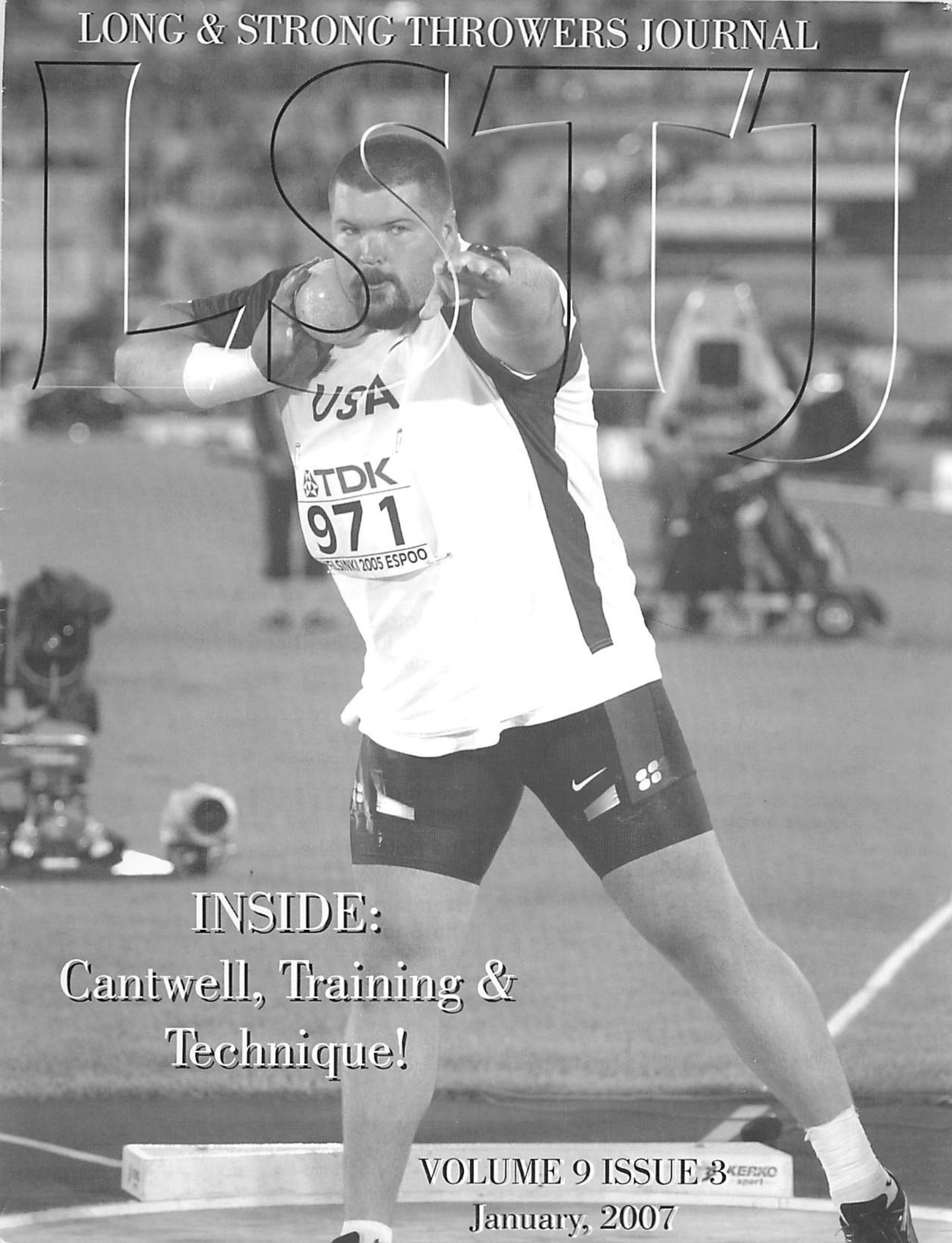
LONG & STRONG THROWERS JOURNAL

LSTJ



INSIDE:
Cantwell, Training & Technique!

VOLUME 9 ISSUE 3
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On the cover: Christian Cantwell at the 2005 World Championships. (Victor Sailer) This page: Like a feared slugger, no one dares look away when Cantwell is in the circle, lest they miss something special. (Victor Sailer)

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LETTER FROM THE EDITOR

Keepin' It Real

Sometimes a single moment lingers with you for days, weeks, months or even years. You may not even realize it immediately, but something or someone has left an indelible impression on you that brings a smile whenever it comes to mind. I had one of those experiences at the 2006 National Throws Coaches Association Conference in Columbus, November 10-12.

I was waiting in the main lobby to head home late Sunday morning. One of the conference attendees strolled up and offered me an apology. My head tilted to the right as my left eyebrow arched. What in the world was he apologizing to me for?

Turns out he felt he had been remiss about not inquiring about my family during the weekend. He then took time to ask about my foster kids, the addition to my house, and my general welfare.

This encounter exemplified the throwers' spirit. Yes, as in any community, there are some egos involved, but for the most part, those that are *in the game*, are in it *for the game.*

In no sport are there less combative personalities. Intense spirits, certainly, but still able to recognize the efforts and achievements of others, win or lose. No one enjoys a post-event meal with competitors more than throwers. Perhaps that's because we all ultimately battle the measuring tape, and not each other.

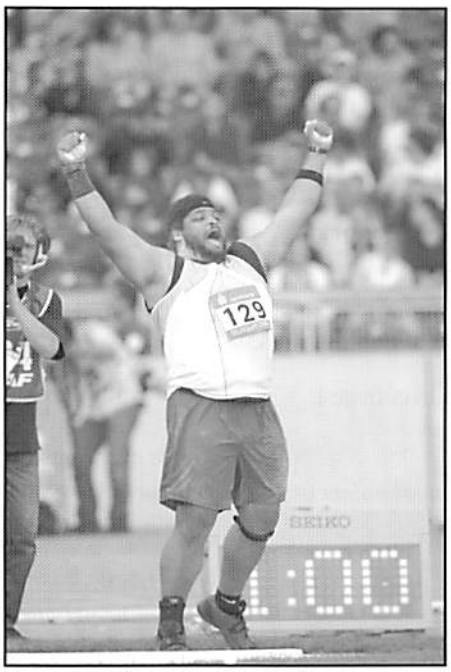
Come to think of it, if the international community were a lot more like ours, there'd be infinitely fewer conflicts. Maybe we should stop dividing ourselves as Republicans and Democrats, Sunni or Shiite, black, white, and brown, and just declare everyone in the world an allegiance to a particular throwing event. One of my travel companions marveled at seeing Mac Wilkins and John Powell, long time rivals, together. Hey, if they can make peace, why can't every one else?!

You can't help but leave Columbus every year with a serious buzz. As an athlete and a coach, I love seeing my peers, interacting with LSTJ subscribers who I would never have the opportunity to meet otherwise, and of course, making like a throwing sponge. I leave every year with strategies to become both a better coach and thrower.

This year was particularly fabulous for me. I have long espoused the weight training philosophies of Westside Barbell's Louie Simmons. Simmons graced the cover of *LSTJ* (April 2000) and contributed a two-part interview, as well as penning a later article. In Columbus, Simmons' hometown, I had the opportunity to witness his intensity not just once, but twice, in lectures. It was a personal thrill to finally meet him in person.

I also had the pleasure of attending two of John Godina's presentations. As with Simmons and iron plates, I am a devotee of Godina's technical style. I've long used his footage as an example of setting up a throw in the back and linear attack. Godina did a thorough review of his technique in the first presentation, then presented a unique use for Keiser exercise equipment for training and the correction of technical faults.

The biggest shortcoming of the clinic was that I couldn't be at more than one presentation at a time. I had to miss several presentations of interest…kinda like having a to choose between J-Lo and Anna Nicole Smith…strictly a matter of personal preference, but it's all good either way.



Reese Hoffa celebrating in Stuttgart, Germany last summer.

The apologetic individual was none other than Reese Hoffa, who, was on hand to be honored as the 2006 NTCA Thrower of the Year. Hoffa is an Olympian, National and World Champion, and superstar in our sport. As I chronicled in these pages before, Hoffa had stayed at my home briefly during a clinic two years ago. Hoffa, himself a former foster child, made quite an impression on my family and was the perfect guest (*LSTJ*, Letter From The Editor, April, 2005).

Hoffa was in demand all weekend, just the same as everyone would want to corner Dwayne Wade at a basketball symposium. But he took the time to offer an earnest apology to little ole yours truly. Damned near left me speechless.

Perhaps it's the nature of the game, and more likely just his personality, but Reese Hoffa continues to keep it real. Hoffa stays humble, like Adam Nelson, who recently wrote me for some copies of his own poster (for which he accepted no compensation) I produced a couple years ago. Wanted me to let him know much he would owe me. Took me awhile to stop laughing. That's why it's so easy to cheer for him, Godina, or so many of the other heroes of our game.

Wonder when the last time Barry Bonds apologized to anyone. ***LSTJ***

Chatting With: Christian Cantwell

By Glenn Thompson

In a super-sized society, Christian Cantwell is still THE Big Mac. At 6'4", 335 pounds, he is the BIG MAN among an athletic society of big men. His strength levels are almost mythic, and no one produces as many long throws as this native of Eldon, Missouri. He is a threat to the world record almost every time he enters a circle. Still only 26 years old, Cantwell has achieved much, but still has some major goals left to achieve to cement his legacy.

Cantwell took some time recently to chat with LSTJ *about his life, in and out of the circle.*

LSTJ: *What sports did you play in high school? How did you get involved in track and field?*

CC: I played football, basketball, and track and field. A family friend pushed me into throwing. He took me to some meets. He got some film of this guy named John Godina for me to watch. I took off from there. I was offered scholarships from a few places, but I knew I wanted to go to the University of Missouri. I practically walked on. It was the end of the year and all they had left to give was about a 15% partial scholarship. I took it.

LSTJ: *Have you ever seriously pursued the discus?*

CC: My freshman and sophomore years in college I practiced a lot.

LSTJ: *What do you consider your technical points of emphasis in the shot?*

CC: Go as fast as you can and knock the crap out of it.

LSTJ: *Allow me to rephrase the question. Over the last few years, what have you concentrated on improving in terms of your technique?*

CC: I am constantly working on different things. I cannot pinpoint one or two things that I try and work on. I do feel like there are times when I am in a great rhythm. My goal is to keep those times as long as I can.

LSTJ: *How much throwing do you and your wife [Teri Steer, 2002 USA Indoor & Outdoor champion; Two-time USA Indoor champion ('99, '02); 1999 World Indoor bronze medalist; Two-time NCAA champion] talk around the house?*

CC: Usually our conversations about throwing consist of me coming home and Teri asking how practice went. I usually respond, "Fine." Sometimes we talk more, but six out of seven days that's how it goes.

