techniques

for Track & Field and Cross Country

VOLUME 7, NUMBER 2 NOVEMBER 2013

CONQUERING HURDLES

HOW TO DEVELOP SPIRIT HURDLERS

ALSO:

WHAT COACHES CAN LEARN FROM THE BUSINESS WORLD

BENEFITS OF THE TEMPO RUN

OFFICIAL PUBLICATION OF THE U.S. TRACK & FIELD AND CROSS COUNTRY COACHES ASSOCIATION

techniques
for Track & Field and Cross Country

contents

Volume 7, Number 2 November 2013

2 A Letter from the President

REPORTS

4 Division I Track & Field
Division I Cross Country
5 Division II Track & Field
Division II Cross Country
6 Division III Track & Field
Division III Cross Country

FEATURES

8 **High Hurdles**
A Methodical Approach For Developing High Hurdles
by Karim Abdel Wahab

22 **The Javelin**
Basic Javelin Aerodynamics and Flight Characteristics (Part 2)
By Andreas V. Maheras, Ph.D.

30 **Resisted & Assisted Sprinting**
A Strength Training Tool for Sprinters
by John Cissik

36 **A Coaches Leadership**
Refining Your Coaching Leadership Skills
by Glen Sefcik

41 **Tempo Runs**
A Staple of Distance Running
by Steve Johnston

46 **Understanding and Managing Lactate**
by Dustin Freckleton, MD

56 **Updates From the NCAA Eligibility Center**
by Leigh Ann Kennedy

AWARDS

52 **USTFCCCA Coaches Hall of Fame Class of 2013**
The Bowerman Finalist 2013

Cover photograph courtesy of Kirby Lee

A Letter From the President

Fall is upon us and we're all well into another school year. As the leaves are changing here in the Northeast, cross country teams are racing, and track and field programs have started practices all around the country. Everyone is in pursuit of another year of great experiences and overall success. I wish each of you my very best in all that you and your programs do this year.

Work has continued with the USTFCCCA as well. Many changes have taken place throughout the summer, with the many coaching changes as well as new divisional presidents and their working committee members. All involved continue to work toward positive changes for the sports of track and field and cross country. This is an exciting and challenging time for our sports and I am excited to work with so many professionals within our sports to bring new and creative ideas forward. It has become apparent throughout my coaching career, that one must "adapt or die" with regard to all that has changed in our coaching worlds over the last 20 plus years. Even now, we are awaiting changes within the NCAA governance that should lead to a more efficient and productive governing body. Our track and field/cross country leadership must be strong as we move through these changing times and we must continue to work together to further our sports to higher and higher levels.

I hope each of you will be inspired to work toward positive change and join us for another great USTFCCCA convention which will take place Dec. 16-19, 2013, in Orlando, Fla. The convention is our opportunity to come together with a desire toward change and productive work ethics to support the overall mission of our sports. I encourage all members to join us in Florida, the schedule has literally something for everyone and we need everyone to participate.

Our convention gives us an opportunity to celebrate our accomplishments, honor our successful coaches, programs, and athletes and bring all of us together for an amazing week. The USTFCCCA National office again has upgraded our convention schedule with our Coaches Hall of Fame dinner and induction moving to Monday night as a kick-off to the convention. The awesome presentation of The Bowerman will remain on its traditional Wednesday evening! These two evenings along with the learning opportunities from the symposium presentations, to professional development topics, to the working committees and Divisional voting sessions give us all a chance to have our voices heard and peers recognized.

Hopefully by the time you read this the USTFCCCA will have received any proposals that you would like to be considered by your respective division (the deadline to submit a proposal was Nov. 1). I would like to also encourage everyone to take the time and put forward your proposals and ideas to your divisional committees. It is important that the members of our body take the time to put forward their ideas and concerns. This process ensures that new and innovative ideas come forward and are discussed. We must "look outside the box" and continue to support our colleagues with their ideas toward change.

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techniques
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Published by Renaissance Publishing LLC
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Metairie, LA 70005
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USTFCCCA REPORT Division I Track & Field and Cross Country

As the 2013 USTFCCCA Convention approaches, there are a number of issues that continue to be addressed by the USTFCCCA Division I Cross Country and Track and Field Committees. Some of those issues are addressed in this column.

64-TEAM RANKINGS FOR CROSS COUNTRY

The Division I Cross Country Executive Committee has begun discussions on the possibility of a 64-team cross country ranking with the intent of achieving two goals. The first is increased exposure for cross country as a sport, but also the teams who earn a ranked position. At this point in time, the 64-team ranking remains a topic of conversation, and further progress towards the establishment of 64-team ranking system will continue to be explored.

JOINT DIVISIONAL CROSS COUNTRY CHAMPIONSHIP

As most know, the possibility of creating a joint divisional championship for cross country is currently being considered. The soonest that such a championship could take place is 2015. Both Division I and Division II have approved such a championship at the administrative level, while Division III has done so within their sport committee. It is possible that a bid process to host the event in 2015 could occur before the end of this year.

NCAA SCHEDULING REQUIREMENTS

More attention is being given to two existing bylaws found in the NCAA Division I Manual (20.9.7.1 and 20.9.7.3.2) that may affect both cross country and track and field's scheduling of meets. It is crucial that coaches do their best to understand these bylaws. Improper scheduling and scoring of meets, according to the aforementioned bylaws, has the potential to directly affect an institution's sport sponsorship. Therefore, it is of the upmost importance that coaches work with compliance officers to approve meet schedules and protect themselves and their schools.

NCAA GOVERNANCE REFORM

What does have the potential to affect both cross country and track and field is the possible reform of the NCAA governance structure. The NCAA membership will be meeting in January to address growing concerns with a number of facets of the association's governance. It is not possible at this time to predict what these reforms will entail or when they may be implemented. The best way to prepare for possible change is to be observant of information pertaining to this matter as it becomes available. The USTFCCCA was represented by CEO Sam Seemes at the recently completed NCAA Board of Directors and President's Advisory Group meetings held in Indianapolis. The USTFCCCA national office and executive committee will continue to monitor the process and keep the membership abreast of any significant developments.

TRACK & FIELD ACADEMY COURSES AT CONVENTION

In addition to all of the regularly scheduled events associated with the 2013 USTFCCCA Convention, there will be a number of advanced course offerings by the Track and Field Academy. The courses being offered this year are:

401. International Competition Protocol in Track and Field
403. Testing and Measurement in Track and Field Coaching
404. Meet management for the Track and Field Coach
407. Weight Training for Track and Field.
409. Sports Science for the Endurance Events
201. Track and Field Technical Coaching Certification

These courses are not included with the convention registration, there is an additional fee for each course. Log onto *www.ustfccca.org/ustfccca-convention/track-and-field-academy* to register and for additional information.

NCAA RULE CHANGE PROPOSALS

The deadline for rule change proposals to be submitted to the NCAA is May 1, 2014. Any rule change approved by the NCAA would go into effect Jan. 1, 2015, thus would have an impact on the 2015 indoor and outdoor track and field seasons, but would not be in place for the 2014 cross country season. Contact Division I Track and Field President Dennis Shaver (shaver@lsu.edu) or Division I Cross Country President Sean Cleary (Sean.Cleary@mail.wvu.edu) if you have questions about the process of submitting a proposal for a rule change.

IMPORTANT UPCOMING DATES

- **Convention Early Registration Deadline – Nov. 30, 2013**
- **Early Registration Deadline for Track and Field Academy Courses Offered at Convention – Dec. 4, 2013**
- **2013 USTFCCCA Convention – Dec. 16-19, 2013**

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USTFCCCA REPORT Division II Track & Field and Cross Country

This year has been a very busy year for the USTFCCCA Division II Executive Committees. Work has been completed on certain fronts while it continues on others. This report serves as an update on some of the items the committee has been working on.

CROSS COUNTRY

• Based on the results of a 2012 convention vote and action by the NCAA, only teams eligible to compete at the NCAA Cross Country Championships are eligible to compete at the Regional Cross Country Championships. This was an area of confusion in the past and this action clarifies those eligibility requirements for competition.

• The student-athlete banquet will remain on Saturday evening following the NCAA Cross Country Championships for 2013 and 2014. The banquet will move to the Friday evening prior to the meet in 2015.

• The possibility of creating a joint divisional championship for cross country continues to be considered. The soonest that such a championship could take place is 2015. Both Division I and Division II have approved such a championship concept at the administrative level, while Division III has done so within their sport committee. It is possible that a bid process to host the event in 2015 could occur before the end of this year.

• The proposal to move our Cross Country Championships during Fall Festival years to the traditional weekend of the Saturday before Thanksgiving has been sent to the NCAA Division II Championships Committee.

• The "Athlete of the Week" program has been expanded to include cross country. This program began with the indoor and outdoor track and field seasons earlier this year.

TRACK & FIELD

• The 2014 Outdoor Track and Field Championships has been moved from Raleigh, N.C. to Allendale, Mich.

• Reminder that qualifying for indoors is November 29 through the second Sunday prior to the national championships. Qualifying for outdoors is the third Thursday in February through the second Sunday prior to the national championships.

• The proposal to increase the travel party for Indoors and Outdoors is currently on hold due to the budget cycle. The NCAA Division II Track and Field Committee will readdress in September 2014.

• The NCAA has created a cross divisional sub-committee that will continue to examine the indexing of indoor tracks. Coaches should be aware that the indexing used during 2013 will also be used during the upcoming indoor season.

• The Executive Committee has begun to have discussions in regards to the seeding procedures for first round competition in races run in lanes at the national championship meet. The committee is busy examining possible alternatives to the procedures currently being followed and will continue this discussion at the USTFCCCA convention.

• Another convention item is the current indoor and outdoor field selections process. The NCAA would like feedback to determine if changes will be made.

• Applications for the Division II Assistant Coach scholarships to the Track and Field Academy are now being accepted. A list of the eligibility requirements can be found in the Division II section of the USTFCCCA website. The deadline to apply is December 1st. Those awarded scholarships will be notified in January and must use the scholarship before the end of 2014.

Finally, an issue that may impact both Cross Country and Track and Field. Greater attention is being paid to two existing bylaws found in the NCAA Division I Manual (20.9.7.1 and 20.9.7.3.2) that may affect both cross country and track and field's scheduling of meets. These bylaws spell out what requirements must be met in order for a competition to count toward both sport sponsorship and scheduling requirements for Division I programs. The bylaw reads in part: "In sports other than football, basketball, men's swimming and diving, men's indoor and outdoor track and field, and wrestling that an institution uses to meet the Division I sports sponsorship criteria, an institution shall schedule and play 100 percent of its contests against Division I opponents to meet the minimum number of contests specified in Bylaw 20.9.6.3." Note that the rule exempts only men's indoor and outdoor track, therefore women's indoor and outdoor as well as cross country fall under this rule. It may be prudent as a Division II coach, if you traditionally schedule meets hosted by Division I institutions, to check with those institutions regarding your participation in future meets hosted by that Division I program.

We are just over a month away from the 2013 USTFCCCA convention in Orlando. We encourage all Division II coaches to attend the convention and take advantage of the educational, professional and social opportunities available. Log onto *www.ustfccca.org/ustfccca-convention* to see all that the USTFCCCA Annual Convention has to offer.

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USTFCCCA REPORT Division III Track & Field and Cross Country

First, a reminder that a well-informed, unified voice carries a lot of weight with the NCAA. NCAA Division III membership is strong, but we encourage coaches to continue to promote non-members to join our association. Ways to increase Division III membership, particularly cross country only programs, will be a key item of discussion at convention this winter.

The NCAA Division III Track and Field Committee shares a strong partnership with our association. Our voice has been sought and accepted in several instances over the course of the past year, resulting in some positive outcomes for our sports.

Below are some points of interest and important dates that coaches should be aware of.

• No cap will be used this fall on the number of teams from each region which can advance to the Cross Country National Championships in Hanover, Ind. A reminder that two teams per region will still automatically qualify for the National Championships.

• Work continues toward the goal of creating a joint divisional championship for cross country. The earliest that such a championship could take place is 2015. It is possible that a bid process to host the event in 2015 could occur before the end of this year. Both Division I and Division II have approved this concept for the championship at the administrative level, while Division III has done so within their sport committee.

• This Cross Country season is the first season to honor an Athlete of the Week. This represents a continuation of the AOW program that was started with the 2013 indoor and outdoor seasons and received very favorable reviews by athletes, coaches and SID's alike.

• Two key reminders for the cross country championships season - the deadline to complete the Direct Athletics online declaration form of 10 athletes is Sunday, Nov. 10 at 5 p.m. EST. Entries are available beginning Monday, Oct. 28. Championships fields will be posted on the NCAA Championships website at 3 p.m. EST on Sunday, Nov. 17.

• As of Dec. 1, the new pole vault box collar rule goes into effect. The pole vault box collar must meet ASTM Standard F2949-12. We encourage you to only purchase a pole vault box collar that is stamped by the manufacturer indicating it is compliant with the ASTM Standard F2949-12.

• Qualifying for the indoor track and field championships is Dec. 1 through the Saturday prior to the national championships. Qualifying for the outdoor track & field championships is March 1 through the Friday prior to the national championships.

• Institutions wanting to host an indoor meet (final qualifier), other than conference, in the final week of qualifying (Monday through Saturday) must petition the NCAA for sanctioning no later than December 15. The application can be found on the NCAA website under Division III Indoor Track and Field.

• The NCAA subcommittee on indexing is still meeting and reviewing information. Although they will incorporate the 2013 data, the numbers used for 2012-2013 will be used for 2013-2014.

• The request to increase the indoor track and field size was more than exceeded, with 17 women and 15 men per event, and 12 relays per gender. 2014 will also see the addition of 200 and 3000 meter races.

• The committee is utilizing the NCAA III Indoor and Outdoor Championships technical manuals as guides to create the technical sheets for the 2014 Indoor and Outdoor Championships.

• There is still time to sign up for the Track and Field Academy courses that will be held prior to the 2013 USTFCCCA Convention. Note that there is an additional fee (on top of the convention registration fee) for each course. Log onto *www.ustfccca.org/ustfccca-convention/track-and-field-academy* to register and for additional information.

The following courses being offered in Orlando:

401. International Competition Protocol in Track and Field
403. Testing and Measurement in Track and Field Coaching
404. Meet management for the Track and Field Coach
407. Weight Training for Track and Field.
409. Sports Science for the Endurance Events
201. Track and Field Technical Coaching Certification

The open period for submitting proposals for consideration for placement on the agenda at the 2013 USTFCCCA Convention has passed. Proposals may be viewed online in the Division III section of the website under "Division III Proposals."

Please continue to be advocates for our sport and NCAA Division III. Continue to be professional in your understanding of how our Championships are conducted. Read the 2014 Championship Qualifying Criteria. Frequently review NCAA Connect (can be found on the USTFCCCA website) to educate yourselves on Indoor and Outdoor Championship information. Stay abreast of all USTFCCCA information on our website.

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HIGH HURDLES

A METHODICAL APPROACH FOR DEVELOPING HIGH HURDLERS

BY KARIM ABDEL WAHAB

CSU SPORTS INFO PHOTO

This article includes the annual training plan for Colorado State University's high hurdlers, basic explanations of targeted performance criteria as well as the Ram's methodical approach in developing high hurdlers. The technical and physiological objectives of the training plan comply with the basic understanding of general biomechanics and sports physiology concepts held by the vast coaching community. The following philosophy and methodology were implemented in developing 2012, NCAA D-1 Second Team All-American student athlete, Trevor Brown, who lowered his PR in the 110-meter hurdles from 14.21 to 13.75 between his freshman and sophomore year, and moved up to be 8th in the NCAA D-1 110h finals in 2013 with a season best of 13.55(w) receiving a first team All-American Honors. Trevor's improvements in the 60 hurdles indoors were as follows: 8.30 in 2010 senior in High School over 42" hurdles, 7.91 freshmen in CSU, 7.86 sophomore and 7.77 Junior in 2013. Trevor currently holds CSU and the Mountain West Conference records in the 110- and 60-meter hurdles.

ESTABLISHING A HIGH HURDLING DEVELOPMENT PHILOSOPHY

Stride length and stride frequency are the parameters for faster sprinting. What about hurdling? In hurdling, stride frequency between hurdles is the limiting factor. A 15-second hurdler covers the race distance using the same number of strides as a 13-second hurdler; they both take 50 strides over the race distance (8 strides at the start + 3 strides between hurdles x 9 hurdle spacing + 10 hurdle clearance strides + 5 steps between the last hurdle and the finish line). Therefore, the ability to accelerate to the first hurdle, efficient hurdle clearance mechanics, stride frequency/efficiency between hurdles, re-accelerate after hurdle clearance, and the aggressive acceleration from the last hurdle to the finish line are the elements that need to be developed in any high hurdling training plan.

