

Track and Field: Jumps Roundtable Discussion 2016

The Coaches:

Travis Geopfert: Travis Geopfert is the Horizontal Jumps Coach at the University of Arkansas. In his 13 seasons as coach, the team has had 10 NCAA National Champions (four long jump, two triple jump, one high jump, one combined-event, one 100-meters, and one 200-meters), 67 First Team All-Americans, 121 NCAA national qualifiers, 69 Conference champions, 132 All-Conference performances, three Olympians, and three World Championship qualifiers.

Dan Pfaff: Coach Dan Pfaff tutored 49 Olympians, including nine medalists, 51 World Championship competitors (also nine medalists), and five world-record holders. He directed athletes to 57 national records across a multitude of events.

Dan served on five Olympic Games coaching staffs in five different countries and nine World Championships staffs for six different countries. He lectured in 27 countries and is published in more than 20 countries. During his NCAA coaching career, Dan coached 29 NCAA individual national champions and 150 All-Americans, and was a lead staff member on teams that have won 17 NCAA National Team Championships—fifteen women and two men.

Dan joined the World Athletics Center as Education Director and Lead Jumps Coach in March of 2013, after a successful three-year stint in London with UK Athletics, where he coached long jumper Greg Rutherford to Olympic gold.

Nic Petersen: Nic Petersen is the current Horizontal Jumps Coach at the University of Florida. Nic's complete resume from his previous eight seasons of coaching includes a World Champion, five athletes who have made IAAF World Championships teams, two Olympians, a collegiate record holder, six athletes who have combined for 13 individual national titles, and two athletes who have combined for three gold medals at United States Track and Field Outdoor Championships. Petersen's top pupil to date, Marquis Dendy, blossomed into one of the most prolific combination jumpers in NCAA history, becoming the only collegian to finish his career as 27-foot long jumper and 57-foot triple jumper both indoors and outdoors.

Jeremy Fischer: Jeremy Fischer is the Lead Coach and Director of the USATF residence program in Chula Vista. He is the lead instructor for USATF Coaching Education and runs coach's education clinics all over the world. He also serves on staff for the Paralympics and was the coach for Rio 2016, and world championships in 2013 and 2015.

David Kerin: Dave Kerin currently serves on USATF's High Performance Committee in the role of Men's Development Chair and as Chair of Men's & Women's High Jump. He is perhaps best known for his paper, "What is the most direct means to achieve

strength gains specific to the demands of jumping events?” The piece was the first to propose and defend the primacy of eccentric strength for the jumps. Although Dave is now retired from collegiate coaching, an athlete of his has held the NCAA Indoor & Outdoor Championships records in High Jump for the past 16 years. Dave continues to be a coaching education instructor and mentor to coaches across the U.S. and internationally.

Nick Newman: Nick Newman is currently the Horizontal/Vertical Jumps and Multis Coach at the University of California, Berkeley. He is the author of *The Horizontal Jumps: Planning for Long Term Development* (2012). His standout success to date was the development of Blessing Ufodiana to a mark of 14.06 meters and the Top 2 rank in the U.S. as a triple jumper in 2011. He graduated with a master’s degree in Human Performance and Sport Psychology from California State University Fullerton, and is a former collegiate and international long jumper for England. He is certified as a Strength and Conditioning Coach, and Technical Coach through the USTFCCA.

Randy Huntington: Randy Huntington is one of the world’s foremost track and field coaches. During his 40-year career, Randy’s coaching and motivational skills have produced world-record breakers, Olympic medal winners, and champions in several countries. He is currently the Head Coach for Chinese Athletics, where his athletes are among the greatest track and field competitors from America, China, and South Korea. For instance, Soonok Jung broke South Korea’s longstanding long jump record and Tony Nai broke Taiwan’s long and triple jump records. At least one athlete that he’s coached has competed in every Summer Olympic Games since 1984.

A high point of Randy’s career came on August 30, 1991, in Tokyo. That night, his protégé, Mike Powell, jumped 29’ 4 ½” to break a 23-year record that was believed to be unbreakable. Another great moment occurred when Willie Banks became the first man to jump over 18 meters at the 1988 Olympic trials.

Brian Brillon: In his 16 years of experience, Coach Brian Brillon has coached at the high school, Division 3 NCAA, and Division 1 NCAA levels. Brian is most notably known for coaching Michael Hartfield at The Ohio State University. While there, Hartfield broke Jesse Owen’s legendary 77-year-old school record in the long jump and captured third place at the NCAA National Championships. Brian’s background in sports medicine and as a practicing massage therapist gives him a multidisciplinary approach to coaching.

Question 1:

SimpliFaster: “Special exercises” are described as those that bridge the gap between traditional exercises and event-specific technical training. An example could be a single-leg hang power clean, which could be deemed a more-specific variation for single support disciplines such as the horizontal and vertical jumps. Can you describe your philosophy on weight training for jumpers, including exercise selection, specific protocols you find beneficial, and your view on “special exercises?”

Travis Geopfert: For years, I have personally been fond of the effectiveness of combination/contrast or potentiation training (whichever you want to call it). I personally believe that varying weights for varying reps, combined with a plyometric movement, is the best way to maximize power output. I first learned of this training philosophy in graduate school at Central Missouri State. I was a GA with Tucker Woolsey at CMSU and learned from him and one of his mentors, Brad Mears (a former thrower and professor at CMSU), the importance of this training principle.

Over the years, our lifting programs have evolved and I believe we are now the most effective we've ever been, thanks to our current strength coach, Mat Clark. I am privileged to have coached Mat at the University of Northern Iowa and now work with him as a peer. He has taken our belief in this combination lifting to another level and he does a fantastic job of finding individual event-specific ways to maximize the power output of all our athletes. Here is a direct quote that Mat wrote to me in an email last year, which I think does a good job of explaining our thought process with this type of lifting:

“Here's the percentage template for the next cycle. The main changes are that each main strength movement is in combination with a maximum power and speed movement, so most exercises are groupings of three related movements that are heavy and fast. The goal is to train maximal rate of force development and the stretch reflex together. Percentages for the main strength movements are similar to the last cycle, but are used as an RPE (rate of perceived exertion) scale, meaning that the focus will be on moving fast and efficiently, so the exact numbers assigned will vary according to how they feel that day. The ‘No-Set’ addition to the hang pull + hang clean combo and hang clean + split jerk combo means that they will move fluidly from one to the other without the chance to reset. This means that [they] have to be able to consistently exert maximum force from an incredibly stable catching position.” ~ Mat Clark, University of Arkansas Track and Field Strength Coach

Dan Pfaff: I think the use of weight training in jumping events should be based on KPI factors for that athlete, time of year, stage of development, injury history, and load effect on compatible/complementary factors in the main programming. It should be an adjunct in most cases, not a driver per se. We safeguard sprinting and jump-specific work all year long. I believe in using lifts that utilize a series of joint

actions and deeply involve synchronization, rate coding, frequency of firing factors, magnitude of firing indices, motor unit numbers, etc.

I guard athlete energy and time ergonomics closely, so we do a smaller number of exercises but strive for KPI themes with each one. Absolute strength, power output, contextual foundations, and injury prevention are some of the main influences on exercise selection. We try to stay with ideas and concepts that have produced positive trends within our group for years or for that athlete in previous seasons, if possible.

We do experiment with ideas and concepts, but only after deep collaboration and discussion, and then only at specific times of the year—still safeguarding the generational design of the daily program. I struggle with the specificity of movement concepts at times as I feel like the purpose of the exercise may not lend itself to movement specificity. If motor unit number is a factor then, in my experience, specificity decreases in importance.

Nic Petersen: Our Strength and Conditioning Coach, Matt Delancey, answered this question. He works with all our jumpers and does an incredible job.

1. Squat/overhead squat assessment to find major dysfunction

Address dysfunction – Do this prior to training so the athlete can train with better alignment. This also creates a situation where the athlete recovers faster from training because of less tissue damage associated with better alignment.

Key general strength/power exercises for jumpers:

- Snatch
- Clean
- Squat
- Vertical hamstring

Use variations of these exercises throughout the training year to prevent plateaus.

Jumps Specific Strength Exercises (JSSE)

1. Step-up variation progressions - Higher boxes to lower boxes. Moving heavy weight fast on all heights. Stay tall through the hips and keep the core locked in.

2. Eccentric work is a JSSE in my thought process. Proper posture and alignment is essential. Start from a :03/:03:01 tempo to a :05/:05:01 tempo with body weight then back to the :03/:03:01 with weight once they've mastered the BW, then progress the time with weight.

Weight room plyos are debatable for me:

- Flying step-ups
- Cyclic turnover drill with back foot on box

The most important aspect is what we briefly discussed earlier: Simple Stuff Done Savagely Well!!!

Jeremy Fischer: My philosophy is that weight training varies from athlete to athlete and depends on gender, anthropometric measurements, and training age, as well as general age. I also analyze the athlete's history of training and how long they have been training with me. I believe that, as with any formation of a training design you do with athletes, you need to have a baseline assessment of the athlete: their strengths, weaknesses, perceived knowledge, technical acquisition, and background. I'd like to say I have a general system, but I don't. I do follow guidelines for using a sound and proper technique, going through the progression of the lift, and going from general to more specific or "special" exercises as the season progresses.