LSTJ: *I understand that you live in Oklahoma now. How much time do you spend back in Columbia, MO with Coach Halter for training/coaching?*

CC: I asked Teri to move up to Columbia and we were married. When Teri and I lived in Stillwater, I lived down there in the fall and came back at Christmas time. I rented a room from a friend and stayed in Columbia for the spring and summer track season. We are living full time in Columbia, Missouri and it feels good to be back in God's country!

LSTJ: *Your strength is legendary. Do you think there is a point where you are strong enough in terms of maximum poundages?*

CC: No, I do not think there is a number that would be too much. The stronger you are the better. When your technique is off, being stronger allows more room for error.

LSTJ: *What are your all-time bests in the weight room, and also your best ever standing throw?*

CC: My best standing throw was just at 60 feet, but that was my junior year of college.

Since everyone always talks about my strength, I think we should not give maximums because it will be more fun to hear all the different poundages people come up with.

LSTJ: *Okay, tell us some of the more absurd rumors/stories you've heard about your strength levels.*

CC: I have heard I could kick Paul Bunyon's butt. I think it is funny that everyone thinks I only throw far because of my strength levels. For my size, my jumps and sprinting aren't too bad.

LSTJ: *You have the strength, a la Udo Beyer, to be a very successful glider. How far do you think you could throw with the glide?*

CC: Definitely 21 meters, after that it is hard to tell. I would like to think I could go 21.50m.

LSTJ: *How difficult was your experience at the 2004 Olympic Trials? [Cantwell came into the Trials as Indoor USA and World Champion with an in-season best of 22.54m/73-11.5] and was made the favorite by many pundits, but finished a disappointing fourth].*

CC: Well I had my baby Teri there so it wasn't as bad as it could have been.

LSTJ: *For track and field athletes, the public tends to ignore non-Olympic years, so that had to sting. Did you need time to re-group mentally? Is there any lesson you would take from 2004 forward to the next Trials?*

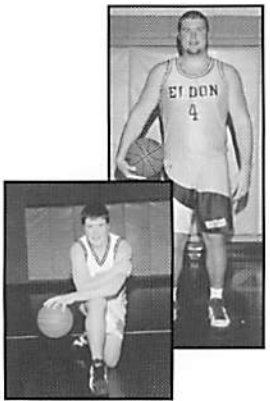
CC: All right, if you couldn't tell by my answer to the question, I don't like to talk about it. I understand when something like that happens everyone wants to talk about why it happened. Yes it affected me. Of course I was undefeated and nothing seemed like it could stop me. I do think about it now. I think about it every time something seems hard. I think about it when I don't feel like pushing through the last set. It is in the back of mind on most things I do, but in a way that I want to overcome, not keep saying poor me.

LSTJ: *Fifth round in Indy (2006 USATF Championships) last year. What were your thoughts (1) when you released that bomb (measured at 75'2" after the competition), and (2) immediately after it was called a foul? Why was that such a great throw for you?*

CC: My immediate thought was, "S—, if I had not pulled off to the left so hard, it would have been two feet farther." I didn't have any thoughts on the fact it was a foul. I knew it was a foul because I felt it. I don't think it was a great throw. Technically I was off. I was just pumped up.

LSTJ: *That's amazing to think that you actually 'missed' that throw. Did you have any throws last year where you felt like you really connected with the shot?*

CC: I never truly felt like I hit a throw last year. I came close in England, but still felt like I didn't finish the throw. I do feel there were some practice throws I felt great technically on.



Christian was already palming the rock as an eighth grader, and had much of his present stature by his junior year of high school.

LSTJ: *You were the man in Europe this summer [Cantwell had seven of the ten best throws in the world, including the top three, and a best of 22.45m/73-8]. Were you pleased with your campaign?*

CC: Yes, I was happy with everything in Europe except my two losses. I think my outdoor campaign was better then anyone else by far.

LSTJ: *How many feelers have you gotten from the NFL? What teams? Have you ever seriously considered football as an occupation?*

CC: I have had feelers from NFL. I really truly would love to do a combine. I think I could come close to the 225 lb. bench test for reps record. I was on track my junior year to play football in college. I tore my anterior cruciate ligament and my mother freaked out at how badly that affected me. After struggling through the injury my senior year, my mother asked I never play again. I decided to do track and field.

LSTJ: *Are there any of your peers, be they American or foreign, that you particularly admire? Why so?*

CC: It is weird to say this because he is my friend now, but John Godina. I watched film of him and admired him a lot. I remember watching him while I competed in my first Olympic Trials in 2000. Now we are competitors. He is a great person on and off the field. I think he is the best thrower of all time. How can you not like someone that looks like Will Ferrell. Although, it is weird throwing against a dinosaur.

LSTJ: *Name three things the average throws fan would not know about you?*

CC: I like to fish, play poker, listen to country music, and talk about trucks.


Teri and Christian.

LSTJ: *Who are your favorite country artists. How many and what type of trucks do you have?*

CC: Tim McGraw, Toby Keith, George Jones, Kenny Chesney, Faith Hill

I have two trucks. Teri and I switch driving both our trucks. The one I drive around the most is the Dodge Diesel 2500 ¾ ton Crew Cab. Teri drives the Ford F-250 Diesel ¾ ton super crew cab. I like both trucks but I am always looking at new ones. I guess it is a hobby of mine.

LSTJ: *How much longer do you see yourself throwing? What are some of your long-term goals?*

CC: I see myself throwing a lot longer. I am still relatively young in this sport. I want many more things in this sport before it is said and done. I know there are people who say they think they can break a world record and everyone else is like, "That guy is so full of s—." I truly think I have seen in my training and where I am in my life that I am capable of breaking the world record. There are many things that have to fall into place, but I believe it will happen. I also want some medals from World and Olympic Games.

LSTJ

THROWS PROGRESSION CHRISTIAN CANTWELL

Post-Collegiate		High School
2006	22.45 (73-8)	1999 SP 60-1 / 52-0 (16#)
2005	21.67 (71-1)	DT 190-2/174-4 (2K)
2004	22.54 (73-11)	
College (Missouri)		
2003	21.62 (70-11)	
2002	21.45 (70-4)	
2001	19.71 (64-8)	
2000	19.67 (64-6)	

Rolf Oesterreich

WEATHERING THE STORM

By Torsten Huelsemann

If you don't know the name Rolf Oesterreich, don't be ashamed. A native of East Germany, the under-sized shot putter (1.81m [5-11¼]/99kg [218]) competed curing the 1970's, but never represented the DDR. Oesterreich was treated as an outsider by the East German bureaucracy during the height of the cold war. While never imprisoned like Wolfgang Schmidt, he was denied the grand stage his talents deserved, as well as the validation of one truly special performance.

Oesterreich persevered in the face of athletic persecution and continued on as a trainer in Germany. Oesterreich was something of a rotational pioneer in his country, and continues today as a successful private coach.

***LSTJ:** How did you end up putting the shot?*

RO: I started late with athletics. Until I was 14 years old, there was only soccer for me. I was always good in throwing, and because of that I participated in district championships for athletics and won gold in the discus and silver in the javelin. This success encouraged me to start real training.

Since there was no athletics club in my hometown, I had to go to a neighboring city for training. From the beginning I was obsessed with the throws disciplines. It was also important to me to expand my knowledge throughout my training. Specialty books about the throws and power training gave me the opportunity to expand my knowledge to constantly improve my training.

After a few years, at age 18, I started to participate in county competitions in the discus and javelin for men. I was thinking about becoming a trainer. Because of that I attended college to become a sports teacher. I discovered very fast, that our high school team had a retired professional who was still able to throw the spear 70m, and because of that did not see a chance in that discipline. But the best shot putter just barely made 12.80m (42-0). That was my future. This was decided by coincidence.

***LSTJ:** How was your performance development as a shot putter after you dedicated yourself to this discipline?*

RO: At the beginning it slowly went ahead, because I didn't agree with the trainer from the high school team and his limp training method, which resulted often in disagreements.

After approximately six months, with mutual agreement, I went my own way and my performance in the shot and discus got better, as did my motivation after I started intensive training. I won for the first time in the district competition.

Every year I raised my goal with the shot about 1.80m. After I reached 16m the first time in 1974, I was looking for training methods and technique improvement to better my performance even more. I also looked at the spin technique.

I had a row of pictures from Baryshnikow and Oldfield, as an example. I tried it and to my surprise, the shot flew the first day as far as with the glide technique. The turn with the shot was easy for me, since I had the discus technique pretty well under control.

In training I was able to get a pleasant result with 18.05m (59-2), but almost nothing worked in competition. I was too excited and was asking for too much. I often took my last throw from a standing position or glide, which most of the times would not work. Therefore, in 1975 I registered an official competition performance of 15.64m (51-4). My stand performance from training was 15.98m (52-5)!

With the shot I was set back, but the discus flew surprisingly 54.26m. With this performance I was entitled for the first time to participate in the DDR (German Democratic Republic) Championships.

The twelth place finish wasn't much, but it gave me confidence to increase my effort. After that, I had lots of time in the winter half-year to think about it, and for experiments.

I realized that I had large reserves in the spin technique. I increased my power training again and discovered the importance of the special power for the spin technique. I accomplished a training performance of 19.60m (64-3) in winter. I did not participate in any inside competition.

Together with that I had an important experience that influenced my consideration of power training. I watched the European championship in weightlifting as a spectator very closely. At that time in middle heavyweight (up to 90kg), David Riegert managed 220kg in clean and jerk.

After the competition, this small athlete jumped from standing up to the 1.20m tall winners podium. I remembered the power weight proportion and that is how I realized that you can increase your power without a high bodyweight, as most of the shot put colleagues had. So I

found a way to improve even more my speed-power performance.

In the spring of 1976 I was able to train at a high level without any injuries and my competition performances (20.74m [68-0], 21.46m [70-5] and in the autumn, 22.11m [72-6.5]) spoke for themselves.

LSTJ: *Your technical idols were Barryshnikow and Oldfield. Did you try to copy them exactly, or did you try your own ways?*

RO: Of course I have tried at the beginning to copy my two idols. With my model of Baryshnikov, I had lots of problems, because he didn't hold his head vertical during the turn. I often lost my orientation.

In comparison Oldfield's technique was better. Every technique has its strengths and weaknesses, so you are never able to take over a technique exactly. From the first week on I used my own right leg swing from the discus throw and felt comfortable. The frame by frames did not play a role anymore. I always counted on my feelings, and because of that I created my own spin technique.

LSTJ: *Did you expect a performance of 20.74m (68-0.5) at the beginning of the season (May 2, 1976 in Ehrenfriedersdorf)? What was your best training performance at that time?*

RO: I never expected a performance like that at the beginning of the season. My best performance during training was 19.80m (64-11.5). I was hoping silently to reach the 20m (65-7.5) mark.
I couldn't forget and get over my failures from last year at the competition. When the judge announced the distance, I almost didn't believe him and he had to say it a second time to convince me.