What does it mean for hurdlers to be "aggressive"? Since the distance between the 10 hurdles is consistent, the "average" sprinting stride between hurdles will also have to be consistent, thus for hurdlers to run faster between hurdles they would have to turn over "shuffle" faster. "Shuffle" is a term that refers to sprinting faster between hurdles without *any* increase in stride length. If hurdlers develop a longer stride length than desired, they will "run out of room" and end up hitting or crashing into the hurdles. A longer stride length than desired between hurdles is the direct result of loss of the aggressiveness.

A balanced speed development approach is required for hurdlers: Developing inner hurdling average stride length shuffling capabilities is crucial as previously mentioned, but general speed, strength, and power development qualities cannot be neglected in training. This recommendation strongly applies to hurdlers that do not have a high level of natural speed. The hurdler's sprint stride length during flat sprinting is typically greater than the average inner hurdler stride length. This allows hurdlers to sprint between hurdles at a lesser percentage of their maximum stride length, which will carry over to a faster frequency and better maintenance of rhythm throughout the high hurdle race. →

Figure 1

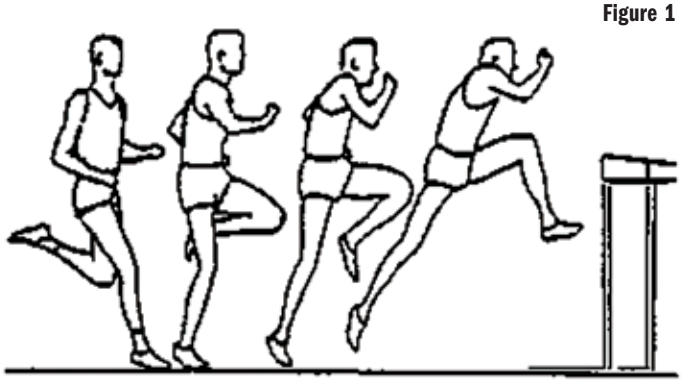


Figure 2

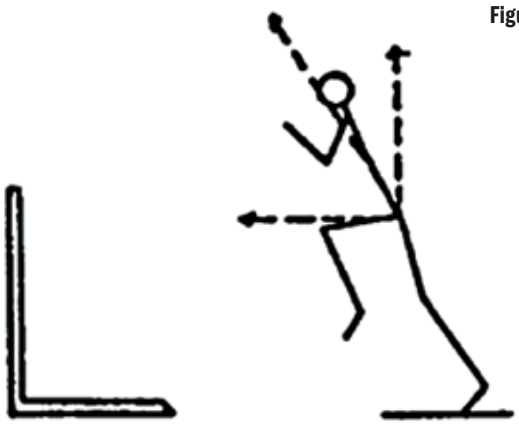


Figure 3

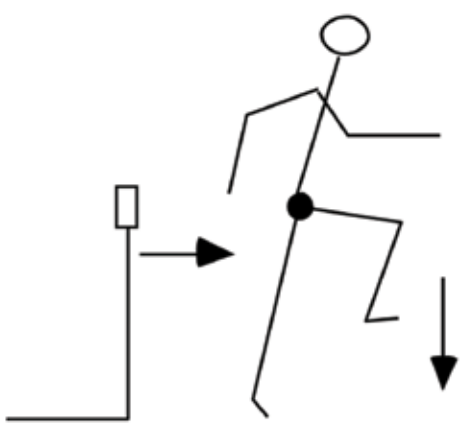
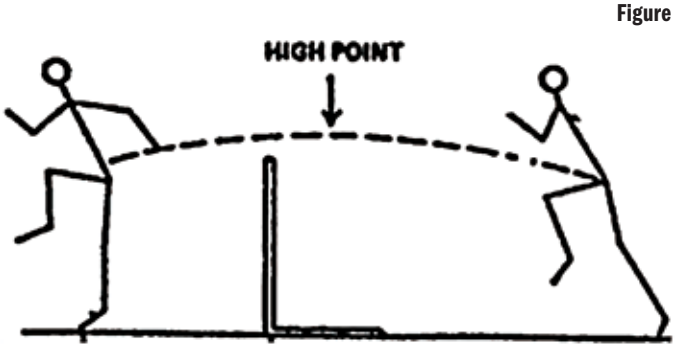


Figure 4



Hurdle clearance stride length: Hurdle clearance stride length is the distance between the point of planting the take-off foot at hurdle take-off and the point of ground contact at landing after the hurdle. The hurdle clearance stride length will have to be consistent throughout the hurdle race for the average sprinting stride length between hurdles to be consistent. The consistency in the "average" stride length between the hurdles, as well as, the length of the hurdle clearance stride are the keys for targeting turnover "shuffling" development in between the hurdles.

Minimum loss of horizontal velocity: High hurdlers cannot afford to lose much horizontal velocity throughout the race. Here are some general guidelines to minimize the loss of horizontal velocity in high hurdling:

Getting in a tall body posture early enough before the first hurdle (Figure 1): Around the fifth stride the hurdler needs to transition to a tall upright body posture, to allow the center of mass to be at a maximally high launching level. Correspondingly, only a slight vertical impulse is needed to clear the hurdle, creating an optimal parabolic curve for the center of mass. Hence, the hurdler would be able to carry more velocity through the hurdle.

"Power leg" and "Cut step" concepts at hurdle take-off (Figure 2) and re-accelerating after the hurdle (Figure 3): The trail leg or "power leg" is very special when it comes to power production. The steps taken by the trail leg are longer than the steps taking by the lead leg throughout the hurdle race. A hurdler uses their trail leg to perform two "cut step" actions, the first is during take-off and the second is during reacceleration after the hurdle. The take-off step is typically shorter in length than the preceding stride, so the hurdler needs to actively "cut the take-off step" making sure the foot plants under the hips. This reduces the braking force and allows speed to be carried through the hurdle. Hurdlers need to have a lower heel recovery going into the take-off step to accomplish an active cut step at hurdle take-off.

The second "cut step" is performed after the hurdle by the trail leg at the get-away stride, the hurdler's foot actively lands under the hips to avoid braking force. This allows an efficient push-off action that will create an ideal re-acceleration between the hurdles.

Taking off at an appropriate distance from the hurdles based on the hurdlers' height/ anthropometric differences (Figure 4): Hurdlers need to take off at an appropriate distance from the hurdles to maintain an optimal horizontal parabolic curve. Thus, helping "displace the hips through the hurdles" with the minimum loss of horizontal velocity. If take-off is too close to the hurdle, then it will either result in

Figure 5

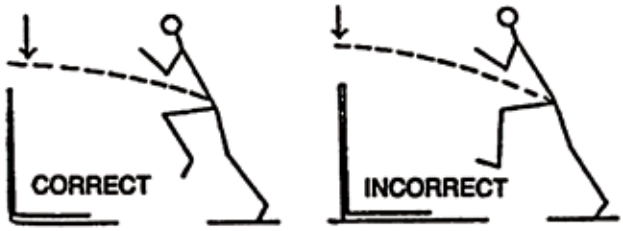
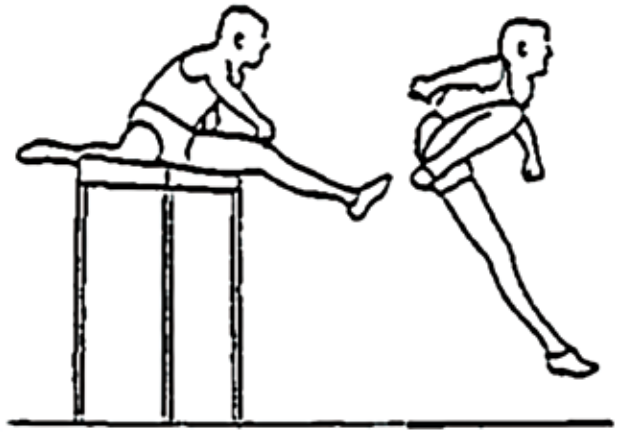


Figure 6



crashing into the hurdle or jumping vertically to avoid the hurdle, in both cases there will be a great lose in horizontal velocity. Figure 4 is the "Model Take-Off Landing" table based on men and women hurdlers' height (Coach Curtis Frye).

Leading with the knee at the lead leg during hurdle take-off (Figure 5): Leading with the knee at take-off allows the avoidance of having a larger vertical parabolic curve of the center of mass at hurdle clearance. Leading with the knee will result in carrying a larger horizontal velocity through the hurdle.

Minimizing the amortization at lead leg ground contact while landing after the hurdle (Figure 6): The lead leg should be grounded in an extended and vertical posture. It also must not yield to the landing pressure to which it's exposed after the hurdle clearance stride. This will prevent the drop of the center of mass at the landing after the hurdle, which can result in losing horizontal velocity.

Eliminating the "slack" in the system while sprinting between the hurdles: Having a tall body posture while sprinting between the hurdles allows the hurdlers to carry as much horizontal velocity as possible. This tall body posture will put the hurdlers' muscular system under pre-tension. This will allow the hurdlers to take advantage of an effective and explosive stretch-shortening cycle in every stride between the hurdles.

Chart 1

"steps in"	3-Step m	3-Step Men	3-Step Women	5-Step Men	5-Step Women
Normal	none	9.14	8.50	13.00	12.00
(-1 foot)	0.32	8.82	8.18	12.47	11.47
(-2 feet)	0.64	8.50	7.86	11.93	10.93
(-3 feet)	0.96	8.18	7.54	11.40	10.40

Chart 2

Reps	Start Pos.	Pattern	Ht/Spacing Men	Ht/Spacing Women
3-4 x 3H-5H	Stand	5 steps	39"/11.4m	20"/10.4m
3-4 x 3H-5H	Stand	3 steps	39"/7.9m	20"/7.3m

5-STEP PATTERN GUIDELINES

1. The hurdles inner spacing that is used during the training plan is typically shorter than regulation spacing, this develops turn over and proper "shuffling" capabilities for high hurdlers.

2. Over the six phases of the training plan the inner spacing progresses from shorter to longer and occasionally regulation spacing is implemented.

3. The 5-step stride patterns are used throughout the training plan for various objectives. The average stride length used in any 5 step stride pattern always mirrors the desired average stride length for the 3 step stride pattern implemented in any specific phase of training.

4. The main goal is to keep the hurdlers locked in using a consistent average stride length whether they use 3-step stride pattern or 5-step stride pattern in any given phase of training. Using 5-step stride patterns between any hurdling unit allows for velocity to carry over to a subsequent 3-step stride pattern unit. This will develop specific "shuffling" capabilities in every training phase.

5. The distance between hurdles for the 5-step pattern can be easily calculated. First subtract the hurdle stride length out of the desired distance between hurdles for 3-step pattern. Second, divide that number by 3, then multiplying it by 5 (these are the number of step utilized in inner hurdling stride patterns). Third, add the specific hurdle clearance stride length that corresponds to your athletes' height.

6. Take-off and landing distances should always be the same throughout the training plan to create consistency. This will make the development of the average stride's turnover become the prime focus of training.

7. The table below shows the distances in meters used in the 3-step inner spacing with corresponding 5-step patterns for a 5'10" male and 5'7" female hurdlers (Chart 1):

THE TRAINING PLAN

FALL A

3-4 WEEKS

SKILL DEVELOPMENT PHASE 1

PHASE OBJECTIVE:

1. Proper take-off foot planting at hurdle take-off.

2. Developing proper take-off distance into the hurdle "more of a horizontal parabolic curve."

3. Leading with the knee with the lead leg at take-off.

4. Tight trail leg over and through the hurdle.

5. Trail leg landing after the hurdle with a positive shin angle at ground contact.

6. Tall body posture between the hurdles.

7. Teaching the skill of shuffling "turn-over" between the hurdles. (Chart 2)

A. Max velocity speed work can be done after hurdling if needed: hurdle volume needs to be adjusted in that case.

B. Hurdle-specifics strength endurance on a non-hurdling day, possibly done on the speed endurance day: reps of 20m A runs.

C. Dedicate a day per week for acceleration development with no hurdles in this training phase. Max velocity work can also be done on the same day after the acceleration work.

Notes:

1. Hurdling will be once a week in this phase.

2. Shorten the approach to the first hurdle 1 inch per-stride in this phase.

3. Use towels to mark take-off before hurdles.

4. Start in week one using 3 hurdles and progress gradually over the weeks to 5 hurdles.

5. 24"-27" hurdles are utilized for women starting this phase and throughout the training plan.

→

Table 1

Model Take Off-Landing:

MEN			WOMEN		
Ht	Take-off	Landing	Ht	T-O	Land
5'3"	7'5"-7'9"	2'9"-3'3"	5'3"	6'5"-6'9"	2'9"-3'3"
5'5"	7'4"-7'8"	3'0"-3'3"	5'5"	6'4"-6'8"	3'0"-3'6"
5'7"	7'3"-7'7"	3'3"-3'9"	5'7"	6'3"-6'7"	3'3"-3'9"
5'9"	7'2"-7'6"	3'6"-4'3"	5'9"	6'2"-6'6"	3'6"-4'3"
5'11"	7'1"-7'5"	3'9"-4'8"	5'11"	6'0"-6'5"	3'9"-4'5"
6'1"	7'0"-7'4"	4'0"-3'10"	6'0"	5'10-6'3"	4'0"-4'6"
6'3"	6'10"-7'3"	4'3"-3'8"			
6'5"	6'10"-7'2"	4'6"-3'6"			

Chart 3

Main workout:

Reps	*Start Pos.*	*Pattern*	*Ht/Spacing* Men	*Ht/Spacing* Women
3-4 x 5H	Stand	3/5	39"/11.4 & 8.2m	24"/10.4 & 7.6m
3-4 x 5H	stand	3 steps	39"/11.4 & 8.2m	24"/10.4 & 7.6m

6. Using 5-step stride pattern allows:

A. More time between the hurdles for the hurdler to respond to the coaching cues.

B. Develop enough velocity between the hurdles, while utilizing tightly jammed running strides, to help make the skill of taking off far from the hurdles feels comfortable and attainable.

7. Using a standing start in this phase helps teaching the hurdlers the importance of a tall body posture at the first hurdle take-off.

8. Mark appropriate take-off and landing marks before and after each hurdle based on athletes' height (Table 1).

FALL B
3-4 WEEKS
SKILL DEVELOPMENT PHASE 2

PHASE OBJECTIVE:

1. Continue to teach and enforce the same qualities introduced in the last training phase.

2. Developing more coordination, turnover " shuffling" between the hurdles and enhance rhythmic qualities over the hurdles by adding more verity and mixing 3 and 5 step stride patterns in the same repetitions. (Chart 3)

A. Max velocity speed work can be done after hurdling if needed: hurdle volume needs to be adjusted in that case.

B. Hurdles specific Strength endurance on a non-hurdling day, possibly done on the speed endurance day: reps of 40m A runs.

C. Dedicate a day per week for acceleration development with no hurdles in this training phase; Max velocity work can also be done on the same day after the acceleration work.

Notes:

1. Hurdling is once a week in this phase.

2. Use towels to mark take-off before hurdle.

3. Shorten the approach to the first hurdle 1 inch per-stride in this phase.

FALL C
4 WEEKS
ACCELERATION DEVELOPMENT OVER 5 HURDLES

PHASE OBJECTIVE:

1. Power leg development "Trail leg cut step at take-off and trail leg re-acceleration after hurdles".

2. Developing a speed curve that is ideal over the first five hurdles "no crashing of speed curve after two to three hurdles, and accelerating through five hurdles at least."

3. Developing proper mechanics of block exit and approach to the first hurdle out of blocks.

Notes regarding the 5-step start:

In the next phase of training a 5-step start drill will be implemented. Hurdlers don't get much velocity built into the first hurdle when starting out of 5-step approach. Without much

Chart 4

Main workout day one and day two:

Reps	Start Pos.	Pattern	Ht/Spacing Men	Ht/Spacing Women
Day 1				
4-5H: 2 x side, 2 x middle	**Stand**	**1 step**	**36"/3.5-4m**	**24"/3-3.5m)**
2-4 x 5H, 5-step start *M 9m, W 8m*	**Stand**	**3 steps**	**39"/8.5m**	**24"/7.67.9m**
2 x 5H	**Blocks**	**3 steps**	**39"/8.5m**	**24"/7.9m**
Day 2				
1-2 sets of 2-4 x 5H	**Stand**	**5 steps**	**39"/12.2m**	**28"/11.20m**

Chart 5

Main workout day one and day two:

Reps	Start Pos.	Pattern	Ht/Spacing Men	Ht/Spacing Women
Day 1				
6-7H: 2xside, 2xmiddle	Stand	1 step	39"/3.5-4 m	30"/3-3.5 m
2-3 x 5H, 5-step start 9m & 8m	Stand	3-3-5-3	39"/8.5 & 11.93m	30"/7.6, 7.9 & 10.9m
2 x 4-5H	Blocks	3 steps	39"/8.8m	30"/8.2m
Day 2				
2-3 x 5H with 10-12 step start	Stand	5 steps	39"/12.5m	30"/11.5m
2-3 x 5H with 8 step start	Stand	5 steps	39-42"/12.5m	30-33"/11.5m

speed build in the first hurdle there won't be much room for error, take off foot should be planted properly "down and back" to create the cut step effect. Hurdlers need to be low over the hurdles to carry over as much velocity as possible "through the hurdle." There is no time for floating over the hurdles, "Lead leg and trail leg are racing to the ground" at landing after the hurdle. Trail leg will have to come through tight and land explosively with a positive shin angle at ground contact to start the aggressive re-acceleration and build more velocity between hurdles 1 and 2. There is no tolerance for over-striding between hurdles. To get to the next hurdle, faster hurdlers have to be efficient, aggressive and powerful. The coach is timing touch down units between a set of five hurdles and the timing units should be decreasing as the hurdlers are re-accelerating and efficiently creating more velocity. If they are not efficient and aggressive the speed curve will be slower over the five hurdles. Doing a few reps of the 5-step start drill followed by doing a few reps of the 8-step start out of blocks will create contrast training effect and will help carry over the efficiency and aggressiveness developed from the 5-step start to actual hurdling. (Chart 4)

A. Hurdle volume can be reduced if flat acceleration or max velocity work needs to be done on the hurdling days.

Notes:

1. Hurdling is twice a week in this phase.

2. Hurdles specific Strength endurance on a non-hurdling day, possibly done on the speed endurance day: reps of 60m A runs.