I implement "special exercises" or strength-specific exercises and believe in their value. I think the timing of implementation becomes one of the more important factors in including these exercises, and analyzing movement and speed of movement in determining their correlation to the specific movement they are trying to complement.

David Kerin: I am under the assumption that we are talking about higher-level athletes as opposed to beginners. Accepting that, much of what is prescribed for such individuals can be translated for appropriate use with developmental athletes.

A pivotal concept needs to be explained and is more important than anything else that follows here. A jump executed off a prior approach run is not best viewed as a jump. Jumping events are more correctly described as deflections off the ground; this being a more user-friendly concept than getting into force vectors.

In the U.S., we continually raise generations of "pushers." Athletes grow to misunderstand the mission as being one of pushing off the ground. Cartoons, sitcoms, the movie industry, school PE classes, well-intended but under-educated coaches, parents, and society in general all serve to misinform athletes about the mission. A standing jump hasn't appeared on the Olympic schedule in 100 years. The reality is that a running jump results from a collision with the ground, and the nature of the collision dictates the result. So, seek out "special exercises" initially to ameliorate this flawed understanding and its faulty motor programs.

"Special exercises" to me mean both non-traditional and event-specific. There are "special exercises" to detrain "jumping" in favor of pre-recruitment and stiffness at desired joint angles, and "special exercises" to detrain inhibitory factors that are psychological and sensory-organelle based. For example: landings as compared to

rebound jumps; isometrics as opposed to more traditional weight room work; max/near max strength work as viewed against lower load and power work.

Isometric work, along with tendon training and health, are current interests. They are natural progressions from previous research establishing the primacy of eccentric strength to a jump. If you think about the ROM of a half to full squat versus the ROM at the knee during run-up and at plant/takeoff, you may see what I am getting at. I am not saying to throw out traditional lifts or stretch reflex/plyo work, etc., but consider their timing, dosage, and contribution to the mission, and then consider my description of “special exercise.”

My apologies for not throwing in some uniquely titled, proprietary sounding, special sauce exercises here. There is no magic bullet to my view. Rather, I encourage the reader to look at the bigger picture, starting with the demands of the event and where the athlete falls short, and then prescribe from there.

Nick Newman: My weight room philosophy blends the use of traditional, non-traditional, simple, complex, obvious, and not-so-obvious methods. Although programming is predominantly based around event-specific requirements, individual needs play a large role as well. Understanding where the athlete falls along the speed-strength or strength-speed continuum is critical for program design.

For me, field tests play a crucial role. For example, bounding tests, short approach jump distances, and specific sprinting tests will determine where the weight room emphasis should fall. The ability to squat the house but achieve mediocre bounding, or jump short approach distances will serve little purpose for the end goal. We must learn what weight room markers relate to the event-specific performance for each individual.

This leans more toward strength protocol than exercise choice. For me, important exercises are the power clean, clean pull, deep/parallel/quarter squat, and step up. I am quite basic here because I feel it is important that technique not be limiting during maximum strength or power development. Simple and direct exercises serve the best purpose. Athletes who perform these exercises well (whether it be with high resistance or light/moderate resistance) tend to have the best event-specific performances.

My programming is progressive in design. I know where I want my athlete at competition time, but all paths to that goal are not always the same. Generally speaking, the ratio of work shifts from general strength/technique to maximum strength to RFD and speed/strength to reactive strength over the course of the preparation period. However, as previously discussed, the length of time spent focusing on a particular quality differs for different athletes.

Regardless of an athlete’s dominant quality, power development is always a priority,

specifically the speed, effort, and efficiency of movement. I am lucky now to have regular access to the Keiser squat. This enables us to determine the optimal resistance for peak power output for each athlete on a daily basis. We can determine where on the power curve we want to focus. This is a superb tool and we use it multiple times per week.

I include transference/“special exercise” selection all year in progressive ratios. For this, I use a host of simple and complex unilateral exercises. These provide excellent variations in stimulus for developing specific neural adaptation related to the takeoff mechanism. I also find that these are excellent psychological tools for jumpers.

I am also in strong favor of complex training and will use it with most, but not all, athletes. I have specific progressions for complex training that I like to use. For example, during early preparation I like a deep squat coupled with a deep-seated box jump. Complexes progress from simple to complex and increase in movement specificity toward competition.

In a nutshell, my strength-training program is balanced; stresses variety, quality, and intensity; and emphasizes the athlete’s strengths while minimizing their weaknesses. I want my athletes to have high levels of general strength, as well as the highest relative power levels possible.

Randy Huntington: I would say, after years of doing this, that I believe the weight room has no “special exercises” that directly influence performance. Having said that, I still use some exercises that, at the very least, strengthen those movements necessary for setting up better sprinting and jumping. Most of my weight training consists of what today is labelled “triads”: high force/low velocity with power coming from the force component, followed by high velocity/med power with power coming from the velocity side of equation, and then finishing with high force/high velocity where I blend the power between force and velocity.

Here is a partial list:

- Sanyevs
- 90-degree step-ups
- Skipping with barbell
- Single leg 20cm step-ups
- Keiser squat
- Keiser rack 10 second double leg hop
- Push jerk into step up
- 20-40cm box down ups w/barbell
- Keiser single leg press
- Shuttle MVP
- Keiser FT and a host of single response hurdle takeoffs into pit, etc.

Brian Brillon: I feel that weight training, by implementing schemes of strength and power, are important in the training component of jumping. Gains in the weight room can have some positive effects on the performance of the athlete. Olympic lifts and their variations are important for the expression of power and strength that the athletes must possess to sprint and jump. I believe that static lifts not only increase the strength of the muscle, but also provide the joints of the kinetic chain with the stability that is needed while sprinting and jumping.

My philosophy is that the weight room aids in the construction of a better engine for the athlete. Having said that, the weight room must be the slave and not the master in the training of the jumps. An increase in the numbers in lifting must be transferable to the gains that must occur on the track. This is not to take away from what happens in the weight room, but I see some athletes who think that, if they only lift more, things will be dramatically different on the track.

I believe the magic in the weight room is a by-product of a well-designed methodical periodization plan. Commonalities between desired accomplishments on the track and lifting should be considered. For instance, if it is a max velocity day on the track, I would prescribe Olympic lifts that would incorporate shorter movements to give a clear signal to the nervous system as to what we are trying to accomplish. These lifts would be above the floor and either below or above the knee. A training week would typically have two or three high neuro days, with Olympic and static lifts prescribed on these days.

Every coach has some “special exercise” that is beneficial to their athlete to help find the missing pieces to the puzzle. I tend to think more as a generalist: I believe in the solid principles of a sound concept of cause and effect in track. It will only lead to frustration if you just look at the moment of error without taking into consideration the concept that preceded it and then try to plug in a “special exercise” to fix it.

Question 2:

SimpliFaster: Technical training for jumpers can take on many forms and can be either overly complex or simple. What is your philosophy on technical training? How do you establish a technical model with individual athletes? What is the general construct of your technical sessions?

Travis Geopfert: Overall, I believe our technical training is pretty simple. Ultimately, everything we do is a technical session. We are consistently reminding our athletes about the basics, whether that be in the warmup, interval training, specific technical sessions, or even the cool down. In track and field there are some fundamental rules across all events that I believe are imperative to success.

The first and most important, in my opinion, is postural integrity. Keeping our body upright and in good position to produce maximum power output in all the jumping and sprinting events is something that we are constantly working on. Hurdle

mobility, sprint drills, acceleration drills, flight phase sprint mechanics, circle drills, bounding sequences, box jumps, hurdle hops—you name it. Across the board, in every session we do, we always want to have our torso upright and our hips underneath us to strike the ground with as much force as possible.

That proper foot strike on the ground is something that we are always looking at in all jumps. Where our foot is in relation to our center of gravity is something that we are always evaluating in every sprint contact and takeoff that we do. These two things, along with a strong emphasis on rhythm, are the three fundamentals that I believe most of our technical sessions break down to.

In terms of individualizing practice, every athlete certainly has different strengths and weaknesses that need to be understood and addressed. That, in a nutshell, is our philosophy: Build on our strengths and progressively eliminate our weaknesses. However, every technical model that we work on comes down to one thing, and that is creating consistency. If we can establish strong patterns of quality posture, foot contact, and rhythm in all our jumps, then we are giving ourselves a good chance at having success from a technical standpoint. Then, as we continue to develop and add speed and power, we have the foundation that can handle and convert it effectively.

Dan Pfaff: I have not had a lot of success with drills as executed by many leading jump coaches worldwide. I find it much more productive to do systematic teaching progressions of the actual jump itself. I prefer to do real-time, real-task motor education work. We teach towards a biomechanically sound model based on the common denominators noted in world-class men and women jumpers.

We teach runway approach dynamics at all times, using acceleration, speed, and alactic sessions as classroom time to implement the shapes and components of the approach. We start actual runway construction by late November and work on it once to twice weekly all season long. We demand steering and targeting accuracy from Day 1, and hold athletes very accountable for this and the biomechanical landmark executions.

For jump-specific work, we start out with four to six step jumps with and without landings. We teach unique postures for each step of the short run jump and demand sound execution of penultimate and takeoff mechanisms. I think too many athletes and coaches use short run jumps with faulty postures, contact times, flight times, and poor acceleration curves. In turn, this can create serious viruses that are difficult to eradicate when one goes back to longer approach runs and jumps.