Rolf Oesterreichs zweiter Versuch im Kugelstoßen bei den Meisterschaften des Bezirkes Karl-Marx-Stadt 1976. Edgar Kobemodel, einer der damaligen Kampfrichter, verfolgt aufmerksam das Geschehen. Wenig später hebt er die weiße Fahne. Der Stoß ist gültig. Vermessen wird er mit 22,11 Metern – Weltrekord. Doch die Leistung verschwand später ebenso aus den Statistiken wie eine Reihe anderer Spitzenwerte. Repro: Murkowski

Oesterreich's world record was acknowledged by a news account, but not by the East German federation.

LSTJ: *How was your series in this competition?*

RO: In the first try I had 20.74m, and the second attempt I wanted more, and I hurt myself pretty bad. With lots of power, the turn technique proved a failure most of the time. With that, my competition ended.

LSTJ: *How did your goal setting change after this performance?*

RO: Since I knew which performances the other DDR shot putters had until then (only a few centimeters more), I had in my head the subject of the Olympics. A couple of days later, I was called to SC Karl-Marx-Stadt and there they encouraged me in the direction of Olympics. I took the challenge.

LSTJ: *Did you experience any promotion or encouragement?*

RO: As of May 9, 1976, I was excused from work. Because of that I had much more time that I could be treated every day by physiotherapy. The excuse from work was a very important point for my performance development. For this special treatment I had to thank the district authority. But because of the influence of Berlin, they immediately withdrew this promotion.

LSTJ: *The first result of the season from 20.74m, and three-and-a-half weeks later it was 21.46m. That should have caused some awareness in the DDR. How was the reaction of the Union?*

RO: These results definitely caused awareness. I was immediately courted by all the big sports clubs. It seemed that the union was almost helpless, but in the background they already pulled strings.

What really happened, I didn't find out until after the turn (uniting East and West) when I was able to take a look at the Stasi file (that is a file which was put together by the DDR's highest secret intelligence, the Stasi, which was like FBI). For me there were just other rules, but nobody knew them before.

To qualify for the Olympics, the qualification distance was 20.90m (68-8.75), but for me it was 21.85m (71-8.25) - they asked from me the world record! [The world record of 21.85m was reached on February 21, 1976 by Terry

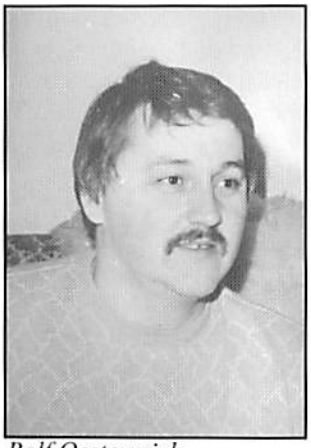
Albritton of the USA]

LSTJ: *Did you believe at that time, that you were able to make it to the Olympic games in Montreal?*

RO: When I didn't know that the qualification distance of 20.90m (68-7) had no meaning, I had big hopes to accomplish the jump to the Olympic Games. When I discovered that only a world record would make Montreal, all my dreams died. But they came alive one more time, when I reached 21.46m (70-5).

LSTJ: *What made your short flames of hope go out completely?*

RO: One week before the Olympic qualification, they let me know that the doctor of sports and medicine disqualified me with the reason that my body could not handle the permanent load of stress. That meant for insurance technical reasons, I couldn't get nominated for international competition for the DDR team. With that I also was not able to become officially a Performance Athlete in the DDR, which was necessary to compete in larger or international competitions. With not taking part of the Olympic qualification, a lot of the officials later on took that as I was afraid to compete with the 'big opponents.'



Rolf Oesterreich

LSTJ: *Juergen Bloss wrote in his documentary about your performance that an injury was also the reason that you were not able to be part of the Olympic qualification.*

RO: I did have had an injury. I had a tear in my back muscle. That happened three days before the qualification, because I didn't keep a clear head during my training anymore. This injury was officially announced to the officials as the reason for me not taking part. The disqualification by the doctor was never brought into public light. The disqualification by the doctor I only mentioned again when I had proof - the Stasi files!

LSTJ: *With what kind of feelings did you follow the Olympic Games in Montreal on TV?*

RO: On one side I followed the exciting competition with enthusiasm, because with surprise Udo Beyer won. Otherwise it was nostalgia to see what kind of role the two other DDR participants played at the competition.

LSTJ: *Was there any reaction from the side of the other athletes from DVfl (German Democratic Republic Athletic Association) in regard to your case??*

RO: Of course I was talking to the other athletes about my problem. I experienced very different reactions. The negative experiences with this situation I would not like to mention here, because most likely they happened because of ignorance. The athletes were only given the same official information as the public about myself. The most positive experience I had was with Udo Beyer. He was interested in my problem and stood by me, even though he was not always able to show this in public in the DDR at that time. We are still good friends.

LSTJ: *This of course explains why you wished him good luck at the Olympic Games. This was not naturally in your situation. Did you ever have a chance to compete with Udo Beyer directly?*

RO: I never had the chance to compare myself to Udo in competition. There were several more quality competitions, but they were only by invitation. Only official Performance Athletes were able to compete. I was never a Performance Athlete. Two years later there was a chance to meet Udo at a competition, but that again was prevented by the unfair ways of the union officials.

LSTJ: *After the Olympic Games there was your successful time- or at least what could have been your greatest time. When did you start training again and what were your goals? Did you focus on the world record?*

RO: I just didn't want to complete that year with a downfall at the end of May. Any further training was restricted after this injury. Inside of me I had a plan, to show that I was able to set the world record. It was important, that I had a goal again! I focused completely on my goal to avoid whatever happened before.

LSTJ: *Were you disappointed when Alexander Baryshnikov increased the world record to 22.00m (after Brian Oldfield marked as a professional a 22.86m (75-0) and surpassed as well as George Woods 1974 indoor effort)?*

RO: It would have surprised me if the world record survived the Olympic year without any damage. Brian Oldfield's 22.86m was hardly known in the DDR; therefore, it didn't play a role in my mind. The only surprise for me was that Baryshnikow made it.

LSTJ: *Who instead do you think could have made it?*

RO: My favorite for the world records was Feuerbach.

LSTJ: *And Udo Beyer? Or the other athletes from DVfl?*

RO: Udo was at this time the young one to strive for, for

whom 21m was already his performance. The other two were already way above the climax.

LSTJ: *Your training efforts didn't have any influence in the performance of Barishnikov, at least not negative. Please tell us about your preparation for the competition in Zschapau.*

RO: The result from Baryshnikov has made me work even harder. My goal was to increase the performance in bench pressing, pull and push. Much more important I thought was the increase in the fast power performance, especially in the reactive area. In the spin I made it step-by-step to get the left foot more active, to get faster to sit on the beam. In the special power I was also able to reach new records. When I could increase my stand push performance by about a half-meter, I was almost sure to have reached my goal. Approximately two weeks before the competition, I exceeded for the first time in training the 22m mark.

I became better every day as the results of the exercises helped to increase results in the throw. It was very promising. I reached almost every time the 22m distance and exceeded even that with 23.10m (75-9.5), the next highest barrier. This gave me the necessary security to announce on the competition day the record push.

LSTJ: *To announce a world record- that is very brave. How did the competition go? How was your series?*

RO: I had to announce the records, to give the organizer the opportunity to complete all the forms and condition for an acknowledgement. This was an international protocol, a doping check and a specific steel tape measurement. The competition itself moved along almost as expected. The only unexpected was foul in the first round.

The second time I reached the world record. It was measured 22.11m (72-6.5), and for me I had reached my goal. With that I completed the competition. I was so excited that I almost jumped over the closest standing soccer goal. I was not able to take one more shot put. Such a high I had never experienced before.

LSTJ: *Even though all the presupposition was fulfilled, they still would not acknowledge your record and all the other performance of the year. How did they explain that?*

RO: One of the officials prevented the fulfillment of the presupposition. He refused to fill out a certain protocol. To me he said before the competition, "You can throw as far as you want; we will never acknowledge a record from you!"

He predetermined what later was reality. Already at the winner announcement I noticed it said, "With the very good distance of 22.11m..." For half-a-year I didn't hear anything about this competition. Nobody spoke with me about it. After I read in March, 1977 in the yearbook of the district, that the second placer was acknowledged as the district champion, I wrote a complaint.

Nothing happened, no reaction! In October of the same year, I called the officials and I was "allowed" to listen to the assertion that my "shot" was not meeting the rules and qualification. Nobody could show any proof like reports from the judges, competition records or an official protest of this assertion. I just had to take it.

Later on the story about my shot got more and more exaggerated. One time it was said there was supposed to have been a filed mark for certain fingers on it. There were also assertions that it was supposed to have been flat on one side. Everybody "knew" something different. But the participating judges at the competition never objected.

LSTJ: *Did you have any kind of hope, after the competition, since you never heard anything about your performance or acknowledgement, that this world record would have been acknowledged?*

RO: At this time my priorities changed. My goal was to get into a trainer position. Because of that I kept quiet about the subject world record, since the same officials would decide about the trainer position. Since I had not heard anything, it was illogical that there would be any acknowledgement of the world record. Besides, there were no international protocols completed. But I still hoped for the list of the best.

LSTJ: *Back to the "weird" shot. Even though there was never any proof and later on as you supplied to DGLD (German Statistic Organization), it met the request, so you had to have it specially made for you. Why?*

RO: I was not only a relatively small shot putter, but also have small hands. Only at the big competitions did they have different sizes of shots in the DDR. Because of that, at most competitions I had to throw with those huge cast iron balls, and some of them went over my fingers. So I had to take a break every time. You couldn't get any Berg shots made out of brass to buy in the DDR. Therefore, I had a steel hollow ball specially made for me in a small size. She is absolutely round. The correct weight I produced myself with lead filling. Since the shot was not completely filled, I added art resin to it. Because of that the gravity of the shot lay outside of the center. Since the gravity is not mentioned in any regulations, it cannot go against any rules. This shot never went over my fingers, so it was worth it.

LSTJ: *In 1978 you participated in competition again. How come and how was your performance?*

RO: As of January, 1977 I was a trainer at SC Karl-Marx-

Stadt. With a little less effort, I continued my training. 1978 was the European Championship (EM) in Prague, Czech Republic. Because of that, the club management was asking me to give it another try, to get qualified for the EM. I started in February, 1978, to concentrate on preparation for this event. Training went well. At my first competition in May, I right away surprised everyone with 21.30m (69-10.75)! This performance I accomplished with a shot from the organization. After that I was nominated for the DDR Championship. And again the officials pulled all lines. They didn't let me go to the competition. Their reasoning was blank arbitrariness, such as, "Has not fulfilled all central starts and the performance never happened under central control." The party was always right! With this they created new rules and regulations, extra for me, which never existed before.

LSTJ: Was this the only competition or did you attend in 1978 any other competition?