3. Frequency and volume of hurdle w-up drills are reduced.

4. Starting this training phase and until the end of the train-

Chart 6

Main hurdle workout day one and day two:

Reps	Start Pos.	Pattern	Ht/Spacing Men	Ht/Spacing Women
Day 1				
2-3 x 5-7H: Wt. Vest & 5 step Start	Stand	3/5	8.5, 8.8 & 12.5	30"/7.3, 7.6, 7.9/11.5
1-2 x 2-3H Competition Start	Blocks	3 steps	39"/8.8m	30"/8.2m
Day 2				
2x5H, trail leg only	Stand	3 steps	39"/8.5m	30"/7.9m
2x5H	Blocks	5-5-3-3	39"/12.5 & 8.8m	30"/11.5 & 8.2m

Table 2

Fall A on Monday Only 50cm hurdles used	
Fall B on Monday Only 60cm hurdles used	
Fall C on Monday Only 60cm hurdles used	**Fall C on Thursday** Only 70cm hurdles used
Fall D on Monday Only 76cm hurdles used	**Fall D on Thursday** 76cm in the beginning of every training session and gradually moving to 84cm by the end of every training session.

ing plan start utilizing regulation distance for the start.

FALL D
4 WEEKS
ACCELERATION DEVELOPMENT OVER 5 HURDLES AND INDOOR SEASON PRE-COMPETITION PREPARATION

PHASE OBJECTIVE:

1. Continue to enforce and develop the "Power Leg" qualities as in the last training phase.

2. Improving the speed curve over five to six hurdles by continuing to enforce the qualities of re-acceleration, aggressiveness and efficiency as in the last training phase.

3. Developing proper mechanics of block exit and approach to the first hurdle out of blocks

4. Introducing regulation height hurdling in parts of the workouts.

5. Introducing assisted regulation hurdling "Height and spacing": to help transition to full regulation hurdling in the upcoming competitive season "Indoor Track Season." (Chart 5)

A. Hurdle volume can be reduced if flat acceleration or max velocity work needs to be done on the hurdling days.

Notes:

1. Hurdling is twice a week in this phase.

2. Hurdles specific Strength endurance on a non-hurdling day, possibly done on the speed endurance day: reps of 80m A runs.

3. Frequency and volume of hurdle w-up drills are reduced.

OVERVIEW ON WOMEN HURDLE HEIGHT PROGRESSION OVER THE FOUR TRAINING PHASES OF THE FALL

• Women high hurdlers have a great advantage of minimally deviating from sprinting mechanic due to the shorter hurdle height when compared to the men's hurdle height.

• The training plan progresses over the fall from 50 centimeters/20 inches gradually to 84 centimeters/33 inches to help develop confidence and establish a horizontal parabolic curve during hurdle clearance.

• The aim is to teach women hurdlers to sprint through the hurdles and gradually increase the hurdle height while continue to emphasize sprinting through the hurdles.

• The progression below shows the women's hurdle height increments utilized over the fall training period. (Table 2)

INDOOR
8 WEEKS
TOP SPEED DEVELOPMENT AND RACE PREPARATION

PHASE OBJECTIVE:

1. Maintain and enhance the power leg and re-acceleration qualities gained from the last phase.

2. Develop top speed over the hurdles.

3. Carry over all the qualities developed over regulation hurdling.

4. Model the sprint after the last hurdle to the finish line.

5. Prepare for races. (Chart 6)

A. Hurdle volume can be reduced if flat acceleration or max velocity work needs to be done on the hurdling days.

Notes:

1. Hurdling is twice a week in this phase plus a competition day over the weekend early season.

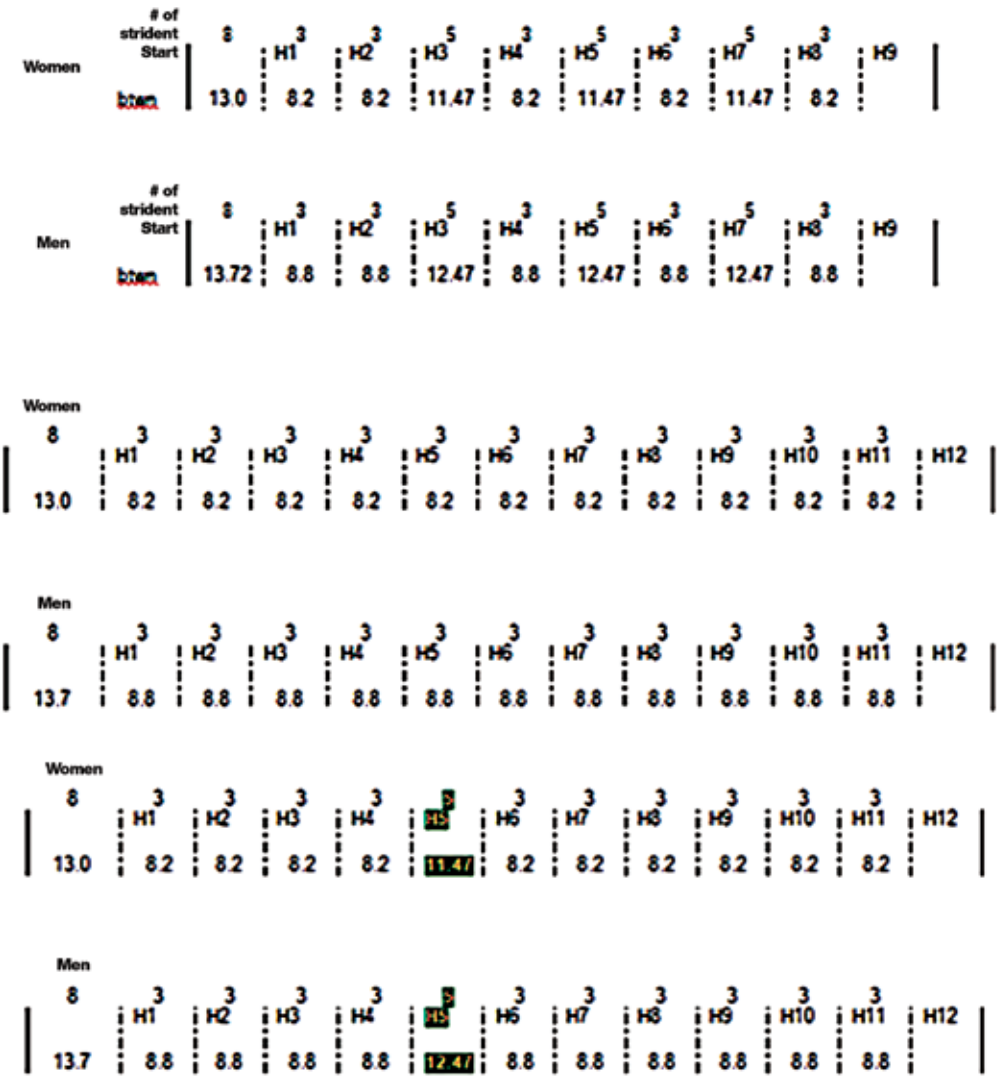
2. Late season and approaching main competition hurdling →

Chart 7

Main hurdle workout day one and day two:

Reps	Start Pos.	Pattern	Ht/Spacing Men	Ht/Spacing Women
Day 1				
1 x Starts over 1, 2 & 3H	Blocks	3 steps	39-42"/8.8m	30-33"/8.2m
2-3 x 12H OR	Blocks	3 steps	39"/8.8m	30"/8.2
2-3 x 9H	Blocks	3/5	39"/8.8 & 12.5m	30"/8.2 & 11.5m
Day 2				
2x5H, trail leg only	Stand	3 steps	39"/8.5m	30"/7.9m
2x5H	Blocks	5-5-3-3	39"/12.65m & 8.97	30"/11.65 & 8.35m

Below for examples of 12 and 9 hurdle rhythmic variation ↓

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Below is the summery of the whole training plan with all progressions for men and women high hurdles

Reps	Start Pos.	Pattern	Ht/Spacing Men	Ht/Spacing Women
Fall A (3-4 weeks) Skill Development 1				
3-4 x 3H-5H	Stand	5 steps	39"/11.4m	20"/10.4m
3-4 x 3H-5H	Stand	3 steps	39"/7.9m	20"/7.3m
Fall B (3-4 weeks) Skill Development 2				
3-4 x 5H	Stand	3/5	39"/11.4 & 8.2m	24"/10.4 & 7.6m
3-4 x 5H	stand	3 steps	39"/11.4 & 8.2m	24"/10.4 & 7.6m
Fall C (4 weeks) Acceleration development "Power leg development"				
Day 1				
4-5H: 2 x side, 2 x middle	Stand	1 step	36"/3.5-4m	24"/3-3.5m)
2-4 x 5H, 5-step start *M 9m, W 8m*	Stand	3 steps	39"/8.5m	24"/7.67.9m
2 x 5H	Blocks	3 steps	39"/8.5m	24"/7.9m
Day 2				
1-2 sets of 2-4 x 5H	Stand	5 steps	39"/12.2m	28"/11.20m
Fall D (4 Weeks) Acceleration Development and indoor pre-competition preparation				
Day 1				
6-7H: 2xside, 2xmiddle	Stand	1 step	39"/3.5-4 m	30"/3-3.5 m
2-3 x 5H, 5-step start 9m & 8m	Stand	3-3-5-3	39"/8.5 & 11.93m	30"/7.6, 7.9 & 10.9m
2 x 4-5H	Blocks	3 steps	39"/8.8m	30"/8.2m
Day 2				
2-3 x 5H with 10-12 step start	Stand	5 steps	39"/12.5m	30"/11.5m
2-3 x 5H with 8 step start	Stand	5 steps	39-42"/12.5m	30-33"/11.5m

Reps	Start Pos.	Pattern	Ht/Spacing Men	Ht/Spacing Women
Indoor (8 weeks) Max velocity over hurdles and race preparation				
Day 1				
2-3 x 5-7H: Wt. Vest & 5 step Start	Stand	3/5	8.5, 8.8 & 12.5	30"/7.3, 7.6, 7.9/11.5
1-2 x 2-3H Competition Start	Blocks	3 steps	39"/8.8m	30"/8.2m
Day 2				
2x5H, trail leg only	Stand	3 steps	39"/8.5m	30"/7.9m
2x5H	Blocks	5-5-3-3	39"/12.5 & 8.8m	30"/11.5 & 8.2m
Outdoor (10-14 weeks) Specific Rhythmic endurance development				
Day 1				
1 x Starts over 1, 2 & 3H	Blocks	3 steps	39-42"/8.8m	30-33"/8.2m
2-3 x 12H OR	Blocks	3 steps	39"/8.8m	30"/8.2
2-3 x 9H	Blocks	3/5	39"/8.8 & 12.5m	30"/8.2 & 11.5m
Day 2				
2x5H, trail leg only	Stand	3 steps	39"/8.5m	30"/7.9m
2x5H	Blocks	5-5-3-3	39"/12.65m & 8.97	30"/11.65 & 8.35m

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will be reduced to once a week plus a weekend competition.

3. Hurdling starts over up to two to three hurdles can be done on the pre-meet day according to athletes' type, needs and condition.

4. Hurdles specific Strength endurance maintenance: reps of 20m A runs.

5. Frequency and volume of hurdle w-up drills are reduced.

OUTDOORS
10-14 WEEKS
SPECIFIC RHYTHMIC ENDURANCE DEVELOPMENT

PHASE OBJECTIVE:

1. Top speed development over hurdles.

2. Rehearsing starting mechanics and approach to hurdle 1.

3. Developing specific rhythmic endurance over hurdles. (Chart 7, p.18)

A. Hurdle volume can be reduced if flat acceleration or max velocity work needs to be done on the hurdling days.

Notes:

1. Hurdling is twice a week in this phase plus a competition day over the weekend early season.

2. Late season and approaching main competition hurdling will be reduced to once a week plus a weekend competition.

3. Hurdling starts over up to two to three hurdles can be done on the pre-meet day according to athletes' type, needs and condition.

4. Frequency and volume of hurdle w-up drills are reduced.

5. Hurdles strength endurance work using A runs is no longer utilized starting this training phase.

TO PREDICT POTENTIAL COMPETITION TIMES IN PRACTICE

For Women 100-meter hurdle: 12 hurdles at 76 centimeters x 8.2 meters between x 3-step all the way out of regulation start out of blocks (timing start with back foot leaving the blocks and stops at the touch down after hurdle number 12) take 0.5 second out to predict competition time. Example: If a woman's total time over the 12 hurdles drill is 14.30 seconds that means this woman is capable of running 13.80 seconds in competition.

For Men 110-meter Hurdles: 12 hurdles at 99 centimeters x 8.8 meters between x 3 step all the way out of regulation start out of blocks (timing start with back foot leaving the blocks and stops at the touch down after hurdle number 12) Total time of the drill is potentially what they can do in competition. Example: If a man's total time over the 12 hurdles drill is 13.80 seconds, that means this man is capable of running 13.80 seconds in competition.

REFERENCES

Figures 1 and 6: Günter Tidow (1991) Model technique analysis sheets for the hurdles Part VII: high hurdles. New Studies for Athletics 6;2; 51-66, 1991.

Figures 2, 4 and 5: Brent McFarlane. THE WOMEN'S 100M HURDLES

Figure 3: Gary Winckler (November 1994) Practical Biomechanics For the 100m Hurdles. USA Track & Field Heptathlon Summit.

Model Take Off-Landing table: CURTIS FRYE. The High Hurdles: How to achieve

BIO

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The Javelin

BASIC JAVELIN AERODYNAMICS AND FLIGHT CHARACTERISTICS (PART 2)

BY ANDREAS V. MAHERAS, PH.D.


ANDREAS V. MANERAS PHOTO

Editor's note: This is the second and final part of the article regarding javelin aerodynamics. The first part appeared in the previous issue of Techniques.

The javelin during its flight can rotate three different ways. It can rotate about its long axis, about its short horizontal axis and its short vertical axis. When the javelin is released, there is always a rotation about its long axis at a rate that fluctuates between 15 to 32 revolutions per second for the majority of good throwers. Those rotations may be beneficial for the current javelins given the fact that, as mentioned earlier, they are perpetually stable and thus, tend to return to a zero degree angle of attack as they also tend to quickly "nose down." When the javelin rotates around its long axis in the high end of the range given above, there is a stabilizing effect, which tends to delay a rotation about the short horizontal axis, ie., delay the nose down effect. This delay generates a small attack angle and a beneficial lift. Indeed, for shorter throws (release velocity ~ 24 meters/second), high rotation about the long axis will increase the distance by approximately 50 centimeters. when compared to a non-rotating implement. Although Terauds (1985), Hay (1993), and Bartlett (1989), wrote about the stabilizing effect of the "spinning" of the javelin, Bartlett (1989) also mentioned that the moment of inertia about the long axis is less than 0.1 percent of that about the short axis an observation that suggests that the spinning effect on the javelin's pitching moment may be minimal. Similarly, Soodak (2004), applying a geometric theory, postulated that the trajectory of a javelin throw is affected little by any initial axial spin because the "gyroscopic action" is quite weak. Bartonietz (2000) mentioned that the positive effect of the rotations on the distance thrown is very small and he quantified it in the order of 0.5 meters for an approximately 55-meter throw assuming a 25 revolutions/second rate of rotation.