As mastery progresses, step numbers increase. We do the bulk of our jump-specific training from 10-14 steps depending on skill levels, time of year, and health factors. We do technical training specifics twice a week. I go to younger athletes three times a week, because their resilience factors are higher and forces generally cause less stress on joints and connective tissues for that age group.

Nic Petersen: Technique is very important. I believe that the more technical you are at your event, the easier it is to compete at a high level. When you're more technically proficient, it keeps you healthier through training and competitions. I also believe technique is an individual thing. Each person is different and each person has their own strengths and weaknesses. Therefore, we need to tailor the technical model around and toward every individual. I say all the time that I coach the person, not the event. I don't want to have a technical model that doesn't fit the person—trying to jam a square peg into a round hole, so to speak.

From there I try and keep the technical model as simple as possible to ensure the athlete can be as successful as possible. While we tailor that simple model to each athlete's individual strengths and weakness, I would say we train strengths much more than weaknesses. Don't get me wrong—we fix weaknesses—but I don't want to spend so much time fixing somewhat that it takes away from what makes the athlete fly.

My technical sessions vary throughout the year as to what we are working on, but we are always doing basic technical stuff year 'round. We start small, doing very easy technical components. We do drills that may mimic specific parts of jumps but, as a rule, I like to do more technical training of the whole versus the part. Take the long jump, for instance. We start working on basic penultimate drills in Week One and we progress to short jumps from a very short run and move the run back. For a technique session, specifically, if we have a specific issue or theme we are trying to work, then we train that technical theme throughout the session.

Jeremy Fischer: Technical training should follow the pattern of simple to complex, and low intensity to high intensity, and always follow a movement pattern of efficiency and accuracy. As the season begins, we do technical training that has low intensity and trains the kinematic chain and muscle recruitment patterns. In essence, we prepare the body to handle greater forces at higher velocities. I believe in training the reactive strength, pushing the capacities of the tendon-ligament-muscle sensory (GTO, muscle/spindle, Pacinian corpuscles) farther, and creating a motor learning pattern that enables coordination of appendages.

We again analyze the technical deficiencies of each athlete—there are basic technical models we accept as a baseline and each athlete changes or adjusts their model based on potential success and efficiency for the future. I believe all correct technical models are first created with proper running posture and form. We do not move onto any advanced technical models until the athlete can run correctly. Once we've established a good running model, then we can establish a set of drills or sequencing of technical training to match any technical deficiencies.

David Kerin: What are the general and specific demands of the event? Jumps require horizontal velocity; an optimized force vector viewed at the COM's position prior to grounding of last foot through ground release. There are in-flight

considerations as well, but let's leave that for now. They need to accelerate optimally and to apply the resultant kinetic energy developed optimally.

Years ago, Brooks Johnson coined the term, "the Critical Zone," when speaking about races and field events. The concept is a good one in that there would appear to be a pivotal moment in an event. But that moment does not occur in a vacuum. Rather, it is dependent on the moments that precede it. Honoring Newtonian realities, a competitive effort is a linked series of moments, each building on the earlier. Hence, my philosophy on technical training is one of sequential mastery beginning at the start of an attempt.

However, the athletes I work with and/or advise most often have a personal coach, so my support takes the form of patching holes as opposed to building a better dam. Ideally, I would like to see optimal approach initiation and elimination of stylistic components. Acceleration and postural integrity should be optimal as the athlete progresses thru the run-up. In the event area, I spend the most time with (high jump), I can usually trace failed attempts back to flawed executions in the early and or mid approach. While vaulters often clear high bars from less-than-optimal takeoffs (inside or "under" at plant), the other jumping events don't have a pole to ameliorate things.

As far as technical sessions, I find myself favoring less full-approach work in practice and, for that matter, short-approach or so called "part-whole" work. Take away the 99th percentile athlete and the beginners. With the pool of athletes that's left, the biggest fish to fry are the earlier discussed misconceptions about jumping, and specific strength, posture, and athleticism. When you spend a lot of time trying to fix technique without first addressing these issues, the time is misspent and injuries often happen. There needs to be work on technique, of course, but in the proper global perspective.

This is a challenge, given our development system here in the U.S. Many nations look longingly at NCAA programs, as having no costs for our national team. But there IS a cost.

How many NCAA jumping event coaches are head coaches at their school? Not many, so we are talking about assistant coaches accountable to a head coach. Now take a highly recruited high school athlete; one who comes to college with a PR that is certain to score at the conference championships and perhaps at the NCAA Championships. In your role, you determine that the individual is getting by on talent and not mastery. Because of this, you know that they have an increased risk for injury. It is your belief that, given the right set of circumstances, they could see international success in their event in the future.

How many head coaches are going to be agreeable when you tell them that this full-ride kid, who has certain conference meet points and is a likely multiple All American, would be best served by purposeful under-performing or not performing

for six to 18 months while you detrain the faulty program they came to you with? And that's before adding in the typical physical strength and athleticism development needs. Not having a collegiate affiliation, it's easy for me to say this, while a college coach needs to balance a number of concerns. I am just suggesting that you look at the facts and come up with a plan that considers an individual's athletic career and their four-year college career, along with the season and or year at hand.

Many coaches tend to rush through developmental phases. When an athlete shows an initial adaptation to, or correction of, a technical concept, many coaches take that as the signal to move on to bigger and better things. True mastery requires stabilization of technique. Another concern regarding technique instruction is the statement, "I can't coach what I can't see."

In the later piece, "Jumps Roundtable: Approach Accuracy," I speak to athletes who are challenged by visuospatial skills. Here the problem is a coach lacking in the same skill set. Go and search for "mental rotations test" on Google. After taking a few of these tests, how did you do? If the answer is "not so good," then as a professional it behooves you to seek out the means to improve and or accommodate that status.

I believe that the best coaches have three-dimensional vision/recall. The use of video replay is one way to level the playing field. I am a big fan of video use by coaches, but not by athletes because I have a fundamental concern with reinforcing a faulty motor program by showing someone their faulty motor program. However, for coaches it's a way to pick up on things not observed in live action.

Nick Newman: I'll address the use of technical models first. Although each athlete has different physical qualities and anthropometric measurements, there are several technical consistencies among elite jumpers. I routinely use approach, takeoff, and landing models, and have narrowed it down to three to four per event that I find ideal for most jumpers.

Technical jump and approach sessions make up a large chunk of my jumpers' training programs. They provide an essential link between the training components and event-specific performance.

Technical teaching and transfer happens within almost every aspect of the program and, while specific technical sessions don't always involve jumping into the pit, they should remain specific to the requirements of the event.

Components of the program, such as acceleration and speed development, multi-jump and multi-throw training, weight lifting, tempo running, hurdle mobility, and, of course, technical jump sessions can all emphasize important aspects of technique. The following are examples of teaching emphasis and possible transfer:

- Approach rhythm/timing/posture
- Approach speed/top-speed mechanics
- Penultimate stride action: roll, push, and extension
- Takeoff plant: extend, fast paw down and back, push, and extend
- Free-leg action: parallel thigh block, lower leg tucked under, hips forward
- Flight: tall and long body throughout
- Landing: hips and feet far forward with feet together. Dig heels down into sand and pull with hamstrings.

Approach development is of major importance, of course. I have written a lot on how to improve approach accuracy both from a skill and psychological perspective. We begin establishing the approach early in preparation and continue to perfect it throughout the competitive season. As no two approaches will ever be the same, the kinesthetic awareness developed through training far outweighs the importance of check marks and other uniform methods.

Technical development for the takeoff, flight, and landing mechanics are practiced early and often. Although there are many options for drills and exercises, I generally keep technical sessions very simple and specific. I personally do not find the majority of drills useful or transferable.

I have a systematic approach to progressing short approach jumps. Generally, during short approach sessions, the approach length increases during preparation and begins the blend with full approach development. However, it is rarely smooth sailing regarding progressions and if an athlete is not achieving the required positioning, timing, and outcome, then a digression will take place.

Ideally, we start technical jumps at four steps and gradually progress to four to six steps shy of the full approach number. Full takeoffs without landings will always occur during full approach practice while on the runway. Gradually introducing more speed to technical jumps while remaining in touch with full speed approaches is a great way of blending performance and technique and, over time, enables kinesthetic development awareness qualities.

A short approach technical session during early preparation may include the following:

- Video review of technical model related to the session goals
- Part Technique – Breaking down 1-2 aspects of technique (15-20 mins)
 - Skip knee drives
 - Takeoffs from low box with knee drive hold and posture emphasis
- Whole Technique – Short approach jumps – (Board Accuracy included)
 - 4 stride approach – Takeoff and hold position – 4x
 - 6 stride approach – Takeoff and land – 4-6x

Randy Huntington: My technical models in jumps are an extension of proper sprinting. Athletes learn to sprint first and then integrate the sprinting into the approaches with integration tools such as sleds, 1080 Sprint, weighted vests, ankle and wrist weights. Of course, they also learn to break the approach down into its parts and reconstruct the whole approach over time. In the long jump, we aim for understanding visual control/steering and integrating it as quickly as we can through various drills. Our focus is on posture position and action at the appropriate distance from the board to execute a proper takeoff. In the triple jump we do the same thing, with two additional factors: the posture difference and board position at takeoff.