RO: It was only this one competition, because they threatened me that if I competed again, I would loose my trainer position.

LSTJ: Did you continue training for yourself?

RO: Yes, I continued training for myself, since I was not ready to put the shot and weights in the corner. Also, as a trainer I still wanted to show my young athletes a lot. There was a third side. I was still motivated to discover more "secrets" of the spin.

I have definitely noticed, which details are more important to maximize your strength in the final output. For example, in 1978 I was at a much lower strength level when I reached 21.30m, compared to my 21.46m (70-5) effort. The distance between the stand shot and the turn technique shot was much bigger. This is one of the important points, to grade the technique level.

LSTJ: Were you allowed to teach your athletes the spin technique?

RO: They even expected that from me. But it is not advisable to teach everybody the turn technique. I also didn't have the most suitable female athletes for that. But it still was instructive for me, since the female shot putters technically had other possibilities as the males. They are more flexible and softer in the muscular system.

LSTJ: How did you feel, once again to follow the event in front of the TV?

RO: Since I was behaving so well, they even let me watch the competition from 22m distance directly in Prague. Again I was torn in pieces, since Udo barely won, but Matthias Schmidt only threw 19.36m (63-6.25).

LSTJ: What was there definition for 'behaving well'? The renunciation for your own competition?

RO: They were satisfied, that I did not write any complaints and did not compete in any competition.

LSTJ: How did it go with you career as a trainer?

RO: I looked after a group of girls as the new generation in the throw field. That meant shot, discus and spear. The girls were between 13 and 15 years old. After two years the first successes were showing. One 13 year-old became DDR champion with 38m with the 1kg discus and a 15 year-old pushed the 4kg shot 15.10m (49-6.5) far and also became the DDR champion.

LSTJ: In 1981 you tried another comeback. What was the cause that made you try again?

RO: There were always confrontations with the club officials. It got so far, that they blamed me for manipulating the shot of one of my female athletes. They declared that I also carved a certain spot on the ball for the fingers. Not even the thought, that the weight of the shot be thrown off and wouldn't be right anymore, helped.

That was the end of my career as a trainer, because the union is always right!! Since I wasn't a trainer anymore, I didn't have to stick to the "stay still agreement." So I trained determinedly, to attend competition. My plan was to compete at that time at a competition in Czech Republic, which they didn't approve for me. So I had to show again in the DDR, what I could do. The 19.36m, I accomplished with changing technique. Shortly after that I reached with the discus 55.50m (182-1) - my best competition distance.

LSTJ: Why with the changing technique?

RO: Right at that time I had a lot of problems with the spinning technique, because I turned too much during my training. Here you get a similar effect, as with a flop in high jumping "Hochsprung". Who does too much, will be short termed completely out of it.

LSTJ: Did they at least acknowledge the distance this time?

RO: It disappeared the same way, as all my other performances without any mention!

LSTJ: You mentioned confrontation with the club officials. What did it entail?

RO: Since I was publicly accused by Mr. Guelle (vice general secretary of DVfl, who already wrote the text on my start ticket to the DDR Championship in 1978) at a DDR Championship of the next generation, to have manipulated

the competition shot of one of my female athlete, what they never could prove. Therefore, I publicly, for everybody to hear, expressed my opinion, which was not very nice for him. The exact words I do not want to repeat here. Whoever publicly attacks such a "sun god", was unbearable.

LSTJ: *Why have your results not been recognized, and why were you not allowed to take part in international competitions?*

RO: In the DDR, not only the results were responsible for your career, but also the permission of the Stasi to be allowed to travel to foreign countries. They wanted to know if there was a danger that you would flee when you were out of the country. To be sure that an athlete would come back to the DDR after the competition was more important than success in competition. Such an estimation needs time! On the 2nd of May I made my first world-class-result, and on the 29th of the same month it was already decided about my non-participation at the Olympic Games! For the Stasi this was too less time, or the approval was refused. I never found out.

This caused one problem: how to explain to the population of the DDR, that didn't know about such examinations. Because of this, the breaking of rules excuse was invented. I found out about all this long after the fall of the wall in 1989.

[**Editors Note:** In 1976 all photos and documents of his competitions were stolen from Rolf's home.]

LSTJ: *What did you work at after you were not able to work as a trainer?*

RO: After a few short tries in different professions, I found a position as a gym teacher at a middle school. Also I was still a trainer at the police sports club.

LSTJ: When did you start to work as a trainer again?

RO: I never worked again exclusively as a trainer. I really wanted to keep my position as a teacher. On the side I was always a trainer, even until now, but only on a fee basis.

LSTJ: *Which distinguished athletes came to you for your help with the spin technique?*

RO: The first one was Matthias Schmidt from Jena, who was a group leader in the DDR era, and wanted to try the spin. After two years he accomplished 20.36m (66-9.75). After the turn (union of East and West), Astrid Kumbernuss contacted me, since she also needed help to learn the technique. This was the most hopeful and interesting job. She threw 20.03m (65-8.75) with the turn technique in the competition. Unfortunately she tore her ACL ligament and put an end to this experiment. Even our only current 20m spin-thrower, Peter Sack, was asking me for help.

LSTJ: *What do you think Astrid Kumbernuss would have accomplished if she would have kept going?*

RO: Since Astrid already reached 20m at the competition after only three months, which is an extraordinary short time, I was always sure that the 21m distance was really possible. From her standing throw performance, it could have been another meter.

LSTJ: *You said not every athlete would be suitable for the turn technique. Which prerequisites must a good spin technician bring along and which athletes should glide?*

RO: The very explosive shot putter has a better chance to be very successful with the turn technique. It is an advantage if they already master the discus throw. Then the orientation ability during the turn plays a big role for the transfer of power. The relatively small athletes have almost no possibility to reach, as gliders do, any internationally significant distance, so they should turn.

In comparison, very tall and slower reacting shot putters would be more fond of the glide technique, so they can add speed to the shot during the glide.

LSTJ: *Why did Oliver Duck (former German shot putter) try it with the turn-push technique? He is at least 2.14m (7') tall.*

RO: I do not know who recommended this change to Oliver. I often talked to him about this and saw him at development measures. I always found it interesting, if we would succeed to turn him around "correctly". With that I mean the output, which was never a true spin output with him, but in between gliding and turning.

LSTJ: *Why do we not have any successful female spin technicians?*

RO: In Germany they have turned very late to this subject. Now almost 30 years ago I accomplished my best performance with this technique. Since then I have not left out any chances to promote this technique in Germany. For two decades I have listened to the responsible trainers state, "We do not need the turn technique, since we accomplished the same performance with the glide."

Another reason lay in the fact that the athletes who transferred (from gliding to turning) took an average of two years to make the connection to their previous performance. Because of that, the "Kader" membership was in danger. [In the DDR, which was communist at the time, they had certain groups within the union/party. If you

belonged to them you did it there way or else—Kaderzugehoerigkeit.]

When a trainer is already doing an experiment with the spin, the non-existing experience of trainers with the power work is a big hindrance, and mostly after six months they quit with the turning. The type of power which is necessary is a different one.

LSTJ: *How do you understand it as a 'different type of power?'*

RO: In principal I mean the reactive ability of power, and especially high development of power in the shortest time.

LSTJ: *Even internationally there are no successful female spin technicians. Are women maybe (with very few exceptions) not suitable for this technique?*

RO: What I saw when working together with Astrid gives me the confidence to answer that women have the same chance as men for the successful usage of the spin technique. But there is always a difference in good and not so good female athletes. It is rarely being tried.

LSTJ: *Who do you think are the three best female and male shot put of all times?*

RO: The men I would like to divide into gliders and turners. From my point of view, for the gliders, Ulf Timmermann is the best. After that, I would say Randy Matson and H.-P. Gies.

I think Adam Nelson is the best turner, and after that follows Randy Barnes and Joachim Olsen.

With the women I see Astrid Kumbernuss as first. Natalia Lisovskaja and Ilona Briesenick follow closely.

LSTJ: *I actually expected the name Udo Beyer. Maybe not because of the technique, but at least because of all his success.*

RO: Udo of course was one of the biggest shot putters. I saw the problem more from the technical side and there he did not use all his potential. With him power was always his trump.

LSTJ: *Some people think the American Christian Cantwell has a chance after his performance from this year to get the world record. Do you believe that the performance from Barnes will be broken in the near future?*

RO: When I watched Christian Cantwell last year throwing, I noticed that his achieved distance mainly depended on his high power levels. At the same time there are still large reserves. Because of that, there is a possibility that Barnes could lose his world record soon.

LSTJ: *Could you give an exemplary training unity of power- and shot put training.*

RO:

Power: Monday:
Snatch: 3 x 135 kg
3 x 145 kg after 30m- sprint
2 x 155 kg after 30m- sprint
3 x 150 kg after 30m- sprint
2 x 150 kg after 30m- sprint
Bench: 8 x 190 kg
6 x 200 kg
4 x 215 kg
2 x 225 kg
4 x 215 kg

Thursday:
Pushing: 8 x 165 kg
6 x 175 kg
4 x 185 kg
2 x 195 kg
4 x 185 kg

Squats: 8 x 225 kg
6 x 240 kg then 3 reactive deep jumps
4 x 255 kg then 4 reactive deep jumps
4 x 260 kg then 5 reactive deep jumps
4 x 200 kg jump off

Shot put: Tuesday + 7.26 kg 10 x push in stand
Saturday 6.25 kg 10-15 x turn push competition style with 90 % intensity
6.25 kg 2 x turn push with full action
7.26 kg 15 x turn technique 90% intensity
7.26 kg 15 x turning from walking 90% intensity
7.26 kg 2 x turning from walking with full action

Rolf's weightroom bests:
Bench- 235kg (517#), Squat- 290kg (638#),
Snatch- 162.5kg (357.5#), Clean & Jerk- 205kg (451#)

LSTJ: *Did you do a lot of sprints and jumps?*

RO: Of course I did sprints, but that is nothing extraordinary when throwing. With the jumps my training was very different at that time than the current shot putters. I preferred mostly the reactive jumps, and to the extreme. From a jump height of 1.20m up to 1.40m, I landed on a sloping board, to only land on the balls of my feet and to try as fast and as high as possible to jump of again. The height to jump up was at least at 1.00m

LSTJ: *How did the jump-power training look like at the*

time of a top shot putter?

RO: Most shot putters used jump hurdles, box jump-ups and horizontal jumps.

LSTJ: *How extensive was your training for the middle class (core)?*

RO: For the middle class I did a lot. A very strong body (torso) is very important for the turn push. In general, I trained the back and stomach muscles and the sloping torso muscles, which are responsible for the turn between pelvis and shoulder.

LSTJ: *Which exercises did you do?*

RO: For the straight back and stomach muscles, I used the same exercises which were generally known and used. For the slopes I used a lot of the turn exercises with weights on my shoulders. Furthermore, I also used static turn exercise against strong resistance.