Another aerodynamic issue with a high rotation about the long axis has to do with the Magnus effect. As the air moves past the rotating javelin, it creates a low-pressure area on the side of the javelin that moves with the direction of the air (right), and a high-pressure area on the side of the javelin that moves toward the air (left). This difference in pressure will tend to move the javelin towards the side with the low pressure. This way, in the later phase of the javelin's flight, the Magnus effect moves the center of pressure behind and to the right of the center of mass. The net resulting effect is a javelin that "yawes" right (rotates to the right about the short vertical axis). Most practitioners would blame such an effect on the wind, but to avoid that yaw toward the right, the angle of attack should not be too large, this being one more factor to consider regarding the initial magnitude of the attack angle. Genxing et al., (1986) found that at angles of attack higher than 30 degrees, vortices around slender cylindrical bodies become asymmetrical and generate sideways forces that would cause such a body to "yaw" (turn to the right).

The rotation of the javelin about its short horizontal axis can be quite influential in the result of a throw. It may be desirable to release the javelin without any rotation about the short horizontal axis but it is unlikely that the javelin will not

→

have even a small measure of that rotation. Indeed, small values of such rotation will not affect the flight of the javelin greatly. On the other hand, high values of it (>50 degrees/second), can be disastrous. They could reduce the distance thrown by several meters. An interesting phenomenon here that practitioners need to be aware of is the existence of a relationship of sorts between the angle of attack and the rotation about the short horizontal axis. If a thrower is to impart a large angle of attack at release (>10 degrees), she, at the same time, needs to impart positive rotation about the javelin's short horizontal axis. In other words, in the case in which a thrower releases the javelin in a way that a rotation is initiated so that the javelin is actually rotating downwards, if there is not an initial positive angle of attack, the javelin will eventually develop a negative angle of attack which will lead to a quick nose dive and a short distance. To avoid this predicament, a larger than normal angle of attack would counter the error of a high rotation downwards, resulting in a satisfactory flight.

Rotation of the javelin around its short vertical axis is occurring as throwers bring the javelin back and have it pointing to the right side of the sector just before release. Following, the thrower often "sidearms" the javelin and if it were not for the rotation imparted around the short vertical axis (here the point rotates from right to left), the javelin could have landed way to the right of the sector. The Magnus effect described earlier will also cause such javelin rotation and of course the sheer force of the wind can impart rotation about the short vertical axis.

JAVELIN VIBRATIONS

The tremendous energy transfer to the javelin initiates vibration of the javelin at the moment of release, via a dramatic pulling down. The acceleration of the javelin during delivery has a mean value 40 times gravitational acceleration and the large forces involved make javelin vibrations inevitable. Their amplitude depends on the stiffness, mass and geometry of the shaft (Bartlett, 1989). The vibrations can be primary and secondary. The former occur while the javelin is in flight, whereas the later occur while the javelin is being held at its center of mass. Primary vibrations range from 19 per second to 28 per second for stiff and soft javelins respectively. A primary vibration is defined as a periodic motion that occurs between two limits. When a javelin shaft vibrates in flight, it appears to quiver. Secondary vibrations range from 13 to 19 per second. Because a vibrating motion occurs perpendicular to the forward path of the javelin, vibrations represent energy delivered by the athlete at the beginning of the throw that is wasted. Ganslen (1967) speculated that vibrations could increase drag and thus result in a decrease in the distance thrown. Terauds (1985) stated that the greater the oscillations in the javelin shaft in flight, the less efficient the throw and the shorter the distance the javelin will fly. This is because a great amount of oscillations will increase drag and decrease lift, thus shortening the flight. Similarly, the stiffer the javelin the further it flies. On the other hand, Hubbard and Bergman (1989) found that the effects of vibrations on the javelin aerodynamics at small angles of attack are enormous. They found that with both drag and lift increase, that increase is larger at larger release velocities. The implication was that elite javelin throwers may be benefited the most, or pay the price for, from thrower-induced vibrations and, is therefore more important for those throwers to control the vibrations as compared to less capable throwers. In that study the authors could not answer the question whether the benefit from the increased lift can outweigh the disadvantage from the increased drag. A few years later Hubbard and Laporte (1997) implied that, in the best case, the increase in distance thrown due to an increase in lift could slightly outweigh the decrease in distance due to an increase in drag. However, the significance of the effect of those vibrations does not have a first order effect on the distance but is in fact a second order perturbation of magnitude of approximately 1 meter. Of interest is also the relationship between the number of primary oscillations and elbow or shoulder injury. One may surmise that a stiffer javelin will exert greater forces on those joints, exactly because the former yields less to those forces, which eventually may damage the joint.

The stiffness of the javelin can also be linked to a quick damping quality particularly on longer flights where there is adequate time for damping to occur. However, the damping of the oscillations is less important than the actual reduction of them. These days there have been dramatic improvements in the construction of stiff javelins with the use of either aluminum alloy or carbon fibers.

Some have proposed that to counter the oscillation of the shaft in flight, the thrower should impart spin to the shaft by rotating the shaft on release. The rotation of the shaft counters any perpendicular vibration and it makes the javelin more stable in the air. Oscillation in the javelin shaft can also be minimized by delivering the javelin into the air on the identical vertical plane as the intended flight path of the javelin. Although those are some rational suggestions to remedy the oscillation problem, oscillations of some magnitude are bound to occur during javelin release, because no javelin thrower, no matter how proficient she may be, is able to direct all the force straight along the long axis of the javelin. Therefore some initial vibrations occur at all times.

MOMENT OF INERTIA

The javelin's moment of inertia is about its short horizontal axis. The purpose of any change in the javelin's moment of inertia is to force the javelin to fly at the most desirable angle of attack throughout the flight (Terauds, 1985). The moment of inertia increases as the mass is located further away from the javelin's center of mass and similarly, as the javelin's mass is brought closer to its center of mass, the javelin's moment of inertia decreases. From this, one can assume that a javelin with low moment of inertia is more prone to influences from external forces that attempt to act on it. Javelins with high moment of inertia tend to resist those external forces and also any kind of rotation. The importance of a javelin's moment of inertia is essential because that inertia forces the javelin to fly at the most appropriate angle of attack during its flight. It should be clear by now that, in the end, it is the angle of attack that matters because it generates lift for an optimum flight.

Any change in the moment of inertia of the javelin will also affect the oscillation patterns of that specific javelin. If the mass of the javelin is placed towards the ends to increase its moment of inertia, the javelin will oscillate with greater amplitude, which may result in the javelin bending more with each oscillation cycle.

Additionally, with an increased moment of inertia there is a decrease in the tendency of the javelin to rotate about its short horizontal axis. For short throws, where "adjustment" of the attack angle in flight by the javelin itself may not be of utmost importance, the javelin's long axis, due to the increased moment of inertia, cannot catch up with the gravity as it influ-

ences the javelin along its path. Therefore, for short throws, a high moment of inertia may be more preferable because it will tend to delay its going "nose down" tendency.

During long throws, the javelin should assume the proper angle of attack as quickly as possible and then maintain it for the duration of the flight. However, any resistance to the pitching moment as it tries to adjust the javelin's angle of attack is not necessary and the moment of inertia presents such resistance. For that reason, high caliber throwers may prefer a javelin with a small moment of inertia.

SHARP VS. BLUNT TIP

The tip of the javelin can basically have a wider "blunt" shape or a more narrow "sharp" shape. It is interesting to note that the blunt tip javelins are also sold as "tail wind" javelins, i.e., most appropriate to throw in conditions where tail winds are prevalent. Given this background, in the absence of a significant wind or the presence of a headwind, most athletes would gravitate towards the use of a javelin with a sharp tip considering that this type of a tip will "cut" through the air and consequently fly further. In the presence of a tail wind, a javelin thrower would then use the blunt tip javelin designed for that kind of wind.

The situation, however, may not be as clear. Schneeberger (2009) has reported that an increase of the area of the front end of the javelin, by widening the tip, may bring the CP forward resulting in a decreased rate of change in the angle of attack and a decreased tendency of the javelin to turn over fast. Hatton (2012) also has reported that he would expect the centre of pressure to be a little closer to the centre of gravity for blunt javelins because of the earlier onset of the turbulent boundary layer than for the pointed javelins, an effect that reduces the downward tipping moment and giving a small competitive advantage. He also mentioned that in essence, the modest increase in drag due to the tip's increased surface, is more than compensated by the movement forward of the centre of pressure and the subsequent reduction in downward pitching moment. He also noted that in talking to a couple of former British world competitors over the years (Mick Hill, Steve Backley), they both had the distinct impression that the advantage was of the order of 2 to 3 meters in 80 meters. Although we do not know of any study that has examined that position, Walchner (1947) tested missiles of different head shape and reported that at a zero angle of attack and a given speed, the air force on the blunt shapes is applied farther forward than on the more slender ones thus, lending some validity to Hatton's postulates. The speeds in those tests where approaching 1 Mach or more, and it is unknown whether the findings are applicable to javelin throwing.

In addition, a known pioneer in javelin design who also crafted the concept of a tail wind blunt tip javelin, has reportedly mentioned that although he knew that the blunt tip javelins would fly further under any circumstances, including head or no wind, he came up with the blunt nose tail wind javelin concept in an effort to make those javelins more acceptable to javelin throwers. Therefore, it seems that there may be a general advantage of the blunt tip over the sharp tip javelin. By the same token, individual preferences should always be taken into account as they can influence the "psyche" of the thrower. Furthermore, differences in the construction of the javelin, may influence the rate of change in the angle of attack.

MEN AND WOMEN JAVELINS COMPARED

Comparatively, the women javelin throwers may not throw the javelin as far as men. That is, after one accounts for the differences in implement weight or strength, and also given the relative world records in men's and women's implements in the other

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throwing events, one would expect the women to throw their javelin further than they currently do. Some aerodynamic differences that exist between the javelin implements, women's vs. men's, may help explain that paradox.

The most salient difference is that women's javelins are lighter, shorter and have a smaller diameter compared to men's. The overall cross sectional surface area (the planform) is decreased by approximately one third. Since lift increases as a function of the planform, if the release parameters are the same, the two javelins will not behave the same during flight. The men's javelin has greater planform area, and it will experience greater lift than the women's relative to the gravitational force. According to Schneeberger (2009), for an 800-gram javelin thrown at its take-off speed, the gravitational force is minus 7.84 Newtons (mass x acceleration). The lift force would be equal to 7.84 Newtons. For the 600-gram javelin, those values are minus 5.88 and 5.56 Newtons respectively. In comparing the two javelins, while the gravitational force is 25 percent smaller for the 600-gram javelin, the lift force is 29 percent smaller. Therefore, the ratio of the drag force on the women's to that of the men's javelins is greater than the corresponding lift and pitching moment ratios. That is, the lift to drag ratio is smaller for the women's javelin (Bartlett, 1989) and it, at least partially, explains why the distances thrown are below their ballistic range.

Another possible difference has to do with the distance between the CM and the CP. The longer the distance, the greater the leverage, and the higher the potential for the aerodynamic force to turn the javelin over. According to Schneeberger (2009), the women's javelin has a very small advantage in leverage. Moreover, because the distribution of the weight is spread across a relatively larger area, i.e., 25 percent less weight is spread across only 15 percent less length, it gives the women's javelin a relatively larger moment of inertia. Assuming that all other factors are equal, the net result is that it would take a relatively larger force to achieve the same rate of turning over for a women's javelin and therefore, they may have a greater tendency to land flat.

Regarding potential flat landings, similarly to what LeBlanc and Mooney (2005) found, Schneeberger (2009) also noted that women tend to employ higher attitude angles at release as compared to men. Although the former authors accepted that fact as an error and suggested ways to remedy that, the latter argued that the differences between the men's and women's javelins mentioned above, may need to be taken into account for practice purposes. He addressed the fact that women may have instinctively been throwing at higher attitude angles to make sure that the javelin lands point first. He also argued that it might be relatively more difficult to get the women's javelin to land point first. To resolve that, he proposed an increase in the initial angle of attack via an increase in the attitude angle while maintaining the release angle closer to normal. The increased attack angle would also increase the lift force, resulting in additional angular momentum, which will aid the javelin to turn over and land nose first.

REFERENCES

Bartlett, R. (1989). The aerodynamics of javelin flight-a-re-evaluation. Proceedings of the Fifth International Symposium of Biomechanics in Sports.

Bartonietz, K. (2000). Javelin throwing: An approach to performance development. In: The Encyclopedia of Sports Medicine, Biomechanics in Sport, V. Zatsiorsky editor, International Olympic Committee.

Ganslen, R. (1967). Javelin aero-dynamics. Track Technique, 30, 940-943.

Genxing, V., Tzehsing, W. and Shixhong, T. (1986). Investigation of vortex patterns on slender bodies at high angles of attack. Journal of Aircraft, 23, 321-325.

Hatton, L. (2012). Personal Communication.

Hay, J. (1993). The Biomechanics of Sport Techniques. Prentice Hall, NJ.

Hubbard, M., & Bergman, C. (1989). Effect of vibrations on javelin lift and drag. International Journal of Sport Biomechanics, 5, 40-59.

Hubbard, M., & Laporte, S. (1997). Damping of Javelin vibrations in flight. Journal of Applied Biomechanics, 13, 269-286.

LeBlanc, M., & Mooney, R. (2005). Factors affecting the javelin's attitude angle in American javelin throwers. Twentieth Congress of the International Society in Biomechanics, Cleveland, Ohio, p.814.

Schneeberger, N. (2009) An introduction to the physics of javelin flight. Unpublished report

Soodak, H. (2004). Geometric top theory of football, discus, javelin. The Engineering of Sport, 1, 365-371.

Terauds, J. (1985). Biomechanics of the Javelin Throw. Academic Publishers, Del Mar, California.

Walchner, O. (1947). Systematic wind-tunnel measurements on missiles. National Advisory Committee for Aeronautics, Technical Memorandum No. 1122.

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Techniques is owned by USTFCCA, 1100 Poydras Street Suite 1750 New Orleans, LA 70163.

The Average Number of Copies of Each Issue During the Preceding 12 Months: (A) Total Number of Copies (Net press run): 9,267 (B3) Paid Distribution Outside the Mails Including Sales Through Dealers and Carriers, Street Vendors, Counter Sales and Other Paid Distribution Outside USPS: 0 (B1) Paid Circulation through Mailed Subscriptions: 9,096 (C) Total Paid Distribution: 9,096 (D4) Free Distribution Outside the Mail: 0 (E) Total Free Distribution: 0 (F) Total Distribution: 9,096 (G) Copies not Distributed: 171 (H) Total: 9,267 (I) Percent Paid: 100%

The Number of Copies of a Single Issue Published Nearest to the Filing Date: (A) Total Number of Copies (Net press run): 9,210 (B3) Paid Distribution Outside the Mails Including Sales Through Dealers and Carriers, Street Vendors, Counter Sales and Other Paid Distribution Outside USPS: 0 (B1) Paid Circulation through Mailed Subscriptions: 9,058 (C) Total Paid Distribution: 9,058 (D4) Free Distribution Outside the Mail: 0 (E) Total Free Distribution: 0 (F) Total Distribution: 9,058 (G) Copies not Distributed: 152 (H) Total: 9,210 (I) Percent Paid: 100%

Signed, Mike Corn

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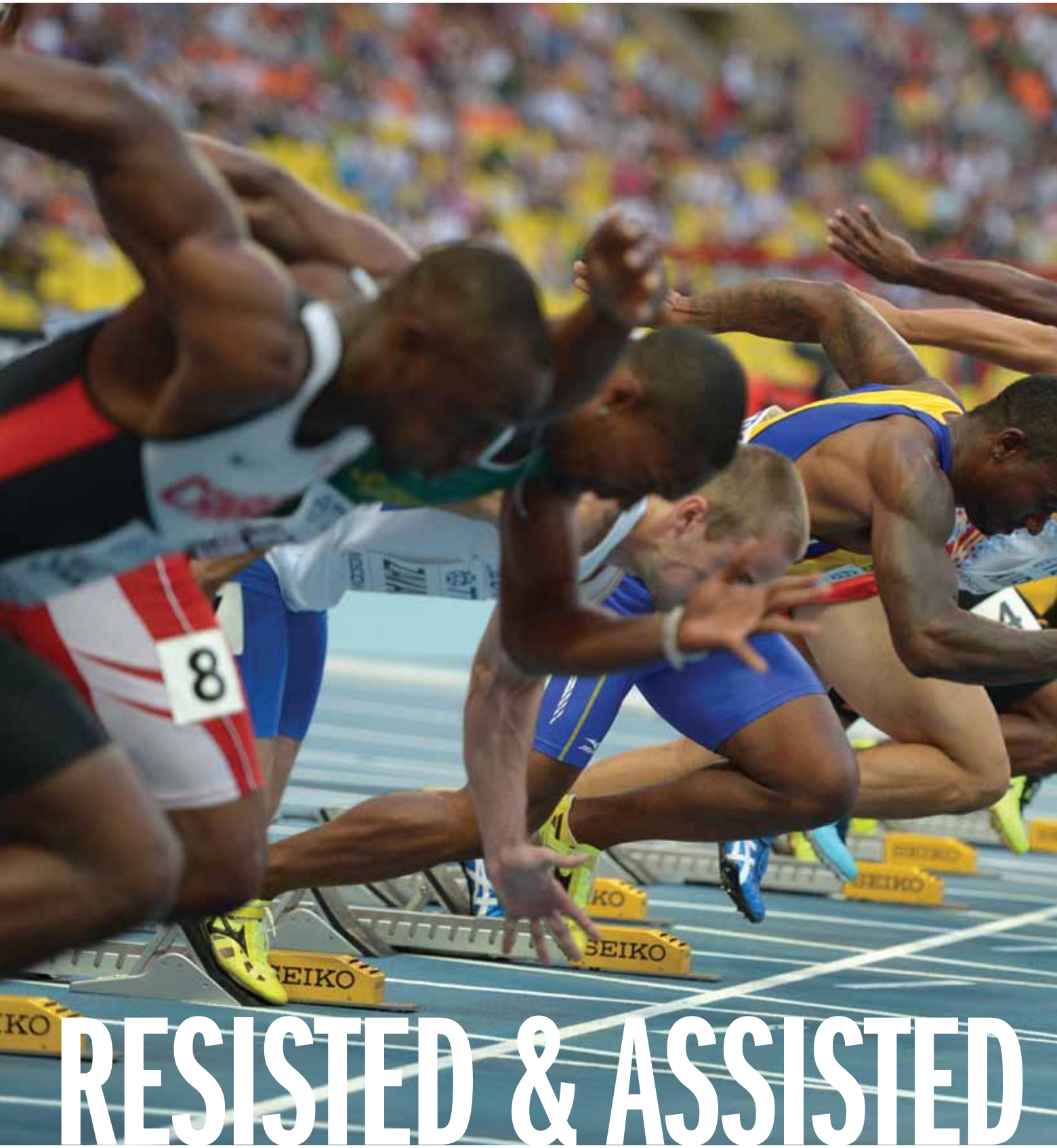

RESISTED & ASSISTED

A STRENGTH TRAINING TOOL FOR SPRINTERS

BY JOHN CISSIK

In 1978 an article by Ozolin was printed in that year's version of *Sprints and Relays*. In it, Ozolin identified the existence of a "speed barrier" for sprinters, which limited the potential performance of a sprinter, and recommended tools such as resisted and assisted sprinting to push through it (Ozolin 1978).