Brian Brillon: Technical training should be viewed as the body striving to move in a fluid state with the least amount of deviation from Sir Isaac Newton's laws. The technical model should start slow, with a progressive mindset. My athletes would tell you that I say, "If you can't do it at zero miles an hour, you can't do it at 100 miles an hour." We will bleed the technical aspects faster when the athlete becomes proficient at solid reps with a distinct change in their form.

I start technical training for the jumps on Day One. I look for foot patterns at takeoff with simple skipping drills that lead to progressive bounding skills. I then look at posture on the track and in flight. I believe if posture is not correct then the limbs will not move with efficiency in flight. The technical model must fit the needs of the athlete to achieve high levels in the sport.

Technical training requires some form of mental training to the athlete. Overthinking technique can be the death of the athleticism for an athlete. Care must be taken to ensure that athletes don't change technique too close to major competitions. It is imperative that they are strong "under the lights" of competition. Too often in technical sessions the athlete becomes paralyzed with analysis. As a coach, you must find simple cues for the athlete to perform complex movements. And the more that you can give external cues instead of internal cues, the more you can help the athlete perform a given task.

For example, if an athlete is struggling to get their knee up off the board in takeoff, try not to focus on the body part, but what action you want. A sample cue could be "explode from the ground" or "accelerate towards the sky." Saying this could get the athlete to do the action necessary outside the body; to facilitate the body getting naturally into the correct position. A coach should have an idea of what they are looking for in their technical model and explain to the athlete how to achieve this. If the alignment of coach and athlete is in sync, great things can happen.

Question 3:

SimpliFaster: How do you assess the key physical qualities you are aiming to develop from your program? What specific testing protocol do you use and when do you implement it? In your experience, what testing and test result combinations seem to provide the most accurate depiction of event-specific readiness? Are there specific testing numbers that you use as a guide? If you don't use a specific testing protocol, can you discuss how you evaluate your athletes and program throughout preparation and competition time?

Travis Geopfert: In the horizontal jumps, specifically, we periodically test our standing long jump and 10-meter fly. Although our jumpers don't fully realize it, I am consistently monitoring their 10-meter fly almost weekly in conjunction with different drills that we do. Additionally, we often test our triple jumpers in a standing triple jump and 5 bound test to measure power output.

I like the testing protocol of a three-step vertical in the high jump and, admittedly, I need to more consistently test that. However, we do have 15 years of SLJ, STJ, and 5 bound testing to compare to and assess an athlete's readiness. Obviously, when an athlete has a best or near best in one of these three, you know their power output is there. If an athlete is under one second (10 meters/second) in the 10-meter fly, they are ready to do big things.

I know it's kind of odd, but I also believe I can see in my head when an athlete is ready, based on their ground contact time even in the simplest movements. I've watched guys do basic warm-up sprint drills in their flats numerous times and said to myself, "They're ready."

Dan Pfaff: We feel like everything we have on the menu addresses physical qualities and needs monitoring of some sort. If we have selected the right KPI factors and ranked them properly, the data pools should show a positive trend over time, both for the entity in question and the overall competition effort. The density of consistency should also show a positive trend in these subsets and performances.

Determining the KPIs comes from experience, in my opinion, and short experience, and using a system from a trusted mentor or set of mentors will give you a sound platform to study from. Obviously, acceleration abilities, top end speed parameters, and jump-specific metrics are main drivers for this process. We use a generational grid for training qualities and first generational work gets the strictest analysis and data collection time.

One overlooked and under-analyzed physical quality is athlete health over time. I see the same injuries and illness factors occurring with the same athletes and at the same time of the season far too often. It is not bad luck. It is a failure to monitor and seek solutions.

I used to have dedicated testing blocks and time frames when I was a younger coach. Frustration and poor statistical patterns led me away from this approach. We now do most of our testing at comps in the form of film analysis and actual results. We test training menu items during the cycle within the prescribed programming format and perform various medical tests daily; sometimes before training, sometimes during training, and quite often post training. We never do one-off, ad hoc testing. If we cannot test it often and consistently, then it is not tested.

The No. 1 test for me is how athletes execute during competitions. Seeing a positive trend on defined metrics is critical for readiness analysis. The same goes for consistency of meet results both within the comp and over the season. We find approach velocities and accuracy of approach readings to be solid predictors. The ability to consistently program shapes during the entire approach is also another KPI factor but, for some reason, it's not a keynote for many athletes or coaches.

We also have formulas that will evolve over time for each athlete with the various short run jump parameters in training. Distance jumped on the SRJ is weighted against accuracy and technical landmark execution grades. So, a huge jump with a foul and poor posture during the penultimate step would have a lower grade value. A gassed-up 12-step jump with poor shapes but a huge distance would likewise be graded down. Accountability to the agreed-upon dynamics is critical and not often managed well.

We have grids we use as the season plays out that show how early season meets feed mid-season results, and how that leads to culminating results at the end. We do not chase absolute result progressions in our competitions. We can't control poor facilities, adverse weather, travel disasters, life stressors timing, etc. Therefore, we demand that athletes keep records of headwind PRs, cold weather PRs, crosswind PRs, extreme heat PRs, fast runway PRs, slow runway PRs, 1-meter board PRs, 3-meter board PRs, time of season PRs, sick as a dog PRs, jetlagged PRs, family chaos PRs, etc.

Nic Petersen: We use a few different tests in our program. But, in all honesty, we don't test very often and not at all during competitive cycles.

Our main tests are the following:

Standing Long Jump

- Men: 3.20 and beyond
- Women: 2.70 and beyond

Standing Triple Jump

- Men: 10m is the goal; 11m elite
- Women: 8m is the goal; 9m elite

Standing 5 Bounds

- We use this as a guide. What an athlete jumps in this is about what they are capable of triple jumping.

Fly 30m

- Men: sub 2.85, goal 2.80 or below
- Women: sub 3.20, goal 3.10 or below

Fly 100m

- Men: sub 9.90
- Women: sub 11

Overhead Backwards/Underhand Forwards Shot Throw

We do some of the Quad testing and we score the four events. We try to Quad test three times, especially in the fall: once after the first six weeks, once after 12, and then right before we leave for Christmas break. However, one thing about testing is that we only rest for testing once, and that's after the first six weeks. Other than that, we may test and not be fresh. Therefore, some people may not believe this is true testing.

We also measure some basic short jumps. I test the 10-step long jump, and we also test the four-step HOP HOP STEP JUMP (gator drill). We use these as mock competitions, so these get heated and people will get after it. We compete during short run sessions on occasions where we may not measure things, but just mark jumps and see how far we can go. I try and use competition a lot.

I think testing is a good gauge for fitness and speed, but not everyone is a good tester. The thing about testing is, if you don't do the tests a lot, you need to teach the tests too. I would say some of my "tests" are more about taking specific training tasks and completing them than "pure" testing.

Jeremy Fischer: I use testing protocol and analysis all the time. Of course, there is the standard Max Jones test (30-meter standing long jump, standing three jump, overhead shot), with the addition of underhand shot and a 150-meter. We do analysis with the 30-meter fly, laser analysis of runway speed, five-meter segment runway analysis, weight room strength analysis, power analysis using Keiser equipment, force plate testing of takeoff, force plate analysis of phase force, blood analysis, saliva cortisol level testing, sleep analysis, and FMS.

The data allows for me to keep tabs on training and the progression of training, and also maintain a check and balance on training. I know when to push harder or back off training. As far as preparedness of athletes for meets, that is the million-dollar question.

I start to see some regularities from athlete to athlete, but for the most part it's what they are doing in practice that shows me preparation readiness. Are they executing their technical positions and how far or how high are they jumping? If an athlete jumps far in practice, they jump far in the meet. If they run fast or bound far in practice, then they jump well in the meet. And, finally, they must be as healthy as possible when they're on the start line or runway.

David Kerin: Meet performance is the ultimate test. We need to eliminate the learning curve to tests before their results can be valued. A competitive environment provides greater value to testing's results. The legendary LSU Fall Jumps Testing is a good example. The accuracy of data collected and accurate record keeping in the present, for the year, over an athlete career, and over a coaching career are all important.

Yes, over the years there are benchmark testing numbers that have been shown to equate to event performance levels, but like the "special exercise" question, there is no magic bullet. As stated above, meet performances are the ultimate test. If I had to choose a favorite test, I like OHBs for their traditional value. But I see further value in that I can instruct to the medball or shot as being reflective of an athlete's COM and the rise of the implement simulating the rise of the COM. More specifically, I like OHBs for high jumpers because of the reflection of in-flight positions during mid to late throw.

The opposite of this is also found in high jump. Every year or so (going back to the '80s for me and Michael Cooper of the LA Lakers), there is an article about how the NBA dunk champion would be a world-class high jumper. These erroneous statements have roots in their author's misconception of the mission as discussed earlier. For a specific example, and to bring it back to testing and physical assessment, consider Dwight Stones. He was a holder of the world record for MHJ at heights that would still be competitive today. Yet he has admitted that his measured SVJ was only around 30 feet.

Nick Newman: The key physical qualities I look for include the ability to accelerate smoothly and explosively, maximum speed capabilities, reactive strength and maximum power outputs, simple and complex coordination, and overall freedom of movement. It is essential to monitor these qualities as often as possible throughout the year. Both subjective and objective assessments occur daily in some regard.

