON THE USATF COACHES REGISTRY FOR UPCOMING USATF COMPETITIONS

USATF members are encouraged to verify their compliance with USATF Coaches Registry requirements and take appropriate action now in preparation for upcoming USATF competitions. Members must be compliant with all USATF Coaches Registry requirements to receive a coach credential. Members may verify their status by logging into their membership profile on USATF Connect while development of the public Coaches Registry listing is under construction. To meet all requirements, a green (current) status must be displayed under membership, Center for SafeSport Training, Background Screening and the Coach Certification tabs. All requirements must be current through the last date of competition to qualify for a registered coach credential. In addition, members must be listed on the club profile and/or designated by declared athlete during the specified USATF Championship.

If you have not logged into your membership profile since USATF Connect launched (May 2020), you must first recover your account (click Recover Account button) on the login page to begin the process. US Center for SafeSport Training is now an every 365-day requirement and NCSI background screens are valid for two years from date of acceptance.

Members can find more information about each individual requirement, including options accepted for the Education Standard, at the following link.

https://www.usatf.org/programs/coaches/coaches-registry

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COACHES CORNER

Q&A *with* Bowerman Coach Pascal Dobert

WHY IS RECOVERY IMPORTANT? Recovering properly from hard workouts allows the body to make the adaptations that are the result of the various stimuli from training. Proper recovery is also very important in injury prevention.

WHEN DID YOU START INCORPORATING RECOVERY TOOLS INTO TRAINING? WAS THERE A TURNING POINT IN YOUR COACHING CAREER, OR OTHER MENTOR WHO HELPED TEACH YOU ABOUT THE IMPORTANCE OF THIS PILLAR? As an athlete I was fortunate enough to have worked with some of the best coaches the sport has ever seen, and recovery was always an important part of our training program. We would schedule easy jog days and have manual therapy lined up every week, either with a physical therapist or sports massage therapist.

HOW MUCH TIME DO YOU DEVOTE TO RECOVERY? I would put stretching, foam rolling, and use of massage modalities like Hypervolt and Normatec in the recovery category, and I'd say our athletes at the Bowerman Track Club devote at least an hour a day, if not more, to recovery.

WHAT IS YOUR GO-TO HYPERICE PRODUCT FOR WARM-UP? WHAT IS THE ATHLETES' FAV? I'd say its a toss-up between the Hypervolt and Normatec.

WHAT IS YOUR GO-TO HYPERICE PRODUCT FOR POST-WORKOUT? WHAT ARE THE ATHLETES USING MOST OFTEN? They love using the Normatec.

HOW HAS RECOVERY TECHNOLOGY, LIKE THE HYPERVOLT AND NORMATEC, CREATED BETTER EFFICIENCIES FOR YOUR TEAM AND STAFF TO BE ABLE TO MAKE RECOVERY A PART OF THE TRAINING? Hyperice products are very easy and convenient to travel with, so we can take those tools with us wherever we go. We bring them with us to the track for use before and after workouts, and I've even seen a few athletes use the Hypervolt in between reps.

WHAT ADVICE WOULD YOU GIVE COACHES WHO ARE LOOKING TO IMPLEMENT RECOVERY ROUTINES FOR THEIR ATHLETES FOR THE FIRST TIME? Be consistent and build recovery routines into any smart training program.

DO YOU HAVE ANY EXAMPLES OF A TIME WHEN AN ATHLETE UPPED THEIR RECOVERY GAME AND SAW POSITIVE RESULTS? ***(Returning quicker than expected from an injury, prolonging their ability to compete into later years, finding a new PR, feeling overall better and more confident, having an incredible race day / season, etc.)*** Honestly we've always pushed recovery and stay on top of that important element of training.

ARE THERE CERTAIN ATHLETES YOU KNOW WHO DO AN EXCEPTIONAL JOB WITH THEIR RECOVERY ROUTINES, AND ANY TIPS FROM THEIR REGIMENS THAT WOULD BE HELPFUL FOR OTHER RUNNERS LOOKING TO OPTIMIZE THEIR TRAINING WITH BETTER RECOVERY HABITS? Not any one athlete in particular, I know the Normatec is in high demand by everyone after a hard session, and at major competitions like the World Championships and Olympic Games where our athletes have multiple rounds to run, we use the Normatec every day.

OBVIOUSLY TRAINING WELL WITH THE RIGHT COACH IS ABSOLUTELY KEY TO SUCCESS, AND SO IS PROPER NUTRITION, BUT HOW ELSE CAN ATHLETES MAXIMIZE ALL OF THEIR HARD WORK IN THE TIME IN BETWEEN PRACTICES? By implementing a comprehensive recovery program, whether it be massage, hydrotherapy, Normatec, using the Hypervolt, and/or just plain rest. A good recovery program would employ all of these strategies.

HOW HAS TECHNOLOGY LIKE HYPERICE PLAYED A ROLE IN HELPING TO OPTIMIZE THE BODY AFTER HARD TRAINING, AND GIVE RUNNERS A COMPETITIVE ADVANTAGE TO BE THEIR ABSOLUTE BEST? These new technologies have allowed athletes to recover better and quicker, which translates into harder and more effective workouts over a longer period of time.

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