Resisted sprinting is a tool that includes things like parachutes, running uphill, towing an object or person, wearing a weighted vest, running in sand or water, etc. In other words, it's something that makes the sprinting motion more difficult (Cissik 2005). In theory, resisted sprinting recruits more muscle fibers and requires more neural activation of the muscles. Over time, this increased recruitment and activation will carry over to non-resisted sprints, resulting in a faster sprinter (Cissik 2005, Faccioni, 1995).

Assisted sprinting makes the sprinting motion less difficult in the sense that it enables athletes to run at faster velocities than their normal abilities. This may include tools like being towed, sprinting downhill, or sprinting on a high speed treadmill. The thinking is that over time, the athlete will "learn" how to run at greater stride frequencies, which will transfer to non-assisted sprints (Cissik 2005, Faccioni 1995).

Both of these training tools are popular for use with track and field athletes as well as with the speed training of non-track and field athletes. This article will review how these tools should be used and why these recommendations are in place, as well as highlight the literature that examines both training tools.

RESISTED SPRINTING:

Adding resistance to sprinting may be effective at increasing speed, but adding too much resistance may have a detrimental effect on the athlete. In theory, too much resistance will result in the athlete running slower, the athlete may take shorter strides due to the extra weight and may have altered sprint mechanics. (Murray et al 2005; Paulson 2011) All of these may transfer to running without resistance, having a detrimental effect on performance.

Two classic studies demonstrated that too much resistance can alter sprinting kinematics in a detrimental way. Lockie et al (2003), studying rugby and field hockey athletes found that loading sleds with 32.2 percent of an athlete's bodyweight resulted in a 23 percent decrease in running velocity, an almost 24 percent decrease in stride length, a 15 percent increase in trunk lean, and an almost 20 percent increase in ground contact time. In other words, too much resistance resulted in slower sprints, more time on the ground, shorter strides, and an inability to extend the hip during the sprint. These results were also seen by other studies looking at female sprinters and rugby/soccer players (Letzelter et al 1995; Murray et al 2005).

The results of these studies help to demonstrate that with added resistance, more is not better. In addition to the amount of resistance, the type of resistance may have an impact on performance. For example, Cronin et al (2008) studied the impact of five conditions on 30-meter sprints; no resistance, sled resistance (one group had 15 percent of bodyweight, one 20 percent), and vest resistance (one group had 15 percent of bodyweight, one 20 percent). For all conditions, the resisted conditions slowed the athlete, however the sled slowed the athlete more for all resistances. Both the sled and the vest reduced stride length. The sled conditions had the smallest stride length at the beginning of the sprint, but the sled and the vest were equalized by the 25 meter mark. Both the sled and the vest reduced stride frequency. The sled increased the trunk angle (i.e. less upright) whereas the vest resulted in the athlete sprinting in a more upright posture.

As a result of this information, there are several guidelines for the use of resisted sprinting in the coaching literature. These include:

• Resistance should not decrease the athlete's velocity by more than 10 percent (Jakalski 2000, Lockie et al 2003).

• Resisted sprints should last for 15-20 meters and allow for 20-25 meters of free running after the release of the resistance (Coaching Education Committee 2001).

• Proper sprinting mechanics should be emphasized so that bad habits are not learned (Cissik 2005).

While there is information in the literature about the impact of resisted sprinting on kinematics as well as coaching recommendations, the literature establishing its effectiveness is limited. The rest of this section will cover some of the more recent studies looking at resisted sprinting.

Spinks et al (2007) studied eight weeks of sled towing with a weight determined to decrease velocity by 10 percent. Their subjects trained twice per week. The authors had a group that did the same workout without the resistance. At the end of eight weeks of training, the non-resisted group increased their velocity on 15-meter sprints by almost 6 percent, the resisted group by almost 8 percent. Looking at stride length and stride frequency, the unresisted group increased their stride length by almost 1 percent and their stride frequency by approximately 3 percent. The resisted group, on the other hand, improved their stride length by almost 10 percent and their stride frequency by almost 11 percent.

Upton (2011) compared resisted, assisted and traditional sprinting on collegiate female soccer players. All groups trained three times per week for four weeks for 10x20-yard sprints. At the end of four weeks of training, the assisted group improved their ability to accelerate during the first 15 yards of a 40-yard sprint. The resisted group improved their ability to accelerate during the last 25 yards of the 40 yard sprint.

Clark et al (2010) examined the impact of non-resisted, weighted sled, and weighted vest sprinting on division III lacrosse athletes. At the end of seven weeks of training, all three groups improved their 60 yard sprint time; the non-resisted group by almost 2 percent, the weighted sled time by approximately .1 percent, and the weighted vest time by approximately 1.2 percent.

The studies above give some indication that the literature is conflicting about the effectiveness of resisted sprinting. Con Hyrsomallis conducted a literature review in the *Journal of Strength and Conditioning Research* and concluded that resisted sprinting was an effective training tool, but not necessarily more effective than non-resisted training. One of the challenges with research on resisted sprinting is that most studies are using non-track and field athletes. This makes it a challenge for the track and field coach to interpret the usefulness of the study for his or her situation. This is because non-track and field athletes don't have the training history with sprints that track and field athletes will. In other words, they won't have an equivalent volume, intensity, or mastery of technique that a track and field athlete would. In addition, if there is a speed barrier, it's unlikely that a non-track and field athlete would reach it – which calls into question whether this training tool would even be necessary for them.

ASSISTED SPRINTING

As with resisted sprinting, guidelines for assisted sprinting exist in the coaching literature. Unlike with resisted sprinting, there is less published research to support these guidelines. In general the guidelines for assisted sprinting are:

• Towing should not cover distances greater than 30-40 meters.

• Downhill sprints should not exceed a slope of 2-3 degrees.

• Athletes should not achieve speed greater than 106-110% of their maximum speed.

• Sound technique must be emphasized (Faccioni 1995, Jakalski 2000).

The rationale behind these guidelines is that exceeding them will result in excessive stride lengths that could result in increased braking during sprinting. Athletes that are towed for more than 30-40 meters may have a tendency to allow themselves to be pulled, rather than actively running (Faccioni 1995). In other words the athletes may have a tendency to run at submaximal levels, which defeats the purpose of the exercise.

Sugiura and Aoki (2008) studied male 100 meter sprinters and had them perform 2x50-meter sprints, then another 2x50-meter sprints being towed by a machine. On average, the machine increased their speed by 7.5 percent. To accomplish that, the athletes increased stride frequency and stride length by approximately 4 percent. Contact time decreased by 6 percent while flight time remained the same. This is one of those studies where just looking at the averages is deceptive, looking at the individual results of the individual athletes showed that each responded uniquely to being towed; some increased their stride length, some their stride frequency, some both.

Ebben (2008) studied the optimal slope for downhill sprints using male athletes. In this study, the subjects ran 40-yard sprints at 0, 2.1, 3.3, 4.7, 5.8, and 6.9 degrees of slope. All slopes except 6.9 degrees resulted in faster times, with 5.8 degrees being the best time (6.5 percent faster). As this falls within the 106-110 percent window, it suggests that the 2-3 degree guideline mentioned above might need to be re-examined.

Compared to resisted sprinting, the literature on assisted sprinting is sparse. While there is a great deal of anecdotal information as well as coaching practice, there is little research

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to support these guidelines. The Ebben (2008) study demonstrates that research may be useful to modifying the guidelines for how to use assisted sprinting. Not only is research on how to use assisted sprinting lacking, but research on its long-term effectiveness is also lacking.

Assisted and resisted sprinting are both popular tools for the speed training of all types of athletes, including track and field athletes. While there is a great deal of anecdotal information on their effectiveness as well as guidelines on their use, the research to support these is sparse and can conflict. Sometimes this is due to the subjects being studied. It is possible, for example, that certain levels of baseline strength and speed are necessary before these tools are truly effective. It is also possible that these tools are not more effective than unassisted or non-resisted sprinting, even so they may provide the variety that an athlete needs to keep his or her training interesting and fun.


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REFERENCES

Cissik, J.M. (2005). Means and methods of speed training, part II. Strength and Conditioning Journal, 27(1): 18-25.

Clark, K.P., et al. (2010). The longitudinal effects of resisted sprint training using weighted sleds versus weighted vests. Journal of Strength and Conditioning Research, 24(12): 3287-3295.

Coaching Education Committee. (2001). Coaching Education Program: Level II Course (Sprints, Hurdles, Relays). USA Track and Field, pp. 8-17, 33-42.

Ebben, W.P. (2008). The optimal downhill slope for acute overspeed running. International Journal of Sports Physiology and Performance, 3: 88-93.

Faccioni, A. (1995). Assisted and resisted methods for speed development. In Jarver, J. (Ed). Sprints and Relays (4th Edition). Mountain View, CA: Tafnews Press, pp. 63-69.

Hyrsomallis, C. (2012). The effectiveness of resisted movement training on sprinting and jumping performance. Journal of Strength and Conditioning Research, 26(1): 299-306.

Jakalski, K. (2000). Parachutes, tubing, and towing. In Jarver, J. (Ed). Sprints and Relays (5th Edition). Los Altos, CA: Tafnews Press, pp. 71-73.

Letzelter, M., Sauerwein, G., and Burger, R. (1995). Resistance runs in speed development. In: Jarver, J. (Ed). Sprints and Relays (4th Edition). Mountain View, CA: Tafnews Press, pp. 82-86.

Lockie, R.G, Murphy, A.J., and Spinks, C.D. (2003). Effects of resisted sled towing on sprint kinematics in field-sport athletes. Journal of Strength and Conditioning Research, 17(4): 760-767.

Murray, A., Aitchison, T.C., Sutherland, K., Watt, I., McLean, D., and Grant, S. (2005). The effect of towing a range of relative resistances on sprint performance. Journal of Sports Sciences, 23(9): 927-935.

Ozolin, N. (1978). How to improve speed. In Jarver, J. (Ed.). Sprints and Relays: Contemporary Theory, Technique and Training. Los Altos, CA: Tafnews Press, pp. 55-56. Originally printed in Legkaya Atletika, reference unavailable.

Paulson, S. and Braun, W.A. (2011). The influence of parachute-resisted sprinting on running mechanics in collegiate track athletes. Journal of Strength and Conditioning Research, 25(6): 1680-1685.

Spinks, C.D., Murphy, A.J., Spinks, W.L., and Lockie, R.G. (2007). The effects of resisted sprint training on acceleration performance and kinematics in soccer, rugby union, and Australian football players. Journal of Strength and Conditioning Research, 21(10): 77-85.

Sugiura, Y. and Aoki, J. (2008). Effects of supramaximal running on stride frequency and stride length in sprinters. Advanced in Exercise and Sports Physiology, 14(1): 9-17.

Upton, D. (2011). The effect of assisted and resisted sprint training on acceleration and velocity in division IA female soccer athletes. Journal of Strength and Conditioning Research, 25(10): 2645-2652.

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A COACH'S LEADERSHIP

REFINING YOUR COACHING LEADERSHIP SKILLS

BY GLEN SEFCIK

Affective leadership is a result of a systematic and sensible approach to a unique management style designed to reach the vision and mission of a successful program. To develop leadership qualities as an athletics coach, one can learn from the business world and its corporate leaders. Numerous studies and articles have been written to enhance the corporate world leadership process and will serve as a basis for research for this article.

The track and field teams that consistently finish in the top four or five in national competitions year in and year out may not simply be a matter of recruiting and resources alone. Rather, these programs are based on a systematic and

deliberate leadership style developed by successful coaches. Regardless of resources and funding, every coach can become successful by developing leadership competencies necessary to be successful in today's competitive world by following a systematic process.

In studying corporate business management data, there tends to be a consistent pattern that frequently indicates that leadership development is a systematic procedure and can be effective in athletic coaching. One would be able to refine their leadership styles by following a four-step process. The process must be defined and presented in order for anyone to develop the necessary leadership skills for success.

The Leadership Process is developed by:

Step 1: Establishing Credibility

Step 2: Setting a Clear Vision and Purpose

Step 3: Being Accessible and Approachable

Step 4: Develop Clear and Concise Communication

STEP 1: ESTABLISHING CREDIBILITY

• Expand one's knowledge of specific programmatic needs and athlete expectations.

In order to be successful, the leader-coach must identify and understand the athletic training model from ground level fundamentals to the elite level specifics, having full knowledge of the processes and procedures. Credibility is established by proving to his or her constituents that the leader-coach has the expert knowledge to understand athletic performance and productivity.

• It is imperative that the coach understand the principles of biomechanics, physiology/energy systems, sports psychology, and the ability to coordinate the sciences into a specific training plan for each athlete based on the principles of training theory.

By proving the leader has the expert knowledge to understand performance, knowledge of the event areas, and how they are governed by each of the sports sciences is essential in developing trust from the athletes which can lead to optimum performance.

In addition, the leader-coach must understand what resources are needed and which are essential in developing the bio-motor competencies of the athletes. Decisions based on knowledge of athletic protocols and other indicators of success will be supported and championed by those that share the vision of success for the team.

• Trust competencies and personal skills that help develop confidence in one's actions and behaviors.

Trust one's experience and continue to develop and explore innovative approaches to problem solving and success. The leader-coach that is confident and shows assertiveness is extremely effective. The true leader is able to build upon previous successes and failures to adjust his or her programs to be innovative and progressive. Elimination of the previous failures by substituting new ideas and experimentation can be of superior benefit to developing a successful program and yet maintain confidence in one's self.

• Expand one's knowledge of management and leadership theories by studying previous models of past successful team performances to determine the qualities and traits exhibited by leaders who have experienced success.

The coach should study previous successful programs and training theories that are necessary to develop a base of knowledge to provide direction and reach leadership goals. Read, research and apply principles of learning based on successful coaches and their programs that perennially are in the spotlight as it relates to national and international success. Research of highly successful programs is needed to develop a philosophy that includes a personalized plan tailor-made for the ability level of the athlete and resources available for one's specific group each year. Focus on a research plan using an eclectic form of leadership behaviors of identified successful coaches and national perennial powers to develop a personal style true to oneself.

• The leader should attend and complete certifications and trainings in their area of expertise.

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Coaching education programs and certifications are available by professional associations affiliated with the sport, such as the US Track and Field and Cross Country Coaches Association (USTFCCCA), the National Governing Bodies (NGB), as well as private, for profit coaching schools and clinics. Corporate business leadership programs like the True Growth Academy would also provide expertise in developing leadership traits. These types of training are extremely necessary for continuing education and personal development.

STEP 2: SETTING A CLEAR VISION AND PURPOSE

• Successful leaders are experts at establishing team goals, setting objectives and creating the vision necessary for optimum and peak performances.