LSTJ: *On what level lay your best performance in backwards shots (overhead toss)?*

RO: This value played a very small role, and therefore I did not use this exercise very often. My best performance was 20.50m (67-3.25).

LSTJ: *Why do you think that this exercise is not important? For many throwers this test exercise is one of the most important ones.*

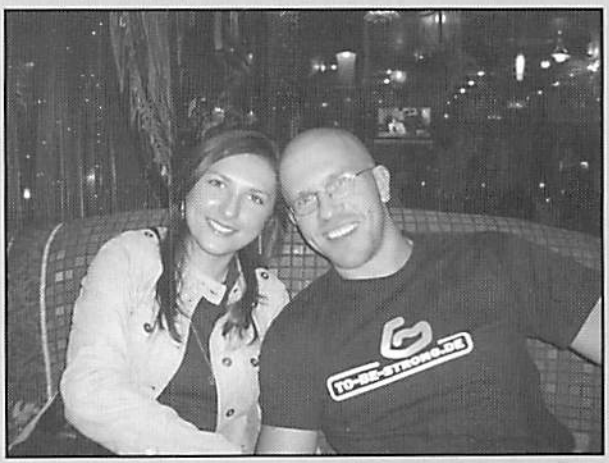
RO: For the gliding technique it is an important test exercise, because with most of the athletes the performance compares almost to the competition performance with gliding. In the spin, this only applies when you are not a real turner. That is, spinners who are getting a very small distance between stand and spin.
***LSTJ ***

**** German to English translation by Kerstin Hocker.***

German Torsten Huelsemann is 30 years old, married, and operates the internet site www.to-be-strong.de. He has a shot put personal best of 16.52m (2005).

After a competition in 2004, Huelsemann struck up a conversation with an official, (Juergen Bloss. "I asked him a if he ever heard about Rolf Oesterreich, about whom I had seen a TV report many years prior. Oesterreich threw a WR that was not mentioned anywhere. He did not only know about Rolf, he said that he was the one who published Rolf's case after the fall of the wall. He is member of a statistical organization and some years ago they had to decide if they would put Rolf's results on their lists. They eventually put his 22.11m on their lists."

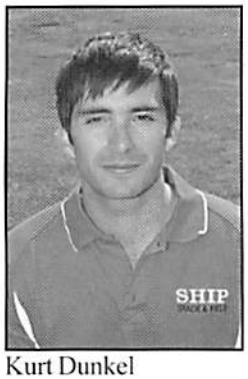
Huelsemann developed an internet correspondence with Oesterreich, which culminated in this interview.



Torsten pictured with wife Nataly.

Paradigm Shift

By Kurt Dunkel, Shippensburg University



Kurt Dunkel

The populations of Germany (83 million), Czech Republic (10 million), Finland (5 million), Norway (4 million), Russia (144 million), and United Kingdom (59 million) if combined will barely exceed the population of the United States (305 million vs. 300 million respectively). This is a very interesting statistic in many respects, but primarily from the obvious one. A difference in sheer population cannot explain the discrepancy between the number of elite, world-class javelin throwers from European countries (primarily the countries listed above) and those from the United States. Currently (November, 2006) 20 of the top 50 ranked javelin throwers in the world (men) are from the previously-mentioned six countries. Two are from the U.S., with the highest ranked thrower coming in at #31. On the women's side, it is a similar story; with the ratio being 15 to 2. If the tiny Baltic States were thrown into the equation (both men and women), the ratio would be even more dramatic. As I have talked to other coaches and throws aficionados about this staggering discrepancy, there are frequent attempts to try to conceptualize, rationalize, and explain this ongoing trend. Nearly the entire focus seems to be on four primary explanations. They are 1. The 'popularity' of the javelin in other countries (primarily Finland). 2. The lack of popularity of American style football in Europe. 3. The lack of financial incentive for a javelin thrower to pursue javelin throwing in the U.S. 4. The limited number of U.S. states (16) that offer the javelin at the youth level.

I find tee shirts with motivational sayings on the back to be interesting, and there is no shortage of these at a typical high school or college track meet. Even more interestingly, it is sometimes the coaches and fans with whom I speak about the aforementioned four 'excuses' about the poor state of U.S. javelin throwing who wear these motivational T-shirts. Often, the backs of the shirts will have a comment decrying those who make excuses for their performances. I find this very ironic because I feel I could make a counter-argument for each of the four previously mentioned 'excuses.' I feel I could also legitimately make the counter-argument that the primary reason that there are so few American javelin throwers at the elite level is actually because of a lack of knowledge about what it takes to be a successful javelin thrower.

I would like to briefly make some points counter to the conventional wisdom of the previous four points. First, contrary to popular belief, the javelin is not wildly popular in Europe (with the exception of Finland). Whereas it is surely more widely known in Europe than in the U.S., there is little coverage of the javelin in the popular media. There is no doubt that the true stars in these countries are the great soccer players. Basketball is also quickly becoming a very popular sport and there is no doubt that winter sports are still more popular than javelin in most of these countries. Ski-jumping and Super-G slalom have millions of passionate fans. Javelin does not (again, with the exception of Finland). Second, it would be hard to argue that football does not pull some potential young javelin throwers away from the javelin in the U.S. However, I wonder if Andrus Varnik and Jan Zelezny would be playing in the NFL if they grew up in the U.S. My guess is that they probably would not. Furthermore, the javelin is the throwing event which is governed the least by physical size and strength. Thus, my guess is that American football impacts the development of elite U.S. discus throwers and shot-putters more than it impacts the javelin. Oh, and last time I checked, there were no women playing in the NFL. Remember the statistic (15 to 2)? Only Kim Kreiner and Dana Pounds cracked the top 50. That might make us reconsider the football excuse. My argument is that actual motion of throwing the football is more detrimental to the U.S. javelin scene than is the existence of the NFL. I will talk more about this later. Third, I don't feel that a lack of financial incentive is a legitimate argument either. Sure, great javelin throwers in Europe may have the chance to make a bit more money than their U.S. counterparts. However, if you are one of the best track and field athletes in the world, you can make a living irrespective of your nationality or particular event. Fourth, although I do not have the date on the combined populations of the 16 U.S. states that offer the javelin, I would *guess* that the combined populations are nearly equal to the population of Germany. Pennsylvania (population: 12 million) offers javelin at the high school level. Pennsylvania has 3 million more people than Norway and Finland combined. Do the previous four factors influence the state of U.S. javelin throwing? Most likely to a certain extent, however, I feel that more significantly these are just convenient excuses. I hear these excuses less frequently around the shot put circle.

The purpose of this article is to focus specifically on the four main areas I feel are often overlooked in the quest to produce excellent American javelin throwers. I would like to make a few very clear points before moving on. First, most of the images in this article will be of male (right-handed) javelin throwers. I've found a greater availability of video footage of elite men than of elite women. Second, the comments in this article are intended to be in no regard disrespectful of the tremendous javelin throwers and javelin coaches in the United States. These are merely my observations and opinions. This article is not intended as a conclusion or 'settled law' so to speak. Rather, it is meant to be an assessment based on personal observation. I do not claim to be an expert.

In the opinion of this author there are four primary areas,

which may be significantly overlooked, in the early to middle period of the development of javelin throwers who have the potential to ultimately be elite. This is not necessarily true of higher-level throwers. This clarification should be emphasized because higher-level javelin throwers in the United States (and of course abroad) already place a tremendous amount of emphasis on these areas. It is my opinion that it is in the critical developmental stages of javelin throwers that not enough emphasis (and sometimes no emphasis whatsoever) is placed on these key areas.

The first two areas are what I would classify as lifestyle approaches. They are **diet** and **patience/commitment/persistence.** The following is only a brief statement about these areas because the primary focus of this article will be on the fourth and final area.

1. Diet – A javelin thrower cannot reach the elite level when consuming the typical American diet. Furthermore, a potentially elite javelin thrower cannot mature and progress through the appropriate developmental stages necessary to ultimately reach the elite level consuming this type of diet. The focus of this article is not on the appropriate type of diet for an aspiring elite level javelin thrower, nor does it address nutritional needs and physiological effects of diet on these athletes. However, the typical American diet will not provide the nutritional needs to a body that must develop the diverse athletic skills required for this event. In some regards, certain physical, mental, and athletic potential is permanently lost (and unable to be 'recouped') when the body develops in the absence of specific nutrients.

2. Patience/Commitment/Persistence – Elite javelin throwers are not made overnight. In a society where the primary issue of youth and adolescents is the inability to maintain focus and control impulses, it may be increasingly difficult to develop javelin throwers with the patience, commitment, and persistence to devote the majority of their emotional and physical energy to one single goal: a goal which may not be satisfied for ten years or more. Whereas the young and resilient body is a tremendous advantage to a javelin thrower, it is a known and understood fact that elite level javelin throwers under the age of 22 are not very common. One of the more interesting and challenging aspects of javelin throwing at the elite level is the purposeful effort to have the separate growth curves of age, performance, and preparation meet at a place which equals optimal performance. The rise of elite, young javelin throwers like Thorklidson and Pitkamaki, while exciting, is more rare. But keep in mind that it has taken about ten years for Pitkamaki to reach 91 meters. In 1997 Pitkamaki threw 57.50 with a 600g javelin. In 1999 he threw 66.83 with an 800g javelin and in 2005 he threw 91.54m. Athletes like Backley and Zelezny have proven that if older javelin throwers can remain robust, physically dynamic and healthy, they can actually improve with age. However, I would argue that it is very, very difficult to reach the elite level as a javelin thrower by starting at age 18, throwing a full-weight implement, and developing bad habits. Starting earlier, throwing a lighter implement, and learning sound basic throwing mechanics is necessary to reach the elite level in most cases. Heck, little league usually starts at age 6. Parents in the U.S. spend millions of dollars on clinics and instructional videos which teach young kids the proper mechanics in baseball. Male shot-putters move to a heavier implement as they get older. I feel this helps to teach proper technique and provide them with a fresh, new challenge.

3. Training - Often we totally miss the boat in regards to training for the javelin throw. One of the biggest challenges we face is how to *totally* destroy the weight room mentality that is the current paradigm with so many high school and college throws coaches. The weight room mentality is very intriguing and addictive because so many young javelin throwers begin lifting when they begin throwing the javelin. Naturally, many will see significant increases in their distance based on four factors: repetitive throwing, luck, maturation, and lifting. First, anyone will find improvement the more they do something. Second, the more throws someone takes, the greater the chances they will get lucky and hit a big throw. Third, most throwers will experience physical maturation which will increase their athleticism, strength, and capacity for work. Finally, the basic lifting that young throwers do will begin to increase strength levels which will, in turn, begin to positively impact throwing results. The improvements, which often occur are not always a result of improved mechanics or sound training. The weight room mentality is intriguing and addictive because it fools us into thinking that early improvements are a result of the same weight training principles which ultimately can be limiting and counterproductive to throwing the javelin very far.