As far as specific testing protocols, I have previously fallen victim to the temptation of systematically testing everything I could think of. Collecting data is fun, as are the testing sessions themselves. However, over time I realized many of the tests were redundant and correlations with performance were inconsistent. I also found that too-frequent or overly rigorous testing protocols can take the edge off competition intensity and focus.

As a result, I shifted toward a testing protocol that could occur during regular training sessions. As the training emphasis progresses throughout the year, so does the testing. The most important test, of course, is full-approach jumping during competition.

The tests I use, along with the corresponding elite standards, are as follows:

OUTSTANDING MARKS (JUMPERS)		
TEST	MEN	FEMALE
30m Sprint (3 pt)	3.70 - 3.85	4.05 - 4.20
10m Fly Sprint	0.85 - 0.93	1.00 - 1.05
150m Sprint	15.60 - 16.00	16.70 - 17.10
Standing 4B&J	17.00 - 18.00m	14.00 - 15.00m
Max 4B&J	21.00 - 22.50m	18.00 - 19.00m
Standing 4H&J	17.00 - 18.00m	14.00 - 15.00m
Power Clean	1.7 xbw	1.5 xbw
Deep Squat	2.2 xbw	2 xbw
10-step LJ/TJ	7.50m / 16.00m	6.50m / 13.50m

Chart 1: The nine tests used by Nick Newman, Horizontal/Vertical Jumps and Multis Coach at the University of California, Berkeley. These tests have proven the most relevant to athletic event performance. The chart also includes elite standards for both men and women.

As previously mentioned, I have used many tests over the years. I have found that the ones in the chart are the most relevant and correlated best with event performance.

Speed testing with the 30-meter and 10-meter fly blends to full-approach 11m-6m, and 6m-1m assessments closer to competition. Bounding tests gradually increase entry running steps, as this coincides with my horizontal plyometric training progressions. Short-approach jump testing gradually increases in stride number and can reach up to four to five strides shy of the athlete's full approach.

During competition periods, we maintain max strength whenever possible with very short weight-testing sessions as we'll assess speed, bounding, and power output numbers when possible.

Randy Huntington: I use only a few testing protocols these days, although I measure almost everything. I still use a 30-meter fly for speed and a 5R 5L from six steps distance for jumping. I also continually monitor the speed of the last two five-meter segments in approach year-round.

I test Omegawave every morning with each athlete. Using this, along with observation and listening, I then change the workouts accordingly.

Brian Brillon: When I coach jumps, I look for the expression of speed and power in the athlete. We stress these components daily in training. I use a revolving four microcycle, with the fourth week as a testing week. We drop the volumes that week and have the athletes compete against their teammates and their personal bests in a battery of tests.

I believe competition in practice is a must before you go "under the lights." Not only does this provide opportunities to showcase expressive elements of the event, but it also gives rise to meet scenarios. That fourth week sees testing in the standing long jump, standing triple jump, double-double, overhead back shot toss, between the legs forward shot toss, 30-meter three-point stance, and 30-meter fly with a 20-meter acceleration. When we get into the specific prep and comp phase, we also do an intersquad short-approach jump competition.

I think all the tests give the athlete the confidence to see the progression provided by the training. The specific test that I see give rise to the most accurate depiction of the event is the short-approach jump. The test jumps are from 12 to 13 strides out because I find that the jumper can add on a foot and a half to two feet from there to what their full-approach jump would be. It gives the athlete a ballpark figure that gets them excited for things to come.

For example, I had a freshman that wasn't understanding the concept of a competitive practice. I challenged him by saying what he would jump in testing would be two feet off from what a full approach would be. Previously, the athlete was jumping 21 feet from 12 strides in practice. His full-approach jumps in competition were a foot and a half more than his 12-stride marks. A week before Big Tens, the athlete jumped 23 feet 2 inches from 12 strides. He became the Big Ten champion a week later, with a jump of 25 feet 2 inches.

Question 4:

SimpliFaster: Specific coaching strategies and philosophies regarding approach accuracy have been written about for some time. Please describe how you tackle the issue of approach accuracy in practice and competition. Discuss your views on the psychological aspects of fouling and how you address those issues.

Travis Geopfert: This is something that we are constantly working on and need to get better at. Dan Pfaff told me last year that, if your athlete is fouling more than 30% of their jumps, then as a coach you're doing something wrong.

Jarrion Lawson specifically has worked very hard on this and is getting better. His visual steering coming in as a freshman was a little "off." There were a couple of times during his freshman year that he would foul by well over a foot and think he had gotten it in. To his credit, over time he has worked very hard to improve upon that.

Of course, there is the simple component of good kinesthetic awareness. We have done numerous drills where we picked arbitrary points to start from on the runway and "steer" to a fair takeoff without fouling, stuttering, or being too far behind the board. I learned from Rana Reider years ago that visual steering starts a minimum of six steps out from the board. With that being said, we have worked hard to get ourselves into a good position that allows us to steer for a positive outcome.

At the end of the day, a consistent rhythm and stride pattern out of the back seems the most effective way to have most of your jumps be fair. We use a checkmark system out of the back that differs depending on each individual athlete's approach distance, and we work hard in our acceleration development and rhythm patterns to make sure those initial "pushes" are consistent.

Dan Pfaff: This is a pet peeve of mine and I am often frustrated by how little attention and discussion there is on this topic. Somehow, the myth of not looking at the board became embedded in coaching culture here in North America. Granted, I don't want a poor head position or a declined visual plane just before takeoff, but I find it incredible that athletes are being taught not to steer or target for takeoff accuracy.

Deceleration at the takeoff is often blamed on visual landmarking. However, our research with hundreds of athletes and thousands of jumps shows this not the case. Research also shows it is impossible to program a repeatable run with no variance in step location during the entirety of the approach. If this is fact, then how do the "don't look" proponents suggest making adjustment while on the fly, so to speak? I think research is needed on visual acuity skills, peripheral vision testing, etc., for this topic to become discussed more in the literature.

I have discussed these concepts at length with Dr. Alan Reichow, O.D., M.Ed., professor emeritus at Pacific University. He is a pioneer in sport vision and strategies. Dr. Reichow has done some very interesting work with NFL receivers that has hugely influenced our practice and research. I first became interested in approach accuracy back in the mid-1980s during a weekend symposium at the University of Iowa hosted by Dr. James Hay and the USATF elite jumps project.

In my role as coach these past 40-plus years, I spent the bulk of my time with inherited athletes; meaning they sought my counsel at their current stage of development. More than 90% of these athletes reported never having been exposed to Hay's work or the concepts he proposed. When I query past coaches, about the same number respond accordingly. I know this concept is out there on the web and presented in several coaching schools worldwide, so I'm not sure why it isn't getting more traction. I have also interviewed dozens of the world's top coaches and their athletes over the past 20 years on this issue and, despite the landmark work of Dr. James Hay back in the 1980s, folks often shortchange this factor or blame fouling on outside variables.

A sidebar research project also shows that many coaches and athletes do not enforce legal jump strategies in practice. It is my opinion that accuracy strategies are very complex skills based on visual acuities. If an athlete is not held accountable for accuracy during hundreds or thousands of practice jumps during the season, then how can we demand accuracy in the heat of battle without corresponding visual strategy experiences?

Our research also notes that pole vaulters and triple jumpers seem to have much more reliable approach accuracies than long jumpers. Perhaps the ramifications of accuracy for these events promote greater subconscious enhancement of visual strategies by the athlete or greater coach awareness of shapes and strategies in these events?

Dr. Hay studied thousands of athletes and approaches at all levels of the sport, including master's, youth, NCAA, high school, and world-class. The pool of subjects was global and gender inclusive. Dr. Hay proposed that there were "two main components" to improving accuracy and consistency. He termed the first "programming," and I teach this as the various sections, postures, rhythms, and kinematics for each step of the run. We call these the "shapes" of the approach. Accountability to these factors is critical. Emotional control, type of start utilized, uniform acceleration efficiencies, and postures at each specific step of the approach are KPI factors for run replication.

The second part of Hay's proposal came from his graphing of step locations for each step of the approach. An intra-athlete scattergram pattern was noted and, from reams of analysis, Dr. Hay proposed that athletes exhibit increased variance in step location during the first half of the approach and then "steer" to the board over the last six steps of the approach. The variance of step location increases with each

successive step of the approach up to this six-step location, at which point the variance reduces uniformly over these last strides. Skilled performers exhibit less variance in each step than novices. This steering phenomenon is influenced by step consistency and kinematics of the preceding run up to this six-step landmark.

We have done additional studies and noted that visual acuity and skill sets of acuity are key indicators of success. It seems that athletes use not only the takeoff board but the landing pit itself, officials at the board, markers at the board, etc. We find much greater accuracy when we use a 1-meter to the pit board as opposed to the international 3-meter board-to-pit distance. I think this implies that the athlete uses multiple environmental landmarks to dial in precision. Lighting, speed of run, and color of surface also show statistical significance on accuracy.

I often question new athletes to our group about their previous strategy to address fouling. For most of them, it involved moving the start mark of the approach for the next jump. My follow-up question is then, “How did that work for you?” How many times do we see athletes move their mark and foul by the exact same amount? That shows a steering issue, in my opinion.