In addition, leaders are skilled in establishing individual goals based on each athlete's potential and competencies by virtue of assessments and athletic measurements that identify potential. Daily reinforcement, monthly feedback, analysis and training phase projections help to define a clear path with purpose and an end result in sight. The vision must be realis- →

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tic, yet challenging, with a projected plan to indicate that the vision can be achieved through hard work and dedication.

• Leader-coaches are masters in the scheduling of competitions, knowing which meets are important and which meets can be used for developmental purposes.

It is extremely important to understand the concept of periodization and training plans that provides a proper direction or path and is the technical component of developing a vision or goal. A fundamentally sound periodized training program with goals, objectives, milestones and constant feedback is necessary to gain the confidence of the athletes. Each event area should have a detailed plan, including the expectations for each cycle of training. There should be sound principles in place to depict each Phase, Macro-cycle, Micro-cycle, Sessions and Units with specific milestones to reach in each cycle.

• Leaders should express their personal goals and vision to ensure that others know the direction and purpose of one's actions.

Leadership many times has been defined by "setting the example" and should not be taken lightly. Coaches are in the spotlight and eyes are watching to see if the leader is ethical and has established principles. The true leader realizes that expressing and living their personal purpose can help improve his or her professional life. Therefore, the leader should be willing to align one's career with one's life purpose to develop a balanced approach in order to establish authentic behaviors that can be trusted and respected.

STEP 3: BEING ACCESSIBLE AND APPROACHABLE

• The coach-athlete relationship should be personal yet professional and must be governed by ethical behavior.

This relationship should be carefully developed to provide the athlete with a mentor or guide for not only sport, but also in life. Each athlete must be treated with respect as the leader must assume he or she is giving their best and working toward his or her personal and team goals and visions. The walk-on should receive the same respect and consideration as the elite athlete. If favoritism occurs, it will be quite evident and transparent. Coaches will lose their credibility and trust with different and varying levels of athlete treatment. Always be in contact with each athlete and support them not only in their athletic endeavors, but also their personal lives as well.

Of course, there is a limit to how far one should take a personal interest, but honest ethical behavior is expected of a true leader. Each athlete's welfare and well-being should be addressed and taken as personal and confidential.

STEP 4: DEVELOP CLEAR AND CONCISE COMMUNICATION

• Communication channels should be transparent and specific with clear and concise verbiage and vocabulary.

Intentions and purposes of the message should align with the visions and objectives of the athletic program and team goals. The messages should relate to the goals and expectation of the tasks assigned and based on the credibility of the leader.

The leader should ensure the proper selection of understandable terminology for transference of technique into action. In other words, the communication should be familiar with the athlete and his or her understanding. Ensure communication is dynamic and energetic within the proper context of the mission and purpose. Show passion in the purpose of the communication. Communication should be proactive and assertive, yet engaging as a communicator with inspiration as its most important objective. Develop a method of communication that addresses proper tone, pitch, and rate of speech that is assertive and decisive. An improper tone can convey an unintended message. Become an expert in receiving feedback on how athletes relate to your communication style.

• Develop a communication strategy to express one's openness to listening and validating others' feedback during communication and rely on feedback to help shape the individual's training plan.

Provide others the opportunities to feel confident in expressing their views and ideas and be prepared to listen. Keep an open mind and validate the athlete's ideas and suggestions. Schedule one-on-one meetings to discuss training plans, academic endeavors or, on occasion, personal issues.

• Communicate your ideas and trust your decision-making process in a way that shows initiative and decisiveness without threat to others.

Every decision should reflect the vision and purpose of the program. Identify the problem, analyze the issue, and provide recommendations for improvement. Be innovative and change the previous weakness or behavior and provide a proactive solution to improve one's competencies.

• Develop a method of non-verbal communication that can be used during "on the field" competition.

Coaches are usually restricted to where they may sit or be located in the grandstand and are unavailable to convey verbal instructions. Sign language, as well as non-verbal gestures or cues, is absolutely necessary to establish communication from long distances. A "cue" system should be in place to indicate a symbol or gesture that initiates a particular action.

• A critical competency for a leader is to establish and communicate an environment that promotes the inspiration for success and internally motivates the athlete.

One should realize that motivation is from within; coaches who use methods to motivate athletes using fear or strict discipline usually find that the performance gained is stained with emotional side effects. Coaches must develop the skills to inspire athletes to motivate themselves to greatness, step aside and realize the true purpose of coaching. Develop patience and understanding when mistakes are made. Keep the emotion from conveying an unintended message.

RESULTS OF FOLLOWING THE FOUR-STEP PROCESS: TRUST IS ESTABLISHED

A result of the four-step process is a development of trust between the coach and athlete. If the coach's ego or self-promoting factors are evident, trust and faith are lost. If the coach places his or her own agenda first, it leads to a downfall of trust and results in mistrust and lack of sincerity.

Once trust is lost it is extremely difficult to regain, so much in fact that athletes, as well as administrators and peers, see through the individual and realize that the vision and purpose is designed for the wrong reasons. The leader must be conscience of maintaining humility, yet establish confidence in their abilities and still remain expressive and confident in his or her decisions. The leader who exhibits integrity and purpose will be respected and admired by athletes, administrators and the public. They and they alone can hold themselves accountable for what actions and directions that they take. Criticism from outside sources is considered, but do not steer the true leader from his or her purpose and vision.

RESPECT IS ESTABLISHED

Acquisition of respect from athletes and the public at large can be expected with following the process as well. Trust will be solidified through the four-step approach and respect for the individual will be of utmost importance. Respect must be earned. Through the right process with the right purpose and attitude, one will develop a lifelong relationship with their athletes. They will always look to their coaches as their "leader-coach" or mentor and even at times ask your advice long after the competitive athlete transitions into life.

AUTHENTICITY IS ESTABLISHED

The true authentic and humble leader-coach will develop and maintain personal integrity, exhibit reliable behavior and be consistent in actions, words and deeds. They will be able to celebrate success with a selfless attitude and give credit when credit is due. Realizing that the limelight and recognition are usually a result of the commitment of the athlete and the team, leader-coaches are willing to accept the responsibility of recognition. They can be proud of their accomplishments and develop self-confidence without being conceited and know that their efforts have been justified. They will be able to exhibit behaviors that protect confidentiality and trust to foster a caring relationship that can last a lifetime.

REFERENCES

Anderson, S. On judging and being judged accurately in zero-acquaintance situations. Journal of Personality and Social Psychology, 46, 294-307: 1984.

Baggett, B. True Growth Academy www.byrdbaggett.com: 2012

Bandura, A. Self-efficacy: Toward a unifying theory of behavioural change. Psychological Review, 84, 191-215: 1977

Branden, N. The psychology of self-esteem. New York: Bantam: 1969

http://www.inter-disciplinary.net/: 2012

Maslow A.H. Motivation and Personality (3rd ed.) New York: Harper & Row: 1987

Nucci, C. Improving socialization through sport: an analytic review of literature on aggression and sportsmanship.. The Physical Educator: 62(3), 123-129.: 2005.

Sefcik, G. Independent Research www.coachinet.net

Shaikh, P. http://www.positionignition.com/pervin-shaikh/ :2012

Wright, A. A retrospective analysis of leadership through sport. The Sport Psychologist, 17, 268-291, Human Kinetics Publishers, Inc. 2003

BIO

Since retiring from numerous years coaching track and field and cross country at the university level, Glen Sefcik now serves as an administrator for the University of Phoenix system. Sefcik is a former Chair of the USATF Coaching Education Program and a USATF Level II instructor.

BRAD BLUME – SDSM&T SPORTS INFORMATION PHOTO

TEMPO RUNS

A STAPLE OF DISTANCE RUNNING

BY STEVE JOHNSTON

Tempo runs have long been a staple of distance training, particularly for those training for race distances of 3,000 meters up to the marathon. The physiological benefits of tempo running and other forms of threshold training are well documented and readily accepted by coaches and athletes. Lately, I have come across a number of articles and sample training programs by coaches of collegiate, elite and recreational runners espousing the use of intervals with short recoveries (less than one minute) in place of the traditional tempo run.

The idea is not a new one. In fact, Jack Daniels, Ph.D., writes about the use of "cruise intervals" in his book *Daniels' Running Formula*. The basic idea is simple: You can work out longer at your lactate threshold pace by taking short recoveries at a set interval (usually between 1 kilometers and 3 kilometers). Because the recovery interval is so short (around 30 seconds to 1 minute depending on the length of the work bout) heart rate remains elevated and blood lactate levels remain relatively constant. This is a great way to get a little more quality effort in a workout. However, there is one piece that can be missing with this type of training: It's not as mentally challenging for many athletes.

Please don't misunderstand what I'm saying. Threshold paced intervals have their place in the training plan, but it should not eliminate the traditional 20-30 (or even 45) minute continuous tempo run. As coaches, we rely heavily on repetition and interval training to improve speed but, athletes teach themselves to run in order to get to the recovery interval. It's a survivalist attitude. The athlete knows that there will be a break soon and that motivates them to push through to the end of the segment. In a continuous tempo run, athletes are forced to apply mental tactics that better emulate racing. They need to be able to refocus when they start to fall off pace. It is a tremendous boost mid-race when you know how to respond as the pain and doubt start to creep into your head. In a continuous tempo run you have two choices when it gets tough: refocus and push through it or quit.

Continuous tempo runs provide athletes with the opportunity to experience and combat many of the same physiological and

→

psychological challenges that they will feel in a race. We need to teach our athletes that problems will arise in every race. The way you deal with the problem will determine your ability to achieve the goals for the day.

DEALING WITH THE MENTAL BATTLES

So, how do you teach your athlete to deal with the internal doubts that creep in? Well, that depends on the athlete but here are a few ideas:

- Refocus
- Change your focus
- Stepping stones

REFOCUS (INTRINSIC)

This method is my personal favorite because it can be relatively easy to learn and works extremely well in athletes that are intrinsically motivated. We talk frequently with our athletes (in all events) about the importance of trusting your training. This concept is the foundation for being able to refocus. The athlete needs to acknowledge the doubt, fatigue or other problem and then put it aside and remind himself that he is ready and able to complete the run (or race) because of all the training that has been put in already.

CHANGE YOUR FOCUS (EXTRINSIC)

This method is better suited for extrinsically motivated athletes. When utilizing this method it is important to make sure you are focusing on something that will still allow you to meet your goals for the workout or race. Running Looney Tunes episodes or a song over and over in your head will not be as beneficial as focusing on staying right on the shoulder of a teammate or a competitor.

STEPPING STONES

This method works well for intrinsically and extrinsically motivated athletes. In this method the focus becomes setting and achieving smaller goals. This might mean hitting specific split times or getting to the next intersection. With this method it is important to celebrate achieving each goal (without stopping, of course). The nice thing about this method is that it can be used in conjunction with the other two methods.

TYPES OF THRESHOLD RUNS

This section is by no means all-inclusive but we use a variety of different threshold workouts in our training. From continuous tempo runs to cruise intervals we try to implement a variety of threshold training opportunities in our program to avoid stagnation and to challenge the athlete to grow physically and mentally. Here's a few of the ones we use on a regular basis:

CONTINUOUS TEMPOS/PROGRESSIVE TEMPOS:

I'm going to "kill two birds with one stone" here. The continuous tempo and the progressive tempo are very similar. In the continuous tempo, your athlete is trying to maintain an average pace without much deviance from that average for the duration of the run.

In the progressive tempo, there are two ways of attacking it. The first method, which is very suitable for early fall training, is to build from mid-intensity pace (we usually define this as around 150-160HR for a collegiate runner) to threshold pace (again, I like to use Daniel's VDOT charts to determine this pace). The alternative method, much more suited for late season training, is to average the threshold pace while building up throughout the run. For example, in a 20-minute tempo, a 4:20 miler trying to average 5:15 per mile might run 5:20, 5:17, 5:13 and 5:10 per mile. This results in an average of about 5:15/mile.

CRUISE INTERVALS:

We've covered these a bit already in this article but the basic concept is shorter threshold based intervals with a short recovery. In our program these usually show up as 2K or 3K intervals with a 1 minute recovery. For us, these usually show up around the start of the indoor track season and are alternated every other week with other threshold work. Intervals could be made as short as 400 meters or as long as 20 minutes if one so desires.

HALF AND HALF RUNS:

This is the term I use for a run that is set up with half the distance at easy run pace and the other half at threshold or the slightly slower marathon pace. The determination of whether to use threshold or marathon pace is determined by the total length of the run. The key here is that there is no transition between the easy run and the faster portion. That means no drill sets, no rest break, no stopping to stretch out the calves and hamstrings. You hit the halfway point and pick up the pace.

Where we have used this the most is as part of the long run. This also means that it's technically not a threshold workout but it can easily be converted into one using shorter distances or times. Instead, I use Daniels' marathon pace and I encourage my athletes to run this section over a hilly or rolling course rather than a flat stretch of road. Typically, we'll see this workout once every three to four weeks but theoretically it could be done more frequently. The catch with this run is that if you have someone with a base pace of 6:15 per mile, this will put their faster section around 5:30 per mile. That means that if they were to go out for a 2 hour long run, they'll run about 9.5 miles at the slower pace and 11 at the faster pace for about a 20-mile day. That's not necessarily a big deal but it does require more recovery time and that is why we space it out so much.

PUTTING IT TOGETHER

Continuous tempo runs are perfect for summer and early fall training and can work well during the transition period between cross country and the indoor track season. I've found that they can help in the transition between indoor and outdoor track as well. During the winter, especially in the northern part of the country, we will frequently do our tempo runs on the treadmill or along a bike path and changes of pace are difficult with the snow and ice. In each of these times, the athlete's workload is likely to be lower initially and building on a weekly or biweekly basis. This is convenient because it allows us, as coaches, to increase the length of the tempo, and therefore the amount of time that the athlete needs to remain focused, in a controlled manner. When I am working with an athlete who has focus issues, my goals for them in their tempo run and even the route that I send them on will depend on which mental strategy I want them to employ.

For example, when applying the refocus method I like to put athletes on the treadmill (and turn the television and music off). I may even have them cover up their screen. Additionally, I will set the pace so they don't have to think about that. This works especially well if you start with a shorter run like a 10 or 15 →

minute tempo run.

If I want to use the "change your focus" or "stepping stones" methods I will usually send them out on the bike path with a group that is slightly faster and have them work on staying with the group for a prescribed amount of time. The key to this is to make sure that they believe they can run with the group in the first place. If you take your No. 10 runner and ask him to stay with your No. 1 runner for an hour there is a good chance he won't last 10 minutes because he's worried about surviving the run and doesn't focus on the actual task of staying on the No. 1 runner's shoulder.

Make sure the athlete understands the purpose of the run before starting out. You also have to make sure the athlete is ready for that run mentally. I don't mean are they ready for a tempo. I mean, do they "buy in" to the idea that they have to do this to become a better runner? While the athlete might trust you as a coach, they may not believe that they can complete every workout you give them. With that in mind it is best to start with an easy task such as a 10- or 15-minute tempo run and work your way up. Even a 20-minute tempo run can be daunting if the athlete believes the pace is too tough.

As the athlete gets more comfortable, progressive tempo runs can be interspersed to bring up the overall training effort. In a progressive tempo run the pace is increased over the course of the run. Some coaches, myself included, use pre-set intervals of a half-mile, kilometer, or full mile. Other coaches simply give a target pace for the final mile. Both methods have pros and cons. In the former, the athlete knows exactly what they have to do and it is completely controlled from start to finish. The distances used to gauge pace can be tracked using a GPS watch, known checkpoints, or it can be done on the track. The downside is that an athlete can get discouraged if they aren't hitting the pace. The latter method allows the athlete the freedom to determine how fast they go through the run and allows them to have more freedom over their pace. The downside here is that an athlete may not put enough effort into the run until the final mile.

WHAT ABOUT THE OTHER STUFF?

By now you're probably wondering if any threshold interval-style runs are even going to be done. Absolutely! The key is to bring this work in later, around mid-season. Don't just abandon the threshold training, transition out of it. As you start needing faster paced work, replace the traditional tempo run and the progressive tempo run with the interval-based threshold running. Daniels' cruise intervals fit in well at this point in your training cycle. This can also be a time to introduce continuous effort intervals in which you alternate between faster-paced intervals and recoveries done at your standard training pace.

You can use both of these methods to help transition your athletes without having to abandon the strength that will carry them through three seasons of competition. Many coaches believe that you can't have three good seasons of competition. They believe that an athlete must either train through the cross country season to have good indoor track and outdoor track seasons or train through the indoor track season to have good cross country and outdoor track seasons. However, if you carefully analyze your athletes I'd be willing to bet that your strongest athletes tend to perform well in all three seasons.

HOW DO I KNOW IT WORKS?

We used 7-day microcyles for our training and broke that up into six phases: summer, cross country, transition 1, indoor track, transition 2, and outdoor track. During the summer training and both transitions you will find us using tempo runs and their variations as the primary fast workouts. We also use them early in the cross country season and part of the indoor season.