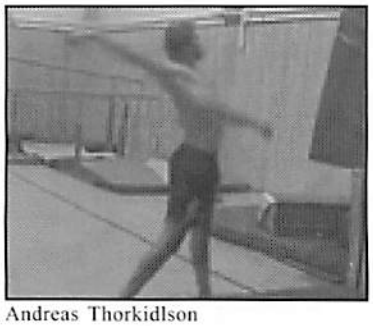
If other states are similar to Pennsylvania, then it may be safe to assume that quite often a throws practice consists of a lot of hanging around and making small talk. A culture begins to develop. This culture says throwers don't work too hard, they eat a lot, and are big. Pretty soon, being bigger is the end game. Bodybuilding and lifting heavy weights can be very helpful to getting bigger, but in many ways they are not always helpful to throwing a light spear very far. Common sense tells us that an athlete that 'puts' a 16 pound ball from the shoulder will have different training needs than someone who slings a 2k plate or someone who throws a 800 gram spear. Keeping in mind that there is a place for weight training for javelin training, I ask the question: How does lifting heavy weights (oftentimes single joint lifts) in a slow manner help the body propel a light object at a high rate of speed?

In some regards, this type of training does not assist in this end goal. Typical weight training is often well-suited for assisting in the development of *absolute strength*, which is helpful in the recruitment of greater amounts of muscle

*** Image editing and enhancements courtesy of Jason Durham**

fibers and the strengthening of tendons and golgi tendon development. However, heavy and slow weight training is not necessarily beneficial in the development of *relative strength.* In a recent interview (December '06) in *Track & Field News,* Jan Zelezny touched on an interesting point regarding relative strength. He stated that the ideal javelin thrower truly does not exist; however, if they did, they would have a muscular 6'4 ¼" frame and possess the coordination and technical ability of a 5'7" gymnast. The key here (in my opinion) is the notion of relative strength. Primarily, the men's javelin is fairly light, and the women's significantly lighter. Because of the relative lightness of the implement and the level of athleticism and technical proficiency needed to excel, relative strength and athleticism are at a premium, arguably more so than the other throwing events. Consider the following world class throwers' height and weight: Zelezny – 6'1" / 195, Pitkamaki – 6'5" / 203, Thorkildson – 6'2" / 198, Varnik – 6' / 220, Vasilevskis – 6'2" / 196. These are very athletic proportions.


Tero Pitkamaki


Andreas Thorkidlson

These athletes spend a great deal of time running in various forms (i.e., long distance, short distance, fartlek, repeats, sprinting, bounding, agility, trail and mountain running). Athleticism is a priority and weight training is quality and usually very dynamic and quick. The goal is producing the maximum amount of force in the shortest amount of time. Pitkamaki's weight room bests are very impressive, yet not earth shattering: Snatch: 120kg, Jerk: 152.5kg, Back Squat: 185kg, Bench: 160kg, Pull-over: 85.5kg. Zelezny possessed stunning relative strength. For example, his best pull-over was 264 lbs! Elite javelin throwers possess tremendous amounts of relative strength. However, it is critical to be mindful of the fact that the increases in maximal strength that are seen at the high school level (where all the throwers practice together with the goal of getting bigger) quite often result in decreases in relative strength. Carrying excessive bodyweight can sometimes be a path to injury and limited *long-term* success.

The *coupling time* is the time between eccentric and concentric muscle action. All things being equal, the athlete with the ability to produce the shortest coupling time will produce the farthest throws. While coupling time does have a genetic component, it can be decreased with effective training. Clearly, plyometric movements and dynamic weightraining are effective ways to develop fast twitch muscle fibers and increase tendon strength. There is a tremendous amount of research and information available on plyometrics and effective weight training for reducing coupling time and ultimately helping produce longer throws. However, there is a smaller amount of research that is often overlooked in the development of training plans for javelin throwing. This is regarding the use of isometric training for the advancement of tendon strength, golgi tendon development, and relative strength improvements. Martial artists possess the ability to produce incredible amounts of relative strength. Specific martial arts, Tai Chi and Chi Gong exercises have a specific isometric focus and are highly effective for health and strength development. Notably, this is a strength development, which is not taxing on the nervous system, skeleton, and tendons. In recent years, Pavel Tsatsouline has become quite a common name, possibly attaining guru status. Many of Pavel's ideas are based on body weight exercises, isometrics, and movements, which are restorative and energizing rather than physically demanding (i.e., plyometrics and Olympic lifting). Koji Murofushi has continued to develop his brand of isometric exercises he terms 'hammerobics,' which he feels have allowed him to recover from a back injury and continue his career. Andreas Thorkildson spends a great deal of time focusing on isometric exercises which safely load his core and allow his body to continuously develop the stabilization needed to absorb such massive amounts of torque.

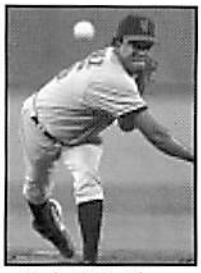
I feel it would be useless to attempt to spell out a training plan or training philosophy, which would address the diverse needs of individual athletes. Again, this article is general in nature and is intended as a reaction to the outstanding, current, overall 'holes' in the approach of American javelin throwing, particularly at the developmental level. Specifically for the javelin, focus should remain on these facets of training. Ultimately, these are supplements to the most important goal: the throw itself. The final area on which I would like to focus is **technique and mechanics.**

4. Technique And Mechanics

The javelin is unique in the fact that it requires a simultaneous and dynamic coordination of tremendous stabilization *and* maximal force development. Any and all analysis of technique should be approached with this idea in mind. Ideally, the thrower must possess enough athleticism and kinesthetic awareness to relax the body and wait for the arrival of the exact time to begin the delivery. If the U.S. is to produce world class javelin throwers with any consistency, there must be a complete rethinking in the way most beginners are taught how to throw. This is the key. In the United States, the most common idea of 'proper' javelin throwing mechanics is derived from pitchers and quarterbacks. This does not work and (as previously stated), I feel the quarterback throwing motion is more destructive to the development of javelin throwing than football itself. If you walk around a European park, you see kids kicking soccer

balls. In the U.S. you will see kids tossing a football or baseball. These two sports alone have taught most American kids a throwing motion that works great for those particular sports, but has limits in its effectiveness to throw the javelin far. I would argue that, while the javelin is in many ways dissimilar to the discus throwing motion, it is actually more similar to elite javelin technique than are the mechanics of quarterbacks or pitchers. Keeping in mind that the mechanics of the javelin are uniquely its own, I feel the technique displayed in the following images can teach young throwers some very important 'secrets' to sound javelin technique: things which are often overlooked at the developmental level. I feel we have much to learn about how someone can throw a 2kg discus 75 meters - more than we have to learn from someone who can throw a 100 mph fastball.


Dan Marino


Pedro Martinez

There are four primary technical points, which I feel are not only often overlooked in the developmental period, but also are crucial to maximizing the potential of a javelin thrower. Clearly, each thrower will need to develop throwing mechanics, which are most suited to their physiological strong points. However, elite javelin throwers have demonstrated an ability to execute the following four technical components consistently.

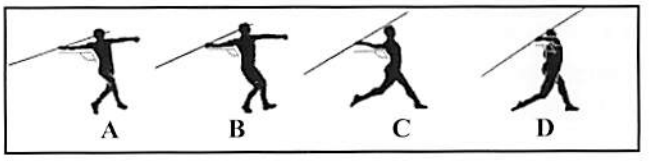
A. Angle Between Torso & Throwing Arm

One of the most common mistakes I see at high school track meets occurs when the thrower drops the throwing hand in an attempt to 'load up' and absolutely crush the throw. When the throwing hand drops, the throw is lost. Obviously, this angle has a close relationship to how the thrower uses the right foot upon delivery. There is clearly a tendency to drop the right arm when the thrower loads up or crashes down onto the right. The action of the right foot has been the subject of some degree of 'debate' in the javelin world. However, most would agree that touch down must be under the right hip (neither in front nor behind) and the foot must be turned forward enough to initiate the throw. The primary goal of this action is to initiate the 'hip slam' necessary for successful throws. However, the secondary (and very important none-the-less) goal is to allow the throwing shoulder to smoothly move forward *without dropping.* This is one of the easiest things to spot in video analysis. Pick out a stable point behind the thrower and observe the extent to which the throwing hand drops during the penultimate, during right foot touch down, and during the transition to block and delivery. Also, observe the angle between the throwing arm and torso. Is it consistent? The following images are based on Andreas Thorkildson. Image B demonstrates the ideal foot placement and how it supports a consistent arm angle, which is evident in A through D. Beginning throwers with tight shoulders often try to drop the hand because they do not yet possess the range of movement that the below images display.

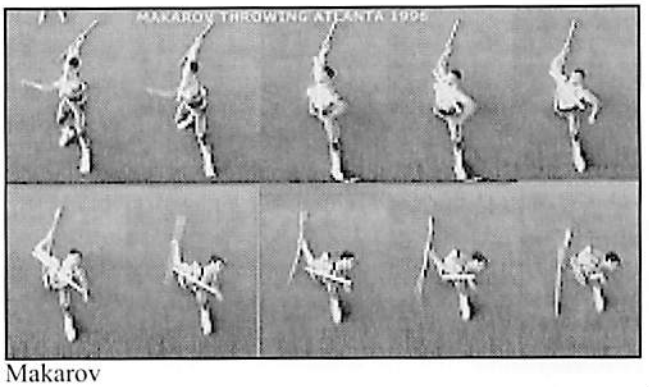

What could a javelin thrower learn from Franka Dietzsch?

B. Closing of Angle Between Throwing Arm and Torso

Many novice and advanced throwers alike will frequently make a quite costly mistake. They will attempt to 'close' the angle between the throwing arm (specifically the humerus) and the torso prematurely. First, notice in the image of Makarov that this angle nearly stays exactly the same until the javelin is released. Second, notice that he does well to make sure that his left shoulder does not drift too far open at left foot touch down. These are the vital building blocks to the final point of reference. Notice that when he begins to exert an impulse onto the javelin, it is still in a position in which he can exert maximum force. It is still within his system and close to the midline of his body. The right hand has not drifted outside of his right foot.



The hand does not move outside of the right foot until after his musculo-skeletal system has been 'loaded.' Upon delivery, the torso – humerus line is perpendicular to where it was upon right foot touch down. The amount of strength and stability required in the hip flexor, latisimus dorsi, serratus, and abdominal muscles is tremendous. Finally, the thrower must be patient enough to wait for the precise moment to strike the javelin. Anxiety, excessive aggression, loss of focus, and impatience can all contribute to a premature closing of this angle.