We have also evolved “steering” into a subset skill factor that we term “targeting.” We have done thousands of elite jump analyses and intra-athlete analyses of these approaches. At the world-class level, most athletes have consistent shapes and programming strategies, yet fouls are still a huge problem worldwide and the fouls are often similar in distance and location. To address this type of error, we propose that an athlete with this recurring issue use a double loci strategy. By that we mean that the athlete is aware of the exact location of the takeoff foot—the ball of the foot, for example—and the exact location on the board, such as the back edge of the board. During various teaching progressions and approach work, we experiment with strategies and the monitoring of these loci locations and utilization.

Some of our fastest jumpers actually aim behind the board to obtain legal jumps when their runway speeds are optimal and/or presented with huge tail winds. A corresponding finding on target strategy is that athletes often lift their head or eye plane several strides from takeoff in anticipation of takeoff. Some athletes seem able to take a snapshot three strides out and still target effectively. Others seem to need peripheral visual contact up until the plant action.

Nic Petersen: Fouling and inaccuracies during the approach are some of the most frustrating things we run into as a coach. I do believe that accuracy is a skill that we can be taught. But on a secondary note, I believe that some athletes are just innately better at it than others. There are people who have no trouble negotiating the right spot all the time. The event itself is not easy. It’s not easy to run as fast as you can and hit an 8-inch board accurately, fast, and in a great position. Then add in the pressure of having to do it all right when it counts, in competition.

First things first: I don't want my athletes afraid of the board. I tell them that they are caged animals and the board is what sets them free. It is the reward of a properly executed approach. They should be happy and excited about it; not worried over and scared of it. They should never have the thought, "Oh, I'm going to foul this one," on their mind.

All that being said, we do a lot of work on accuracy. We do approaches a lot: We start in the beginning of the year, running our approaches on the track, teaching mechanics, and fixing issues. I do it this way so athletes run their approach. They learn what their run is going to be like before we add the board and the adjustments that happen naturally with a board. Then, as we begin to practice approaches with the board, we do it multiple ways.

There are days when we do approaches and I coach the approach and we don't even talk about the board or where their foot was at all. Then there are days where the only thing we work on is trying to hit a certain spot on the board. They make an approach with takeoff and everything, and I ask them where they were and was it fair. We talk about it from there; we try to teach them to be aware of where they are and how to make slight adjustments. Then there are days we do all three: working on a great approach, great takeoff mechanics, and hitting a spot.

We do other things that involve steering as well. Hurdle takeoffs and certain drills that involve steering, where they are steering for certain spots without the board.

Jeremy Fischer: First, postural integrity is very important. Flaws in postural integrity can lead to inaccurate proprioception. Anterior rotation of the hips can cause inaccurate segment alignment and placement of the distal appendage. Therefore, the athlete keeps fouling by a centimeter each time. Until the athlete corrects this, they are going to have tiny toe fouls all the time. They'll also have an inaccurate approach, which may cause them not to create enough momentum, while a change in the approach running mechanics can lead to improper steering.

I've watched thousands and thousands of approaches and almost every time, from five steps out (the place where steering occurs), the athlete will over stride, shorten stride, or stutter as they prepare for takeoff. Approach rhythm and checkpoints for the athlete allow for greater accuracy (the more, the better). I may use an acceleration mark, a transition mark, and a penultimate step mark for the athlete. I will also let the athlete get behind the board in practice, to take into account the greater speed and intensity in meet situations. More than a psychological effect, I want the athlete to be able to understand and establish the rhythm of the approach in their heads.

David Kerin: While it may sound silly at first read, do you know which of your athletes wear contacts? Have you ever considered asking them if they are wearing them before you get on them for runway faults? As mentioned earlier, visuospatial skills are something I have spent some time researching. For an athlete lacking in this area, it's like a horse and jockey relationship. No matter how big an engine they

have, if they can't find the board correctly... Also, it is science's assertion that females face greater visuospatial challenges on average than men.

As far as long jump, I wouldn't say that PV and TJ athletes are somehow less challenged in their approaches. A PV coach can tell you that many vaults occur on takeoffs that are inside of the optimal mark. A modality that I have used to address approach issues is putting the athlete on a section of the track devoid of markings and making them run without the steering cues they have on the runway. Another way to do this, if you have a roll-up runway, is to lay over the runway markings. They are going to steer, so your job is to make them better drivers.

For high jump, changing the location of the pit on the apron is a good way to change up the backdrop and the benchmarks that the athlete might be settled into. It also spreads the wear and tear of constant plants in the same general area. For the horizontals and vault, most outdoor facilities have a prevailing wind. But is it in the athlete's best interest to always jump/vault with the wind?

My experience with horizontals has led me to not seek a last pre-meet run-through that catches the whole board. Run-throughs can't replicate a competition run-up to that level of precision. Generally, and specifically with a multi-eventer at the long jump, I prefer a fair jump to open competition even at the expense of 3-6 inches. After observing the nature of that run and its relationship to the board and checkmarks, I can make a better call for the following attempts than if the first jump is foul. If the first jump is a foul, any counsel you offer has yet to be proven successful. If it isn't a foul, now you are down to a third jump and if it wasn't in play already, psychology now adds to the challenge.

In all jumps, the athlete needs to have a backup system to relocate a previously placed mark, see: Jeff Henderson/Beijing. I have seen purposeful "scuffing up" of tape marks by competitors and coaches. Officials often mistakenly remove tape from runways and aprons. I have seen a stretched taped inadvertently moved so that it displaced a marker. There needs to be identification of an immovable point like a painted line or odd variation to the track surface, so that the athlete can pace to their original mark location. In the past, I have advised palming a Sharpie to put a small dot on the surface. In a pinch, I have literally offered a tiny piece of chewed gum for a jumper to do something similar with.

Nick Newman: Accuracy of movement and freedom of movement are contradictory terms. You can maximize either in isolation, but together the outcome will always be relative. To achieve high accuracy rates and maximize the potential for freedom of movement, the athlete must develop a subconscious awareness and connection to their approach and its spatial context. It is not possible to achieve 100% certainty with either outcome at the same time. It is achieved on occasion, but never deliberately.

Basically, you have to accept some kind of loss if you want consistency of legal jumps. Targeting the board with great focus will yield high accuracy rates but will inevitably limit performance.

Ultimately, the best jumpers understand when to “go for it” and when caution and accuracy are needed. It is all about reducing the gap between freedom and accuracy. Those with the best ratio can maximize their own potential the most.

Development of the ability to maximize performance while producing legal jumps requires a systematic, not haphazard, approach. It starts with the acceptance that the athlete is in control of their outcome. They must be aware of the board at all times. They must LOOK AT THE BOARD during their approach run. This must occur during every approach and every jump in practice and in competition.

The discipline and focus required for this is challenging—to say the least—especially early, when performance can suffer. However, athletes learn over time to adopt more subconscious habits, allowing their legal performance to increase once again. It takes ownership, trust, and great practice. Discipline from the coach is just as essential as it is from the athlete.

I have discussed specific training strategies in great detail in several articles and will briefly address them here. Once targeting and focus have been established, the use of variable practice methods can enhance the skill of steering further. Options that can be used during practice include changing the approach step number, start positions, and exact targeting positions, etc. The options are endless depending on how much added stress, and difficulty you want the athlete practicing under.

Randy Huntington: I never address fouling psychologically because we learned years ago that focusing on it as a problem creates a much bigger problem. Learning to utilize VC and maintaining technical abilities through the last 6 meters and last two steps is key. Testing the eyes for tracking abilities is the most important item for us. Then there is the small technical flaw of pushing to the takeoff. It is an athletic move and the coach can't control it during competition. That is why I don't program to the board during practice and warmups, but instead program to penultimate step position. I know through experience that, if you are at that critical zone, you can successfully jump.

Brian Brillon: I believe that accuracy on the board is a skill that needs to be trained. Like a long division problem, if there is a mistake at any point in the solution the answer will be wrong. The approach is broken down by knowing where the athlete should be on the runway. We have an eight-stride checkmark, a coach's mark four strides out the board, and a 2-meter penultimate stride mark.

Knowing where the strides should land is only one part of the problem. I like to know what velocities are being produced through the board. Not using the correct velocity can throw off the timing of the run and cause fouling as well. Correct

postures are also observed in the head, shoulders, and pelvis. Improper postures can put the feet ahead of where they need to land and can give rise to fouling.

From a psychological standpoint, I try to create chaos in some practices. For instance, I will give the athlete a scenario in which they have fouled twice in the opening rounds and need to get this jump in to make it to the final. I feel this has helped in the real situations that we see at meets. My athletes will also hear me say “control the runway” a lot in practice. I want them to feel that, if they have a headwind or tailwind, they will always be on the board. What I will have the athlete do is either move up a shoe or back a shoe from their starting point, and get their foot on the board for takeoff. When the athlete gets chaos in practice, proper foot positions on the board can be taught.

Question 5:

SimpliFaster: Several key physical qualities determine success in the jumping events. However, it is common for jumpers of similar meet performances to possess different ratios of these qualities. How do you (or how would you in an ideal world) manipulate individual training programs based on your athlete’s strengths and weaknesses?

Travis Geopfert: We think it’s important from the very beginning to assess where our athletes stand in terms of basic movement patterns. Our athletic trainer, Cole Peterson, does a fantastic job of evaluating the basic movement functions of all our incoming jumpers. If there is a deficiency or weakness in any specific area, we create a plan to correct that right away. Nobody is perfect and everybody has something that they can work on in terms of functional movement, mobility, and strength. As we personalize these plans and see proficiency, it allows us to add speed and power and then we can move on from there.