BRAD BLUME – SDSM&T SPORTS INFORMATION PHOTO

Every season we watch our runners set personal records (PRs) in every event they ran on the track even after a good cross country season. Our upperclassmen show extremely good versatility with this type of training. Many of our middle distance runners are able to race 800 meters through 5,000 meters without seeing much variance between events.

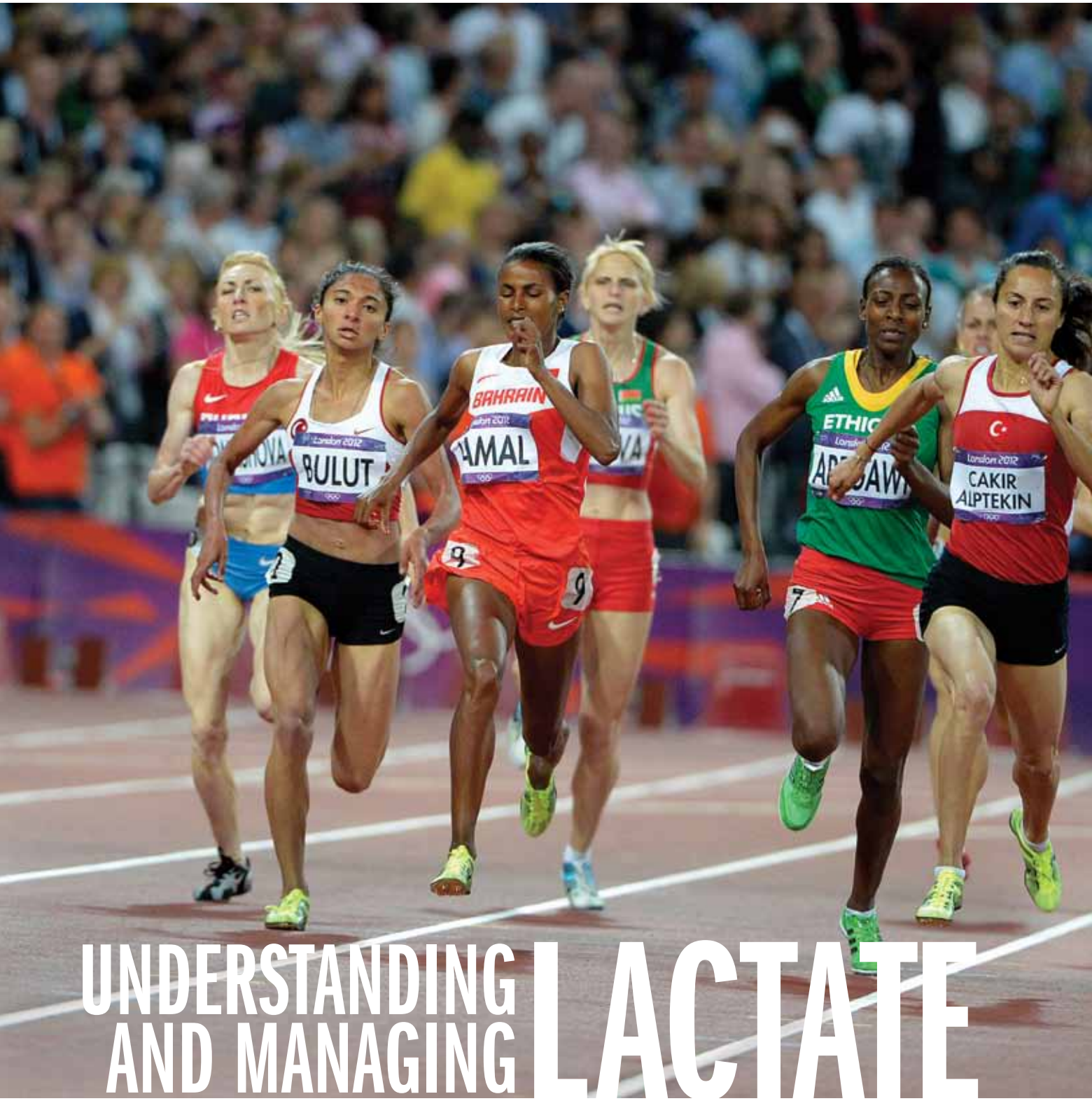
Without a doubt, the use of continuous and progressive tempo runs played a role in their success. The use of the mental training strategies discussed earlier were a part of that training. When they were asked to employ these strategies in races, they raced better. Knowing how they were going to cope with the boredom, doubt and fatigue that can set in left them ready and able to continue to push on. We have had athletes that split their mile and 5,000-meter races at their 800-meter and 3,000-meter PRs, respectively. But they weren't distracted by that. Instead they were focused on continuing to push through to the finish.

REFERENCES

Daniels, J. (1998). Daniels' running formula: Programs and strategies: 1500m to marathon. Champaign, IL: Human Kinetics.

BIO

Steve Johnson is in his fifth year as the middle distance coach at South Dakota School of Mines. During his time at Mines, his athletes have rewritten many of the school's records between 600 meters and 3, 000 meters.



UNDERSTANDING AND MANAGING LACTATE

Despite prevailing misconceptions about what lactate is and how it's made and used, lactate threshold continues to remain the gold standard for quantifying performance in endurance athletes and defining appropriate training intensities. In this article, we'll cover the challenges facing endurance athletes, the impact those challenges have had on the endurance community, and lactate threshold's role in providing a viable solution to enhance training needs.

THE PROBLEM

We live in a world of fast paced competition filled with high performers and over achievers. Not surprisingly, this competitive condition is greatly magnified within the endurance community. Unfortunately, far too many people (coaches and athletes alike) have difficulty finding that ideal balance between training and recovery that maximizes the performance outputs of an individual athlete. And because the human body is so complex, training and recovery aren't really binary states of being either, but rather complements of a

KIRBY LEE PHOTO

BY DUSTIN FRECKLETON, MD

wider spectrum of activity. To really help athletes improve, each workout (or rest period) within a training plan must be assigned an intensity that is based on the strategy of that training plan and tailored to the individual athlete.

This observation is not meant as criticism of us coaches, but serves as a commentary on how difficult it is to train right. Despite the growth of readily accessible data there remains a lingering confusion of what the best ways to train really are.

At collegiate and even high school levels of performance, the literature shows that more performances are spoiled by overtraining than by undertraining. Coaching experience also confirms this. Five-time Olympic running coach Bobby McGee has observed that "an athlete who is 90 percent conditioned for an event will do better than an athlete who is 0.5 percent overtrained." So how do we as coaches come to know each athlete at such a level that we can provide the individualized service they need? Essentially, how do we help each athlete train correctly?

THE IMPACT

We have found that the strongest predictors of real-world training intensity are frequently not the true needs of an athlete, but the subjective importance of a particular race or competition. Rather than listening to the athlete's body and the body of available scientific literature, athletes and coaches continue to relentlessly push harder and harder as they perceive the stakes to rise. Far too often this dangerous approach leads to either overtraining fatigue and/or injuries.

A common definition of overtraining refers to the point where an athlete starts to experience physiological maladaptations and chronic performance declines. Notice here that the technical definition begins even before injury and includes any event/state of being which negatively impacts performance.

The injurious effects of overtraining cannot be overstated and are becoming an increasingly common phenomenon. One particularly telling study reported that in preparation for the 1996 Atlanta Olympic Games, more than 28 percent of U.S. athletes reported overtraining injuries. These ranged in severity from serious injury to impaired performance. If this figure seems impressive to you, consider that it more than doubles in the general athletic population where between 66-79 percent of athletes report overtraining injuries annually.

THE SOLUTION

There is no single solution that can definitively rid the world of overtraining; however, the burden is on us as coaches and recognized professionals to use all reasonable efforts to prevent it from happening in our own athletic populations. Doing this consistently (and effectively) involves an intimate knowledge of each athlete and how they respond to training. It involves a combined appreciation for their fitness level, events, goals and training history.

In my medical and coaching experience the best way to understand an athlete at a "molecular" level and really start to appreciate what their unique training needs are is to use lactate threshold.

WHAT IS LACTATE?

In order to make sense of lactate threshold, it is important to have a basic understanding of the energy producing systems in the body. Energy is supplied by the body through a series of complex chemical reactions that take the nutrients we consume and converts them into a universal currency—ATP. This ever-present molecule is then used for all energy requiring processes, including the muscular contraction of endurance running.

Despite the existence of a single common currency for all biochemical activity, the human body has evolved multiple methods for producing ATP based on the amount, intensity, and duration required. The general rule we all learned in high school is that aerobic metabolism fuels periods of sustained, moderate activity and anaerobic metabolism is used for short periods of high demand. The truth is that the energy pro- →

ducing systems are complex and highly interrelated. Both work together in a dynamic environment to produce the energy our bodies need both during exercise and at rest.

As the intensity or speed of a workout increases, energy production needs to occur more rapidly and in greater volumes. In this state the body relies more heavily on the anaerobic energy system to overcome the functional deficit of what aerobic metabolism can generate. A by-product of anaerobic metabolism is lactate. Contrary to what you may have read though, lactate (or lactic acid if you add a hydrogen) does not deserve all of the negative press it has received. We now know that lactate is not the cause of muscle soreness and the fatigue that occurs during training but is in fact a metabolic intermediate that can both help reduce increasing levels of acidity and also serves as a secondary source of fuel for the rapidly contracting muscles. In other words, lactate is actually a good thing.

We continue to talk about lactate in the athletic community because it is an important molecular marker for performance related events. We now know that accumulating lactate does in fact indicate increasing acidity within the muscle, but is not the perpetrator as we once thought; it is instead a measurable surrogate marker for the same event. In medicine we use surrogate markers all the time to measure important biologic events we otherwise couldn't quantify. When we want to know how the kidney is functioning we measure creatinine instead; when we want to assess liver health and/or toxicity we look at the transaminases. By measuring lactate, a coach is simply applying the same rigor a physician would use to help him or her understand the body system of their primary interest.

LACTATE THRESHOLD

Lactate levels dynamically change based on both rates of production and removal. As long as lactate removal capabilities exceed the rate of production, levels remain relatively low. This is why during low intensity training, even training of extended duration, lactate levels do not increase significantly. But once production increases above the maximum clearance rate, lactate begins to accumulate. This point is known as lactate threshold (LT). Because of the increasing level of intracellular acidity, athletes can only exceed lactate threshold pace for a limited amount of time before fatigue forces them to slow down. Research shows that well trained athletes can typically maintain LT pace for approximately 45 minutes to an hour.

Because of its tight correlation with endurance performance, lactate threshold has been shown to be the most powerful monitoring technique available. It can be used with great accuracy to define the appropriate training intensities of each athlete and then quantify their improvements over a training season and over a career.

THE BENEFIT

A series of recently conducted independent studies have illustrated the usefulness of lactate threshold for understanding race performance. In one such study, a large cohort of elite 10-kilometer runners had their lactates measured just prior to start. The researchers then made predictions of race finish order simply by ranking athletes based on their lactate thresholds. Once

KIRBY LEE PHOTO

the race was completed, the actual results were then compared with what had been predicted. They had been able to predict the actual finish order with an impressive 93 percent accuracy. These results generated significant interest in lactate threshold and subsequent studies have further validated these findings. Further attempts to improve LT using simple statistical analysis have improved its prediction correlations up to 95-97 percent.

AN OPPORTUNITY

Despite the widely accepted success of lactate threshold in predicting race performance and improving training, only about 5 percent of competitive endurance athletes get it done annually. For those of us coaches who understand how to use lactate, this represents a huge opportunity. It also represents a great opportunity for performance monitoring experts to develop better methods of testing. The low current adoption rates are largely due to the barriers of traditional LT testing. Multiple blood draws, high cost, and complexity of the testing procedure are among the most cited reasons for non-testing. Over the last several years there has been a growing demand among top coaches and athletes to get easier access to lactate data. But as long as testing process remains cost prohibitive and painful there will continue to be a low adoption rate.

With the emergence of new wearable technologies the opportunity for noninvasive, simple testing remains a tantalizing option. It will be interesting to see how performance monitoring changes in the next several years and what technologies will participate in building the next generation of elite athletes.

BIO

Dustin Freckleton, MD, received his medical degree from the University of Texas Medical School at Houston and has an extensive research background in health and human performance. He has served as an instructor at the USATF National Podium Education Project and is a USATF level 1 certified coach. In 2012 he co-founded BSX Athletics, a sports technology company that combines wearable technology with real-life coaching to help improve athletic performance.

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RON ALLICE

USC, CAL POLY POMONA, LONG BEACH STATE, LONG BEACH CITY COLLEGE

During his 19 seasons at Southern California, Ron Allice guided the Women of Troy program to the 2001 NCAA Outdoor team championship, the pinnacle of a 19-year tenure of perennial championship contention that featured a combined 25 NCAA Championships top-10 finishes and 32 individual NCAA titles between his men's and women's programs.

All told in his 49-year coaching career, Allice produced 313 All-Americans, 27 Olympians, 16 Olympic medalists, seven American record holders and four world record holders, while maintaining a dual meet record of 217-48-1. Additionally, Allice coached teams and won 11 state championships at the junior college level in 16 years at Long Beach City College.

From 2005-08 the USC program stood alone as the only school to record top-10 national finishes in both the men's and women's team competitions. The men's team continued that streak of top-10 finishes through the 2010 NCAA Championships, completing a six-season run of top-10 finishes.

His coaching career began in 1964 when he served as the coach of the Long Beach Comets girls' and women's AAU program, expanding the team from five girls to more than 150. Meanwhile he was a graduate assistant at Long Beach State (1964), an assistant at Compton (Calif.) High (1966) and the head track and cross country coach at Wilson High in Long Beach (1967-68).

Allice began coaching Long Beach State in 1974, where he guided the new program to a track and field Pacific Coast Athletic Association title and two cross country PCAA titles. Prior to USC, Allice served as the head coach at Long Beach City College for 16 years, where his teams won conference championships in each of those seasons and went 78-1 in dual meet competitions. His 1980 team was named the best junior college team in history by *Track & Field News*.

AL CANTELLO

NAVY

A mainstay at the U.S. Naval Academy for more than half a century — 51 years, to be exact — Al Cantello has been the guiding force for a Navy distance program that shifted the balance of power in the long and storied Army-Navy rivalry firmly in favor of the Midshipmen.

Cantello, a world-class javelin thrower prior to his tenure with the Midshipmen, has served to date as the head coach of the men's cross country program for 46 seasons and was in charge of the men's track and field programs from 1981-'88. Cantello continues to serve as the Head Cross Country coach and Assistant Track & Field coach today. In total, he has guided those programs to a combined record of 318-81-2, including a combined 46 N-Stars — signifying victory over rival Army — 35 of which came through cross country.

During his tenure he has coached three cross country All-Americans and four indoor/outdoor track and field All-Americans, and has been named the Mid-Atlantic Regional Coach of the Year three times. He has also been named Patriot League Coach of the Year four times, earning the honor four straight years from 2008-2011 as the Midshipmen claimed four consecutive conference titles. He coached Patriot League champion Andrew Hanko in both 2009 and 2010.

Cantello has been honored not only for his athletic accomplishments and his work in the field of education. The Naval Academy Alumni Association awarded him the Distinguished Athletic Leadership Award in 1997, given to a coach or faculty member who did the most for the physical development of the Midshipmen in physical education. That same year he won the Tom Hamilton Teaching/Coaching award. In 2008, the Patriot League Award of Good Sporting Conduct.

Prior to his days coaching at Navy, he was a 1955 graduate of La Salle, where he was a two-time All-American in the javelin. Cantello set the world record in 1959 and competed at the Rome Olympics. He was voted the world's greatest javelin competitor in *Sport* magazine in 1964 and named to its all-time track and field team.

DENNIS CRADDOCK

NORTH CAROLINA, VIRGINIA

With 44 years of coaching between the collegiate and high school levels, Dennis Craddock has amassed a legendary resume that includes two women's NCAA cross country team titles (1981, '82), a women's indoor NCAA team title (1982), and an unparalleled 45 ACC team titles via coaching tenures at Virginia and North Carolina.

His nine seasons at Virginia built the foundations for what would become an all-time great career, as his 1981 women's cross country team recorded an NCAA Championships-record winning score of just 36 points, with four finishers in the top 12 and seven All-America honorees. The women would repeat the feat by winning the cross country title the following year. A combined 16 women's and three men's cross country All-America honors were earned under his watch. In between the two women's cross country titles was an indoor national title in 1982 that featured a staggering 17 All-America performances.

He made the move to Chapel Hill in 1986 and served as the head coach of Tar Heels for 27 years. During his tenure, he mentored 25 individual student-athletes to a combined 38 individual NCAA titles and coached 19 Olympians who went on to claim five gold and two bronze medals. His women's teams would go on to win 15 indoor ACC titles and 14 outdoor titles, while his men's teams won two indoor titles and four outdoor crowns. In the period between 1988 and 2004, Craddock's women's team claimed indoor titles in all but two seasons and took the outdoor title in all but three.