Makarov

C. Throwing From the Ground Up

A house is only as strong as its foundation. How many times have you heard this? The notion of throwing the javelin from both feet seems strange when so many of us are trained to 'post' over the throwing leg. If one follows the chain of impulses from the throwing arm, through the core, and the legs, one ultimately comes to the source of power: the ground. The more force a thrower attempts to put into the javelin at impulse, the more support from the ground he will need. Most elite level javelin throwers effectively keep their body balanced more than novices.

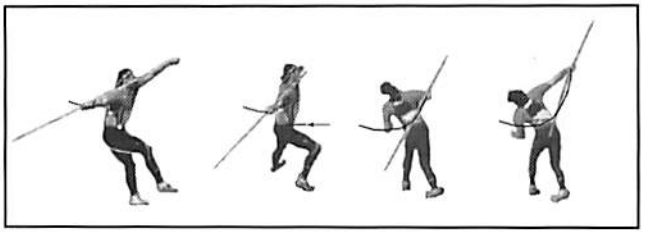
They do not prematurely open the non-throwing shoulder. In my opinion, this helps the thrower to create support and generate power from the rear foot. As previously stated, this will help to prevent the throwing shoulder from dropping. It will help to keep the javelin moving forward and prevent a 'dead spot' or 'stall' in the delivery. But most importantly, maximum force upon impulse can be developed if the thrower 'throws from both feet.' If one reviews the photo sequence of Zelezny's current world record, it is obvious to see how he utilized a strong double leg action. To use both legs effectively means that the thrower will create a wonderful 'reverse C' position. This requires hip stability and strength. Keeping in mind that many of us have shortened hip flexors due to our sedentary, seated nature, a reverse C may sound like a daunting proposition. Might a kid who has grown up kicking a soccer ball have the hip flexor development, which his football tossing counterpart lacks? At the 2005 World Championships, Andrus Varnik unleashed a wonderful gold medal throw in treacherous conditions.

The middle image demonstrates the balanced position needed to produce the dynamic load he places on his right side. It is difficult to simultaneously be very active and precise with the lower body while also being very patient with the upper body. This is why starting throwers at a younger age is often beneficial.

Varnik

D. How to Move the Left Side 'Out of the Way'

If you hold your elbow stationary at the level of your shoulder and move your hand in a 'throwing motion,' you will notice that your hand follows the path of a semi-circle. This is problematic when trying to exert force onto a straight object. The dilemma is how does a javelin thrower most effectively use the left side in order to create a throwing hand movement, which is linear and not semi-circular? Franka Dietzsch wonderfully demonstrated the physics lesson we all remember from high school. A wider orbit means more energy. First you may notice that watching the javelin from the front or back can be, in some regards, much more revealing than the traditional side view. You also may notice that many elite level throwers 'wrap' the javelin and frequently throw to the right side of the sector. Note the following images of Pitkamaki and Thorkildson. Pitkamaki fluidly rotates his hips left of the center of the sector, which makes the 'wrap' appear even more exaggerated. The arrow indicates how he moves his hips in order to 'line up' the javelin. As he moves his hips, his hand remains very constant (which maintains the arm – torso angle). This also helps him to keep his right hand behind his right hip and within the body system.



Thorkildson's movements are not identical, but the principles are similar. The line across the sector can be used as an anchor to monitor his movement. Notice the hips do not drop significantly; nor do the shoulders. The delivery is the aspect that is overlooked by many beginning throwers and coaches. Instead of continuously telling their throwers not to 'bail out,' coaches should explain that for the throwing hand to deliver along the shaft of the javelin, the left side needs to 'move out of the way.' This motion can be supported when the block leg has moved out toward the left sector line. Elite throwers not only support this left side with a 'wide' left leg, they also have developed the flexibility needed for the hand to still be back. As you can see in the final Thorkildson frame, he has moved the left shoulder (i.e. dropped his scapula) out of the way, so that the reverse C can provide a tremendous impulse in combination with a wide orbit. As noted in the Makarov image, the hand remains within the body system as long as possible, while at the same time, attaining a wide orbit. Beginning throwers have a tendency to attempt to deliver the javelin too early and they often do not rotate their hips open completely. Thus, they will truly 'bail out.'

There is no shortage of talent, knowledge, and coaching in the United States; certainly enough to produce elite level javelin throwers with regularity. Starting throwers at a younger age with age-appropriate implements is necessary. It is my hope that this article serves to supplement the vast body of javelin-related knowledge. My goal is that this article serves to highlight some of the main areas, which are often overlooked in the quest to produce better javelin throwers. ***LSTJ***

Emerging Highland Star

Dave Barron

By Mark Valenti

When does an athlete become elite? Is it when he produces world-class throws at his home meet? Is it when he beats a world-class thrower? Or is it when, time in and time out, he hangs with the best throwers in the world, throws far distances in all kinds of conditions in all kinds of competitions, and throws lifetime best throws in the World Championships? I would say the latter, which brings me to the subject of this interview...the one the only Dave Barron.

Dave is a strange person, make no mistake about it. The first time I met him he had painted toe nails. He takes more good-natured ribbing than any other thrower on the pro-heavy events circuit and I truly think he enjoys every minute of it. It's easy to get a kick out of your buddies making fun of you when you go out and pound them into the dirt every Saturday with an uncanny ability to throw far on a weekly basis.

Unlike track and field, the heavy events are an every weekend thing. There is no use trying to peak for a certain meet, because there is money on the table week after week. No rest for the wicked.

Dave Barron was made for this sport. He seems to be able to turn it up on a weekly basis and let loose monster throws at a moment's notice. At the world championships this summer in Pleasanton, CA, he nearly did the unthinkable when he came within a couple of points of beating five-time world champion Ryan Vierra. Dave placed second with one of the most outstanding performances of the season.

Dave Barron

Thus it is my pleasure to introduce Dave Barron.

LSTJ: *What year and how old were you when you started in the Games?*

DB: I competed in my first games in Ligonier, PA in 1989, when I was 17 years old.

LSTJ: *How did you get involved with them?*

DB: I've always loved throwing. I first found a shot put at summer camp when I was 14, and right away it struck a chord in me - something about the history and obscurity (for me) of the event. I became a pretty decent shot putter in high school (52 feet or so) and when I heard about the Highland Games, I figured they would be pretty easy. Well, the first person I saw when I got to the field was 6'6" 360-pound Paul Ferency, and I just about crapped in my kilt. I didn't actually have to throw against him, but I got my butt handed to me all day long. Since then I've been hooked.

LSTJ: *What is your current height and body weight?*

DB: I'm 6'3". This year I got up to about 282 lbs. The extra weight definitely helped me in some of the events. What's the old saying about mass moving mass? But I feel better and move better at around 265-270. So I'm going to try to lean down a bit over the winter without giving up too much strength.

LSTJ: *How were you in the track and field events and what were your best events?*

DB: I threw shot, discus and javelin in high school and college, but the shot was my best event. I pretty much gave it up when I got to college though in favor of the hammer. I'd always wanted to throw hammer after seeing "Wee Geordie" [Ed. Note- movie from the 50's about a Scottish kid who is very skinny and weak and gets a mail order weightlifting program and becomes big and strong and starts throwing the Scottish hammer. He makes the Olympics in the hammer but is not allowed to wear his kilt.] when I was a kid.

LSTJ: *What college did you attend and did you compete in track and field in school?*

DB: I went to Connecticut College, a small DIII school that didn't even have its own track or throws coach. I trained across the road at the Coast Guard Academy. I learned from watching other throwers and figuring out the footwork for myself. I never got over 190' in the hammer, but managed to throw the 35-pound weight 61' and take second at NCAA DIII Nationals. At the time I didn't know what a power clean was or how to squat - I would just bench press (had

to work the pecs to impress the girls) and throw, throw, throw. Boy, if I had it to do over again.

LSTJ: *Who were some of your role models when you were coming up through the ranks?*

DB: Mostly the guys I competed with. I was clueless for years about the earlier athletes who paved the way, guys like Jim McGoldrick and Ed McComas, who are my role models now.

Once I got serious about throwing, I met a lot of incredible athletes who helped me out. Don Stewart and Art McDermott let me come train with them for about a year when I lived in Boston, and I learned more in that year than I have since. I've thrown against World's Strongest Man competitor Steve Pulcinella, Olympian Petur Gudmundsson, Francis Brebner, Matt Sanford - some of the true greats in our sport.

I think the biggest influence on me has been Ryan Vierra. The guy's been the best for years, and knows more about throwing and training and the history of Highland Games than anyone else, and he'll help anyone who asks. He's seen and done it all, and he still has more passion for the Games than anyone I know. He's a great competitor and a great friend.

LSTJ: *What's it like having a brother on the circuit? How competitive are you guys, and what is your best Will story?*

DB: What about his first pro Games in Richmond where he broke all the weights? No kidding, after the 28-pound weight and the hammer broke on his first toss, he broke the 56-pound weight for height too. He went to pull on it and the chain broke - he must have flown five feet up in the air backwards and landed flat on his back. A legend was born that day.

Seriously, it's great having him to throw with. He's all the way up in Syracuse, so we can't practice together very often like we used to, but we'll trade training tips and workouts and help motivate each other in the off-season, and then talk about how far we're going to throw at the next Games, and make bets about who's going to win - he still owes me a few beers. He's actually always been a much better natural thrower than me - he could always throw a football farther than me, even though I'm six years older. And technically, I'm still trying to be half the athlete he is.

LSTJ: *You had one of the best amateur-to-pro classes ever with you, Harrison Bailey, Mike Smith and Roy Bogue turning pro all around the same time. You guys seem to have a really special bond.*

DB: Yeah, the class of 1999 was something special. One of the greatest things about Highland Games is hanging out with your buds, and those guys have-become some of my best friends. Competing alongside guys who knew you way back when is a lot of fun, and we have plenty of stories I won't reveal here. Roy and Mike are pretty much retired with injuries, which definitely sucks. But Harrison just became the first man in years to beat Vierra for the American Championships, which was awesome to see. Huge props to the man.

LSTJ: *How do you feel your season went in 2006 as far as highs and lows? And what does the off-season have in store for you?*

DB: Overall I was pretty happy with the season. I set PR's in the 56-pound for distance and the weight for height, thanks to being bigger and stronger this year. I wasn't so thrilled with my other events, I just didn't have enough reps under my belt to get my technique down. But my biggest goal, like always, was to do well at the Worlds. And I managed to grab second place in a tremendous field of athletes, so I can't complain!

LSTJ: *What are your goals for 2007?*

DB: Again, I'm shooting for the World Championships. It's being held in Inverness, and I've always loved competing in Scotland. The Worlds are always a highlight for me, because I get to travel, see friends from around the world and be a part of history. I've competed in the Worlds five times now, and finished second twice. So who knows what's going to happen next year.