For example, Clive Pullen and Jarrion Lawson are two very different but great athletes who, over time, had functional improvement in several basic things. As both proved they could handle it, we were able to add some key training elements that allowed them to succeed at the highest level. In general terms, the plans capitalized on Jarrion’s speed in the long jump and Clive’s power in the triple jump. Their individual training plans were VERY different. However, I believe they were highly effective specific to their individual strengths and weaknesses. Having said that, however, we first started with basic functional movement patterns and strength level assessment that allowed us to then layer on the training they needed over the course of three to four years.

Dan Pfaff: That is the art of coaching. Determining the KPI factors for each athlete and then ordering them in a hierarchy is a never-ending project for the coach. The KPI factors can change in type and order during the career or even the season. They

differ based on biomotor factors, anthropometrics, training history, etc. There are generalities for this, but I think it's dangerous to reduce these items into a formula.

In truth, programming is a hypothesis. You build out a program, run it, monitor it, and then formulate a new hypothesis based on evidence gained. I think it is a major error to tilt the table towards weaknesses. We like to polish strengths always and often, while slowly filling in the gaps in deficiencies and voids. I have seen way too many athletes destroyed on the "we can fix this weakness and then you will soar" train. If the athlete is healthy and enjoying the process, then we are on the right path. Disinterest and burnout are red flags that my ego has gotten in the way. Sometimes a weakness is a defense mechanism and should not be attacked directly.

Nic Petersen: Speed is always a cornerstone of everything we do. We train acceleration all year and we are always trying to become mechanically and technically better in everything we do. That being said, every athlete is different and must be treated accordingly. Not everyone can handle large training loads, or large doses of speed endurance. So, I have a template for the week, month, year, etc., and I plug and play different sessions and workouts based around the theme of the adaptation I am trying to elicit.

An example would be if we have a max velocity day. One athlete might do a fly 30 with a 30-meter run in, one may do a fly 20 with a 30-meter run in, and someone else may do a 100-meter fly with a 20-meter run in. This is all based on what is best for each individual athlete and their own strengths and weakness.

We do the same in technique as well. We may have short jump session in long jump. One athlete may go from 12 steps. One athlete may go from eight. One might go off a box. And yet, everyone is working on some of the same things.

In general, I would say that we train to our strengths much more than our weaknesses. We address weaknesses and try and make them better, but I like to make sure we do what people like to do, and what works best for them. Some of my athletes need to jump a lot to maintain rhythm and jump well. Others can jump very little and compete at a high level. As coaches, we must figure out what works best for every athlete and use those skills.

Jeremy Fischer: I think that all training plans are, and must be, malleable. While a rigid structure is good for younger, less-advanced athletes, but the more advanced, higher-level athletes need a solid foundation with adaptation and flexibility to be successful. You might have two 17-meter triple jumpers, and one is a power athlete with great strength while the other is a power athlete with much more elasticity and a relative lower overall strength capacity. It is easy to say, "Make the power athlete stronger and the strength athlete more elastic," but it's not as easy as just applying this generalization. The art of implementation is making sure you address the weakness but not at the cost of their strengths.

David Kerin: A quick answer would be that it's not unlike training a multi-eventer. This means, look at where your time is best spent. In the multi events, it's often how good you are in your weaker events that determines the final outcome. High jump is a great jumps-specific example to look at this question. Clearly, there is advantage to a higher standing COM and longer levers. Yet, Stefan Holm and, more recently, Inika McPherson have had success in an event that would appear to not favor their morphology.

Staying with high jump, Dr. James Becker and I had the good fortune to capture three different jumpers make 2.40+ jumps in 2014. We did this while filming the top U.S. jumpers at the same meets. Under 3-D analysis, many things stood out. First and foremost, the three athletes (Mutaz Essa Barshim, Bohdan Bondarenko, and Dered Drouin) all were traveling 8 meters per second or better at the plant. Second, in fully analyzed jumps, neither Jesse Williams nor Dusty Jonas ever breaks 8 meters per second and Erik Kynard almost never does. Correspondingly, none have broken into the 2.40 club. Regardless of a given athlete's background and gifts, physics are universal.

However, I just read a quote by an elite jumper's coach, stating that his athlete's approach is purposefully slow. However, we have data that shows this is not the case. You must understand "Job 1," and know your athlete's strengths and weaknesses first if you want to effect positive change.

There are minimum data points required at a given performance level. Horizontal velocity, degree of conversion, and orientation of the COM are big ones common to all jumps. For a horizontal jumps reference, who was the faster athlete, Carl Lewis or Mike Powell? As we all know, maximum achievable velocity is not optimal velocity in the jumps. What does matter is the velocity at the moment of the last grounding.

I see Mike Powell's execution of the penultimate as the key to his world record jump. I won't go further into it, but pull up his Tokyo jump on YouTube and see what you think. My purpose in bringing it up is that I think it's one of the best examples of addressing strengths and weaknesses in the jumps.

Nick Newman: I touched on this topic during Question One and can elaborate here. Over time, it becomes clear that certain factors drive certain athletes. Generally, you have three types of elite jumpers: tall and slim with long limbs and long tendons, shorter and slightly thicker with more muscular size and shorter tendons, and those that fall somewhere in the middle. You can group your jumpers into one of these categories fairly easily.

Again, these are general categorizations and every individual is different. However, you can make solid expectations once you understand the type of athlete you are working with. Don't kill yourself trying to develop your tall, slim, tendon-driven jumper to 2x body weight deep squatting. Instead, focus on her elastic qualities,

strength, and specific ROM. Likewise, an athlete who doesn't have tremendous advantages with their tendon structure would perhaps benefit from more muscular-based strength and power.

The general notion here is that, for the most part, focusing on an athlete's weaknesses is a mistake. Their natural development processes drive their strengths. Therefore, it makes far more sense to carefully nurture those aspects than to pursue unnatural pathways. An understanding of what makes the individual successful in the first place should heavily influence their program design.

Randy Huntington: This is the hardest question to answer and I'm not sure any scientific answer would be accurate. I use Omegawave to see if athletes are adapting to training loads or not, and I listen and observe. Additionally, we do deep water pool recovery and massage every day to enhance recovery. Sports medicine in China is not very advanced, so we do what we can.

Brian Brillon: I believe 8-meter jumps are the standard for males at the collegiate level. In my coaching experience, I have never seen a slow 8-meter jumper. Therefore, I focus my training for the jumpers to travel at or over 10 meters per second. I see many good high school jumpers load up on their penultimate step to jump far. You can get away with that in high school, but as the athlete progresses, you must help the athlete get faster and feel comfortable with that speed.

My athletes have heard me say numerous times in training that you must get comfortable getting uncomfortable. This new speed that they will apply to their jumping will make them feel like they aren't achieving the height that they were accustomed to, but in time the added velocity off the board will produce better distances.

Most of the time, I get the athlete to run faster through takeoff, but an important factor is the takeoff angle. To manipulate an athlete's takeoff angle, I use shorter approaches with less horizontal velocity to train more of a vertical velocity. With these slower velocities used in short approaches, the athlete can produce force longer on the ground to achieve greater vertical forces to enhance takeoff angles. We will progressively add more steps to bleed in more horizontal velocity. We strive to bleed in both horizontal and vertical velocities during the progression of the season.

Question 6:

SimpliFaster: Can you describe the training setup that you use and who/what would you say influenced your programming style the most?

Travis Geopfert: We set up training blocks that start from our biggest championship meet at the end of the year and work backwards. Ultimately, we spend 70% of our macro-cycle in a general preparation or special preparation phase. Although this is often difficult for athletes to understand, I do believe it's a big reason for our success late in the year. Our athletes have the discipline and focus required to trust in the process and know that they will be ready during championship season.

Throughout this training calendar we have specific training blocks that are anywhere from 7-21 days long, with intermittent "recovery" weeks periodically built in. The time of year and the phase of training we are in affect what we do in these individual micro-cycles. In very general terms, however, I would say our training in a micro-cycle mostly pairs high-intensity speed and jumping with our lifting days. Then our active recovery and general strength work opposite to that.

There have been numerous strong influences on my personal programming. Doug Case and I work closely together with our jumpers and sprinters in programming almost the entire year. Other strong influences on me in my early coaching days were Kip Janvrin and Cliff Rovelto. They both helped to give me a very good understanding of training cycles and the importance of laying out a "master plan."

There are numerous other coaches that I've gained valuable information from over the years. I've benefitted from personal conversations about jumps with Rana Reider, Cliff Rovelto, Boo Schexnayder, Jeremy Fischer, Dan Pfaff, Randy Huntington, Doug Case, Kip Janvrin, Mark Napier, and Steve Lynn, to name a few. These, along with reading literature and watching videos from Tom Tellez and many others, have helped me formulate our Arkansas Training Philosophy.

I believe it's our responsibility as coaches to educate ourselves and decipher quality information that can continue to help our athletes progress in the sport. I have learned that having a plan is a necessity, from both the above-mentioned jumps coaches, and numerous other coaches including Chris Bucknam here at Arkansas. However, being able to adapt on the fly and make adjustments based on numerous variables is equally important.