His women's teams swept the cross country, indoor and outdoor ACC titles in both 1994-'95 and 2003-'04, a feat that no other women's program in conference history has accomplished. The 1994-'95 campaign was particularly special, as the women claimed all three ACC titles and the men swept the indoor and outdoor crowns.

Prior to his collegiate experience, Craddock experienced similar success on the prep level.

OF FAME CLASS OF 2013

CURTIS FRYE

SOUTH CAROLINA

Since day one of his 17 year-and-counting career at South Carolina, Curtis Frye has guided a perennial contender in the Gamecocks track and field program, both at the national and conference levels. Frye, a sprints and hurdles specialist, brought the women's program an NCAA outdoor team title in 2002 and a runner-up finish in 2005 in route to 10 straight top-10 NCAA finishes thus far in his tenure in Columbia.

That 2002 championship team claimed three NCAA event titles, part of an astounding seven total first-place national finalists between the men's and women's teams both indoors and outdoors. Frye's 2000 program was nearly as prolific, capturing a combined six individual and relay titles. Illustrative of the high-level performance of Frye's Gamecocks is the fact that Frye coached teams claimed at least two individual or relay crowns in nine of his first eleven years at the helm.

Indoors, his women's squads have finished in the top 10 at the NCAA Championships 10 times, including runner-up finishes in 2000, 2001 and 2003. In total, he has coached five national athletes of the year, 31 individual NCAA champions, nine NCAA championship winning relay teams, 115 SEC champions and 435 NCAA All-Americans. Frye has coached at least one student-athlete that claimed a national title in all but three years as head of the USC programs.

South Carolina's national prominence was demonstrated at the conference level as well. The women have won the outdoor SEC title three times (1999, 2002, 2005) and have finished in the top three fifteen times, while the men have finished in the top five 11 times between the indoor and outdoor seasons. He has coached at least one SEC champion in all but two years at South Carolina, and 12 of his student-athletes have been named SEC Athletes of the Year.

In his career, Frye has coached 25 Olympians who have won 13 medals at the Olympic Games. Nine of his former student-athletes competed at the 2008 Olympic Games in Beijing.

JIM HUNT

HUMBOLDT STATE, UC DAVIS, SIERRA COLLEGE

A fixture in the West Coast distance coaching scene for nearly a half-century, Jim Hunt created a lasting legacy at Humboldt State.

During his tenure at Humboldt State from 1967-'86, Hunt's teams in cross country and track and field won six Far Western Conference titles and produced 64 All-Americans and 11 national champions, culminating in the 1980 national title in the school's first year in Division II. Hunt's impact on the school's track and field program resounds to the present day, as ten men's school records in track and field that were set during his time there remain atop the program's all-time record books.

Hunt would be hired as the head track and field and cross country coach at UC Davis from 1989 to 1993, where he guided the women's cross country program to a runner-up finish at the 1991 NCAA Division II cross country championships with four All-Americans, among three other top ten team finishes. The men's cross program finished fourth that same season with two All-America selections.

His men's track and field teams finished in the top 20 at the NCAA Division II outdoor championships in three of his four seasons, while the women finished as high as tied for 24th. Between both cross country and track & field at UC Davis during this four-year stretch, 28 student-athletes claimed All-America honors.

After seven years as a head coach at Sierra College, Hunt returned to UC Davis as an assistant distance coach in 2000 before his retirement in 2003. His indoor and outdoor track and field runners combined for 26 All-America honors during that four-year stretch.

In addition to his collegiate coaching career, he also coached the USATF Men's Development distance and middle distance programs from 1981 to 1992; served as the West Team coach at the U.S. Sports Festival in 1981; and was the international director of distance running and race-walking for Special Olympics International. He has continued to hold clinics.

PAUL OLSEN

AUGUSTANA (ILLINOIS)

At Augustana College (Illinois), one thing has remained constant for the better part of a half-century: head men's track and field and cross country coach Paul Olsen. In 47 years as the head track and field coach and 45 years with cross country, Olsen has guided the Vikings to success at both the conference and national levels.

He first took over the cross country program in 1966, and since then the Vikings have appeared at the Division III championships 24 times. Among those appearances are ten top-ten team finishes, including a 1980 team that finished runner-up by just four points. The year prior, his team finished fourth, and he has guided the program to two fifth-place finishes in 1974 and 1992. Individually, his runners have earned All-America honors 24 times with three individual national champions.

His success at the conference level in cross country has been just as consistent. The Vikings won back-to-back College Conference of Illinois and Wisconsin (CCIW) titles in 1969 and 1970, and have finished runner-up in the conference 28 times and finished no lower than fourth. Seven individual conference titles have been won by five runners wearing Augustana colors since Olsen has taken over.

After taking over the cross country program in 1966, he took the helm of the men's track and field program just a few short years later in 1969 and has guided it to the same levels of success as he did the fall program. Immediately, Olsen mentored the track & field program to five CCIW titles in his first six and five straight CCIW titles from 1980 to 1984.

His guidance has resulted in 213 individual league titles and 27 relay titles outdoors, and 31 individual indoor crowns and seven relay championships. Nationally, his outdoor squads have recorded 13 top-10 finishes, including national runner-up showings in 1975 and 1981. Indoors his teams have posted four top-10 finishes. In all, he has coached 22 national champions and 162 All-America selections.

THE BOWERMAN

DEREK DROUIN

INDIANA

It was a banner year for Drouin, who became the first to sweep both the indoor and outdoor NCAA Division I high jump titles in one academic year since he did it himself in 2010. Clearing heights of 7-8 (2.34 meters) or greater, he threatened the collegiate records at both championships. He finished unbeaten in nine collegiate high jump finals between indoors and outdoors, with his only overall loss coming at the Nike Prefontaine Classic, where he posted the No. 2 outdoor mark in collegiate history at 7-8¾ (2.36 meters) in a second place effort.

He won all four high jump finals indoors, three of which came with clearances of 7-6 (2.29 meters) or greater. The highlight of his 2013 indoor campaign was claiming his third career NCAA indoor high jump title with a winning mark of 7-8½ (2.35 meters) to move him up to No. 2 on the all-time collegiate indoor performers list. Competing in the heptathlon at the Big Ten Championships, he set the world's all-time best high jump mark in heptathlon competition with a clearance of 7-6½ (2.30 meters), going on to finish third in the overall event with 5,817 points. He won the open high jump title the next day at 7-5 (2.26 meters).

His outdoor campaign saw him go unbeaten in collegiate high jump events and clear heights of 7-6½ (2.30 meters) or greater in five high jump finals, culminating in his NCAA outdoor title at 7-8 (2.34 meters), which he cleared on his final attempt. His title came one week after his outstanding performance at Prefontaine. In addition to an outdoor Big Ten title, he won the Penn Relays title with a meet- and facility record clearance of 7-7¾ (2.33 meters).

LAWI LALANG

ARIZONA

Though Arizona junior Lawi Lalang did not compete as frequently as many other semifinalists due to the nature of his events, he made every race count. He claimed four NCAA Division I individual titles, two each at indoors and outdoors. He also set two NCAA Division I Indoor Championship records, four all-time collegiate top-ten marks indoors in two different events, and a 2013 collegiate-best in an event he elected not to run at the NCAA Division I Outdoor Championships.

In terms of championships performances, Lalang became just the third man to win four individual distance titles in one academic year, joining 2009 The Bowerman winner Galen Rupp of Oregon and Suleiman Nyambui of UTEP who accomplished the feat in both 1980 and 1982. His combination of indoor mile and 3K titles and outdoor 5K and 10K titles has never before been accomplished in Division I.

Lalang's 3:54.74 win in the mile at the DI Indoor Championships bested the 18-year-old meet record of 3:55.33 set by Kevin Sullivan of Michigan in 1995 and gave him the fourth-fastest indoor mile time in collegiate history. He also took down Colorado's Adam Goucher's 1998 NCAA Meet record of 7:46.03 at 3,000 meters en route to winning the title in 7:45.94, the tenth-fastest mark in collegiate history. In the process he became the first man since Washington State's Bernard Lagat in 1999 to win both titles in the same meet.

Lalang's outdoor campaign culminated with a 13:35.19 NCAA title-winning performance at 5000 meters and another title in 29:29.65 at 10,000 meters. He finished his outdoor campaign undefeated in nine events between 1,500, 5,000 and 10,000 meters. He won Pac-12 titles at both 1500 meters and 10,000 meters, with his winning 1500 time of 3:38.53 standing as the collegiate leader at the end of the season.

JULIAN WRUCK

UCLA

Following up on his 2011 national championship in the discus, junior Julian Wruck had a breakthrough year in 2013, re-writing the record books en route to his second NCAA title in the event. He finished the season not only undefeated but nearly untouchable in eight collegiate events in 2013, registering the top 27 throws by any collegian this year.

The one meet in which he was given a true challenge was the NCAA Division I Outdoor Championships, where he ultimately defeated defending champion Chad Wright of Nebraska with a throw of 213-0 (64.94 meters) after trailing midway through the final three throws.

Though his winning throw was the top mark in the Outdoor Championships since 2000, that performance was outdone by his efforts at the Claremont Throws meet the week prior, where he uncorked the best throw ever by a collegian with a 223-7 (68.16 meters).

His season was filled with other all-time best throws. After debuting with a winning throw of 213-4 (65.04 meters) at the Texas State Elite, he then recorded marks of 216-7 (66.01 meters) and 215-10 (65.80 meters) to win the Texas Relays. The very next week he improved upon his season's best with a 216-8 (66.05m) mark at UCLA's Rafer Johnson/Jackie Joyner-Kersee Invitational.

He competed in Australia the following week, where his performance was highlighted by a winning throw of 217-7 (66.32 meters) and another of 216-5 (65.96 meters). Back Stateside, he won the UCSD Triton invitational with a throw of 216-3 (65.92 meters).

FINALIST 2013

BRIGETTA BARRETT

ARIZONA

Arizona senior Brigetta Barrett closed out her collegiate career on a high note after sweeping both the indoor and outdoor NCAA Division I high jump titles for the third consecutive season. She also set the outdoor collegiate record while going unbeaten against collegians in ten event finals over the course of the indoor and outdoor seasons.

Her brief four-meet indoor season culminated with a season's best clearance of 6-4¾ (1.95 meters) to take the NCAA Division I indoor title by two inches over the nearest competitor. The outdoor season was one for the record books, as she not only claimed the Division I Outdoor high jump title but also set collegiate and all-time dual meet records along the way with two of the ten best clearances in collegiate history. Just as she did indoors, she took the outdoor Division I title with a winning height of 6-4¾ (1.95 meters), this time with a bit more drama as she cleared her final height on her third attempt, before taking three tries at a new collegiate record of 6-6¾ (2.00 meters).

It was her own record, set a month prior at the Pac-12 Championships that she was attempting to better. After a long build-up, she was successful on her third and final attempt at 6-6¼ (1.99m) to break the previous collegiate record of 6-6 (1.98 meters) held by Amy Acuff of UCLA (1995) and Kajsa Bergqvist of SMU (1999).

Barrett has shined on the international scene as well, claiming silver medals at both the 2012 Summer Olympics and the 2013 IAAF World Championships.

ALL PHOTOS BY KIRBY LEE

KORI CARTER

STANFORD

Stanford's Kori Carter became a hurdling force to be reckoned with not only at the collegiate level but also on the world stage during in 2013. She claimed the NCAA Division I title in the 400 hurdles with a collegiate record and finished runner-up nationally in the 100 hurdles.

She finished undefeated in eight races in the 400 hurdles, with two of the four fastest times in collegiate history, and lost just once in five finals in the 100 hurdles. The lone loss came in the NCAA final against collegiate record-holder and fellow Bowerman finalist Brianna Rollins of Clemson.

Carter, whose collegiate best in the 400 hurdles had been 57.10 set two seasons ago, finished her 2013 campaign with an NCAA title in a collegiate-record 53.21, surpassing the previous record of 53.54 set by Sheena Johnson of UCLA in 2004 and becoming just the second woman to dip under 54 seconds during the collegiate season.

A testament to how strong her competition was this season, Georganne Moline finished an instant later to become the third woman to dip under 54 during the collegiate season in 53.72, a time that would have won 30 of the 32 400 hurdles NCAA finals ever contested. The next day, Carter claimed the runner-up spot in the 100 hurdles in a career-best 12.79.

She won Pac-12 titles in both the 400 and 100 hurdles, with her winning time of 54.21 in the former giving her the second-fastest performance in collegiate history at the time, which now ranks No. 4.

BRIANNA ROLLINS

CLEMSON

Clemson hurdler Brianna Rollins ended her final year at the collegiate the exact same way she started it: with a collegiate record. The Tiger hurdler set the collegiate record in the indoor 60 meter hurdles in her very first final of the season and ended her campaign with the 100 meter hurdles collegiate record outdoors en route to an NCAA Division I title in the event.

In total, Rollins' season featured NCAA DI titles in both the 60 and 100 hurdles; collegiate records in both events, five of the ten fastest times in collegiate history in the 60 meter hurdles; three of the seven fastest 100 meter hurdles all-conditions time in collegiate history; and an unbeaten streak of 17 races between the two events.

She left no doubt who was the best collegiate sprint hurdler of 2013, running away from the finals field to win in a collegiate record 12.39 (+1.7 meters/second) by .4 of a second — becoming the first collegiate woman to run faster than 12.40 in any conditions. Rollins went on to break the American record of Gail Devers at the World Championship Trials and followed that with a gold medal at the World Championships in Russia.

Her indoor season followed a similar arc to her entire 2013 campaign as a whole, winning the Tiger Challenge 60 hurdles in 7.78 to break Powell's record of 7.84 from 2006. She did not run slower than 7.96 for the remainder of the season, ending with 7.82q and 7.79 performances to win the NCAA Indoor title in the event, giving her the three fastest times in collegiate history.

UPDATES FROM THE NCAA ELIGIBILITY CENTER

BY LEIGH ANN KENNEDY

Happy fall from the NCAA Eligibility Center! As you have learned from recent installments of "Updates from the NCAA Eligibility Center," our education and outreach efforts related to the new academic standards for 2016 are a top priority. For an overview of those standards, please visit *www.2point3.org*. In this column, however, I would like to provide insight on an equally important part of a college-bound student-athlete's NCAA eligibility: amateurism certification.

The amateurism certification process ensures that NCAA amateurism regulations are applied consistently and accurately across the board for all incoming student-athletes who wish to compete in athletics for any NCAA Division I or II member institution. When college-bound student-athletes register with the Eligibility Center, they are asked to answer several questions regarding their sports-participation history. That information is used to capture a better picture of their amateur status, which the staff uses to identify any issues that may conflict with NCAA amateurism legislation. It is important to keep in mind that the NCAA has very specific legislation relating to amateurism and each college-bound student-athlete has a unique participation history; therefore, amateurism certification requests are reviewed on a case-by-case basis.

HOW LONG HAS THE AMATEURISM CERTIFICATION PROCESS BEEN IN PLACE?

The Eligibility Center began certifying amateurism for college-bound student-athletes who enrolled on or after Fall 2007 to ensure consistency for all members. Before that, each member institution made its own determination regarding amateurism, which sometimes led to an inconsistent application of the rules.

WHAT KIND OF ACTIVITIES DOES THE NCAA ELIGIBILITY CENTER REVIEW IN THE AMATEURISM CERTIFICATION PROCESS?

- Contracts with a professional team.
- Salary for participating in athletics.
- Prize money.
- Play with professionals.
- Tryouts, practice or competition with a professional team.
- Benefits from an agent or prospective agent.
- Agreement to be represented by an agent.
- Delayed initial full-time collegiate enrollment to participate in organized sports competition.
- Any financial assistance based on athletics skills or participation.

WHAT SHOULD CROSS COUNTRY AND TRACK AND FIELD COLLEGE-BOUND STUDENT-ATHLETES KNOW ABOUT THEIR AMATEURISM CERTIFICATION?

- College-bound student-athletes should register with the Eligibility Center at the beginning of their sophomore year at *www.eligibilitycenter.org*.
- When college-bound student-athletes register, they should include all sports participation information (e.g, club teams, expenses, prize money/awards, etc.). Being as thorough as possible in their responses will help the amateurism staff complete the review.
- College-bound student-athletes should continue to update their registration with participation information as necessary, up until they request a final certification. Final certifications can be requested beginning on April 1 of the college-bound student-athletes' senior year for Fall enrollees and October 1 for Winter/Spring enrollees.
- Cross country, indoor track and outdoor track are all considered separate sports under NCAA legislation. That being said, each college-bound student-athlete will need to be certified in amateurism for each sport in which he or she plans to compete at an NCAA Division I or II institution.

Leigh Ann Kennedy is the Assistant Director of Amateurism Certification at the NCAA Eligibility Center. If you have questions or ideas for additional topics, please feel free to contact her at lkennedy@ncaa.org.

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