I believe there is a scientific and an artistic side of coaching. It's important to know your stuff, but also to read your individual athletes and communicate the plan effectively. It's our job as coaches to "think" and communicate in such a way that enables our athletes to trust the process and just go "do."

Dan Pfaff: I was hugely influenced by my first major mentor, Tom Tellez, so a lot of my fundamental programming concepts came from the way he trained sprinter/jumper combo athletes. During the first 10-15 years of my career, I collected and reverse-engineered training systems from around the world delivered by guys in my evolving network. The bulk of this research was in the late '70s and all of the '80s, so pharmacy factors were huge at the time and they heavily influenced the designs, volumes, intensities, and density patterns used in those systems. To surf that issue, a concerted effort was made to study junior and youth-level programming from those countries to establish fundamental curves of load and progression.

I have always worked with multiple event disciplines, large numbers, small support staffs, etc., so I had to evolve systems that addressed these variables. Access to facilities, liability issues, and the cooperation of support staff also influenced the evolution. Time, wisdom, experiences, great athletes, injuries, failed hypotheses, network information, research, and divine intervention have all led me to our current formats. We still tweak and experiment, but not as much as when I was a younger, clueless coach.

In general, we do no GPP-type phases and start out with what folks would most likely call SPP. We use two-week load cycles with the third week an unload on density pattern. We shift to one week on, one week off during the indoor season and then move to a three-day rollover cycle for the outdoor competitive season. We identify KPIs during the preseason induction meetings, rank them in a hierarchy, develop strategies for monitoring and adjustment of these generational factors, and then go to work. It is fluid and athlete-driven. It is deeply tied to sports medicine findings at all times.

The weekly format is fairly common throughout the year. We do acceleration work, power conversion exercises, and a moderate weight room scheme on Mondays. Tuesdays find us doing jump-specific work, various plyometric exercises, and then a shift to parasympathetic work with circuits and special strength exercises. Wednesday is a speed or running technique day, followed by power conversion exercises or plyometrics, and finished off with our most demanding weight room session of the week. Thursday is often an active rest, therapy-driven day, although early in the year many athletes will do designed recovery training. Friday is a jump technique day, followed by throwing power exercises, and then a monitor-driven weight room session. Saturday is an alactic/run technique day for us, with extensive work capacity exercises done post running. We take Sundays off.

Nic Petersen: Typically, Monday is an acceleration day consisting of anywhere from 10m to 40m, but we may go out further depending on the athlete and time of year. This is followed by either a med ball throw series or a simple plyometric exercise.

Tuesday is a mix of technique and speed. We typically do some type of approach development on Tuesdays, followed by a short run technique session. This may be

short run long jump, etc. Then we finish with a few absolute speed runs; maybe fly 30m or something similar.

Wednesday is a recovery day. We do an easy jog and strides, most the time in approach rhythm. And we do some restorative work here: yoga, balance, and trigger point therapy.

On Thursday, we come back and do another combination day, with approach work and a technique session followed by some speed. This tends to be a bit longer, but it depends on what we did Monday and Tuesday.

Friday is typically our tempo day. We do this on grass. A lot of times we do circuits as rest.

Jeremy Fischer: My setup for training is very athlete-specific. One athlete may have more of a European setup, and another may have a more typical American setup. USATF coaching education was an early influence on my coaching. They were the first ones to show me that there were different training styles than my college system. They gave me the science and answers to why and how we did things. These names include Boo Schexnayder, Dan Pfaff, Vince Anderson, Dennis Shaver, Vern Gambetta, Gary Winkler, and Cliff Rovelto. Book influences were Bompa, Gambetta, Freeman, and McFarlane.

As I grew as a coach, I wanted to know more and learn different thought processes. I started talking to foreign coaches and visiting their training facilities and watching their practices. I watched the Cubans train in Puerto Rico for three days, spent a few days with Wolfgang Ritzdorf at the Cologne Sports Institute, had dinner with Franz Bosch, and talked with and spent time with Nelio Mauro. This gave me a different perspective and I saw how training can vary with the art of coaching—the variability of training we use from athlete to athlete and year to year.

David Kerin: I am a continuing ed student at the Tellez/Pfaff/Schexnayder School of Jumps. From that base, I then apply my experience. My views on training are most traditional in the fall. As the year progresses, I shift away from strict adherence to more commonly accepted work and phasing during indoor and early outdoors. I like to see athletes do just enough traditional work in the weight room to maintain strength levels gained to that point. Testing is important here to determine whether a given strength level has dropped off. Like Dan P's "Three Day Rollovers," I believe you can maintain levels with minimal lifting as long as it's specific.

Between indoor and outdoor, with timing dependent on the length and goals of the outdoor season, I like to remediate to bring strength back up when decline is observed. Back to indoors—I am not a fan of the collegiate, almost-every-weekend competition cycle, and its effect on training and health. I believe in as late a start to indoor competition as possible, and as little indoor competition as possible. The nature and quality of training and adaptation is far better. I will leave more specific

periodization and session descriptions to my more distinguished fellow Roundtable participants. My observation is that, once the competition schedule begins, technical components in the athletes' jumping become harder to adjust.

Full approach jumping is impactful, and competition jumping is even more so. Once competition begins, training setup should take this into account, particularly in spring and summer. More specifically, think about recovery time. In the U.S., we have been very good at making people tired; we have only recently started to get better at building them back up.

As for the comparison of U.S. vs. European training models, I believe both have their merits. Rather than thinking that you must reside in only one camp, consider that either could be a sound option for individual athletes at any given time. This could also be viewed as a response to either method by gender, and further, that the deciding factors are health, recovery to maintain it, and travel/competition demands. Between the two models, I generally favor keeping high intensity work bundled by day as opposed to distributed across a week. However, there is merit to the idea of playing with its distribution, particularly when tempering a jumper for an Olympic trial or international competition's Q round and finals on separate days.

Nick Newman: Dan Pfaff and Boo Schexnayder have influenced my training philosophy the most. I have spent time with and/or conversed with many other coaching greats over the past 10 or so years as well. The likes of Randy Huntington, Tudor Bompa, John Crotty, Jeremy Fischer, Pete Stanley, Gary Bourne, and Nelio Moura must be mentioned, as they have all personally shared their knowledge with me.

Early in my athletic career, I spent a great deal of time dissecting and experimenting with the training programs of many coaches. Although this likely hurt my career as a jumper, it helped my coaching career tremendously. This, along with endless reading and observing of great coaches and athletes, has served as the basis of my philosophy on all aspects of programming and coaching. Over the years, my beliefs evolved into the training system that I use today.

Generally, I use a high dose of specific training all year, with each component of the program carefully progressed from specific to ultra-specific. I use three-step loading patterns throughout the preparation period. The first phase of training is four weeks in length, using forward step loading with a drop-in load during the fourth week. As specificity increases, we remain with forward step loading but switch to three-week phases with a drop-in load occurring every third week. During ultra-specific or specialized training phases, we use a four-week phase with a reverse step-loading pattern and decreasing loads from weeks two through four.

Throughout the preparation mesocycle, the weekly setup stays fairly consistent. Mondays are inertia days with accelerations, bounding, and moderate to heavy weights. Tuesday is a technical jumps, drills, and circuit day. Wednesday is speed

and power development. Thursday is technical or pool recovery work. Friday is resisted or assisted speed, assisted jumps, and special weight training. Saturday is extensive and intensive tempo, or speed endurance, endurance bounding, and circuits. Sunday is rest.

Competition phases see extremely flexible and individual-based programming. Generally speaking, competition weeks will see a neuromuscular heavy hitter day, a couple of general recovery days, and a technical focus day.

Randy Huntington:

a.m./p.m.

M	Acc – MaxS
T	Speed – UbS
W	Speed endurance (ASSE or GSSE) or temp – Rest
Th	As Monday, with small variations – Rest
F	Jumps day – Power
Sa	Long speed endurance (SE)
S	Rest

Brian Brillon: I use alternating neuro days followed by a general themed day of training. I would say that I have been more influenced in the training pedagogy by Boo Schexnayder, Dan Pfaff, Mike Young, and Vern Gambetta. I have found that this type of training works best with the goals that need to be met in the collegiate setting. There are occasions that we have had to bend the rules due to schedules, but if you can foresee these conflicts, it is important to budget your week correctly in training.

For instance, in a typical week, Monday will be neuro followed by a general day. We would typically see acceleration modalities done on Monday, with technique and general themes set for Tuesday. If I do runways on a Tuesday, I will budget my Monday practice with volume to complement the runways on Tuesday. I try to think of the “train today so that you can train tomorrow” mantra when writing sessions.

The first week in the four-week cycle would see a technical-themed week, followed by a speed week, then an endurance/work capacity week, and ending with a rest/test week. I have found that this rotational system worked well at all the levels I have coached. It keeps the athlete able to express the power outputs important for the event, without many overtraining symptoms. I want the athlete to always feel that the base of their training is speed and power.

I follow a short-to-long philosophy with the training of speed. Before I coached them, some of my athletes had coaches who used the long-to-short philosophy in their training of speed, and they never felt like they gained speed. Some athletes felt it was just a grind to see how many reps and sets they could do. When they became

aware of their speed capabilities earlier in the year, these athletes felt that they achieved more beneficial training and saw greater successes.