LSTJ: *You actually got to compete in some the strongman events this year over in Europe. What did you have to do and how did you stack up against guys like Mikhail Koklyaev and Kirilo Chuprynin?*

DB: Ouch, don't remind me. Those guys are beasts. Douglas Edmunds had the brainchild of inviting some of the strongman competitors with throwing backgrounds to compete in Scotland. Koklyaev, Chuprynin and Sebastian Wenta from Poland were all there, and somehow I got invited too.

It was a combination Highland Games-strongman comp, with Atlas stones and max log clean and press. I took fourth in the log press with 325 lbs. and bowed out of the stones after tweaking my back. But I had a great time hanging out with those guys and would do it again in a second.

LSTJ: *What is your favorite event to throw and why?*

DB: Whichever one I'm doing well in! Honestly, it depends on the day - sometimes my technique is in the groove and the implement throws itself. Other days the technique just goes into the crapper, and all you can do is grip and rip. The great thing about the Games is how

balanced the events are - the stone, weights and hammer are all about technique and timing, while the sheaf, 56-pound for height and caber are pure power and strength. Not to get on my soapbox, but that's a big part of why I'm against modifying the events with the spin. With the "pure" events, you can't win with just strength or just technique, you need the balance of both. Spinning changes that.

LSTJ: *So should they ban the spin in the weight for height, and if so why?*

DB: Yes, because they're cheating!

LSTJ: *What are your PR's in the Heavy Events?*

DB:
17-pound Stone: 52'4"
56 lb. weight: 46'3.5"
28 lb. weight: 84'6"
16 lb hammer: 135'
22 lb hammer: 116'
56 lb weight for height: 17' (stand only)

LSTJ: *How about in your gym lifts?*

DB: I would have a tough time giving you exact maxes. I gear my lifting to being explosive in the throws, and not towards total poundage. For instance, I'll do sets of three as quickly as possible instead of a 1 rep max in the squat, because otherwise I'm moving too slowly to carry over into anything useful. That being said, I figure I would be good for 500-550 pounds in the back squat (high bar, Olympic style). I've also power cleaned 315, done a 225 hang snatch, front squatted 405 and done 325 in the bench press back in high school. I'm considering getting back into bench work to try and help my stone for next year, as well as more push presses.

LSTJ: *What do you love about the Highland Games, and throwing in general?*

DB: The travel. The friendships. The festival atmosphere. Wearing a skirt. What's not to love? But the best part is simply getting the chance to throw stuff. I just love to throw, no matter the event. Throwing is just the greatest athletic activity there is. When the balance and the power and the technique come together and you hit a good one, there's just no better feeling. I used to sit in class back in college and just visualize hitting the perfect hammer throw - I still do, but now I have seven different events to choose from. ***LSTJ***

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Pre-Season Training For The Hammer And Weight Throw

By Glenn McAtee, Clemson University

As well as being technically demanding, the hammer throw is a physically demanding event. Preseason training must address general fitness, but must also provide a technical foundation and specific conditioning to ensure success for the thrower in the indoor and outdoor seasons. Most hammer throwers will also compete in the weight throw during the indoor season, so preseason training must account for the special challenges of that event too.

All training, regardless of time of year or event, must address the five bio-motor elements: skill, speed, strength, suppleness, and stamina. I have presented the bio-motor elements in the order of descending importance for the hammer and weight thrower. I believe that this order of emphasis does not depend on the time of year, but instead remains the same throughout the training year.

What are the elements, what do these elements mean and how can they be measured?

Skill: Proficiency in accurately performing the skill of throwing the hammer and weight under competition conditions; the coach assesses the skill level as he compares the thrower's skills against technical norms. Also, comparing performance at practice against performance in the meets will reveal if the skill is stable under competition conditions.

Speed: Rate at which general and specific skills can be performed. For example, a hammer thrower must be able to turn rapidly (specific skill). This can be measured by throwing of light implements. Also, being able to perform general skills (sprinting, agility drills) rapidly is a plus.

Strength: Ability to overcome outside resistance. Lifting exercises are a good expression of strength and are easily testable. For a hammer thrower, the ability to squat, snatch and clean large weights is important, but not nearly as crucial as being able to move with the implements. Heavy implements reveal weaknesses in the thrower's technique and specific strength.

Suppleness: Range of movement in joints, or combinations of joints, is important for all sport skills, including the hammer and weight throw. A hammer thrower must have good range of motion in the shoulder girdle to obtain maximum radius and a good range of motion in the ankles to allow for proper turning. Additionally, the thrower must have good flexibility in all the muscles that connect to the hips and vertebral column in order to prevent injury to the spine. An athletic trainer can perform range of motion tests and problems can be identified and corrective exercises can be prescribed for the thrower.

Stamina: Not many throwers have a lot of general endurance; send them on a 10 mile run, and most would not return.... ever. However, an athlete who throws the hammer or weight 30-60 times in a session must have a high level of specific endurance to complete all those throws with good technique. Add in some weight lifting and other conditioning and you are really tapping into the thrower's stamina!

The challenge for the coach is to prepare a pre-season training plan that addresses the five bio-motor elements. First we need to re-examine the bio-motor elements to see what should be done during the pre-season as we address each element.

Skill: Any major changes to the thrower's technique should be addressed during the pre-season. The first step is to assure that the thrower understands the nature of the technical errors and also understands what the correction will look like and how it is made. Video analysis is invaluable for improving the cognitive understanding of the thrower and improving coach-athlete communication. Next, the thrower can begin his error correction either with full throws or drills, or any combination of throws and drills; both approaches are valid. One of the most helpful tools for the pre-season is doing multiple turns with a variety of implements. Ten or more turns with a hammer, medicine ball on a rope, or stick will not only give the thrower a chance to work on his ability to turn, but it will also act as a specific conditioning tool. Working up to 300 turns a session will enhance the specific stamina of your thrower!

Speed: Both general speed and specific speed have a role in the ultimate performance of the hammer or weight thrower. It is important to include speed training from the very beginning of the year. One approach that I like is to start the year throwing light hammers. Not only does this get the thrower thinking and moving quickly, it also prepares the body for the stresses of heavy hammers and throwing weight work to be done later. In addition, more throws can be done with light hammers, which allows the hammer throwers to build a base of specific endurance.

For general speed, there are a variety of approaches that are suitable for the pre-season. I like to start short and work to long with sprinting. Most of my work in the pre-season would involve 10-20 meters sprints from a stand or crouch. I feel that this approach is a great way to get the thrower started sprinting while minimizing the risk of injury. It is important to note that fast sprinting is a great general speed exercise, but that the correlation between fast sprinting and fast turning with the hammer is not strong. Therefore, while some sprinting should remain in the program throughout the year, it should never take the place of the more specific work with the hammer.

Strength: The value of good strength training for the hammer thrower can never be underestimated, but it is possible to overemphasize this bio-motor element.

Throwing any implement that is heavier than normal, or doing any hammer drill with added resistance is going to improve specific strength as long as the movement pattern is correct. While it is possible to begin pre-season training with heavy hammers, it is often better to save the heavy hammer throwing until some adaptation to training has occurred. I favor more turning with heavy hammers, and less throwing during this early period of training. I would recommend throwing of kettle-bells (also known as puds) during this time. Not only will this improve specific strength, but it will also help to condition the body for the demands of the in-season training.

The pre-season is also a time to work on the lifting technique of the thrower. It is necessary to perform all lifts correctly, not only for safety reasons, but also to improve effectiveness. Don't turn your throwers into Olympic lifters or powerlifters, but instead assure that they have good basic technique in all the lifts that you will use during the upcoming year.

Using exercises arranged into a circuit is also very beneficial during the pre-season. Circuit training, either with or without weights, not only can improve general strength, but with different exercises can boost specific strength as well. The effect of the cardiovascular system is strong if the circuit is done with short rest periods, and circuit training has a good effect on improving body composition.

Suppleness: The pre-season is the most sensible time to work on improving a thrower's flexibility. As mentioned before, a good place to start is the comparative range of motion assessment that is performed by someone (like an athletic trainer or physical therapist) qualified. In this type of test, the ranges of motion of all major joints are compared to norms and also between the two sides of the thrower's body. The information gained from this type of assessment will allow for the rational planning of a flexibility routine. All too often we see throwers stretching patterns that are already good and ignoring patterns that are poor. I would argue that it is better to have poor flexibility in all your joints rather than having good flexibility in some joints and poor movement in others. When all the joints are tight, they share stress equally, but when only a few joints don't move as they should, the stress is placed squarely upon them, and they become overstressed. Well-planned stretching can correct this problem.

Keeping these ideas in mind, let's look at one example of a pre-season week of training for a hammer thrower:

Monday
Warm-up: 15 minutes of general exercises (jogging, skipping, lunging, bending, calisthenics)
Sprinting: 6 x 20 meters, full speed, on grass with 2' rest
Hammer drills: 60 minutes
- sets of 10 turns with hammers and other implements
- practice starts with the hammer
- release drills with the medicine balls

Lifting: power cleans 4 x 5, back squats 4 x 10, bent over rows 4 x 10
- working on good technique
- 1'30 rest between all sets

Stretching: with a partner for 15 minutes

Tuesday
Warm-up: same as Monday
Jumping: 10 reps each of 6 in-place jumping exercises, on grass, 30 seconds rest
Hammer throwing: 60 minutes
- using light hammers

Kettle-bell throws: 5 exercises with 10 throws each
Weight circuits: 3 x 10 with 2' rest between sets
Front squats, Pull-ups, Plate twists, Crunches with weight
Lunges, Chin-ups, Plate twists, Sit-ups with medicine ball throw
Stretching: self stretching for 15 minutes

Wednesday
Games: 45-60 minutes
Stretching: with a partner for 15 minutes

Thursday
Warm-up: same as Monday
Sprinting: 8 x 10 meters, full speed, on grass with 2' rest
Hammer drills: 60 minutes
- sets of 10 turns with hammers and other implements
- practice starts with the hammer
- release drills with the medicine balls

Lifting: power cleans 4 x 5, back squats 4 x 10, bent over rows 4 x 10
- working on good technique
- 1'30 rest between all sets

Stretching: self stretching for 15 minutes

Friday
Warm-up: same as Monday
Jumping: 6 reps each of 10 in-place exercises, on grass with 30 seconds rest
Hammer throwing: 60 minutes - using light hammers
Kettle-bell throws: 10 exercises with 5 throws each
Weight circuits: 3 x 6 with 2' rest between sets
Front squats, Pull-ups, Plate twists, Crunches with weight
Lunges, Chin-ups, Plate twists, Sit-ups with medicine ball throw
Stretching: with a partner for 15 minutes

Saturday
Games: 30 minutes as a warm-up
Hammer throwing: 90 minutes
- using normal weight hammers

Sunday
Rest and relaxation


Glenn McAtee

There are many ways that the pre-season training can be constructed to address the five bio-motor elements. What I have outlined above is simply one approach. I suggest that it be adapted to meet the needs of your throwers and your particular situation. ***LSTJ***

A Linear Approach For Rotational Style Shot Putting

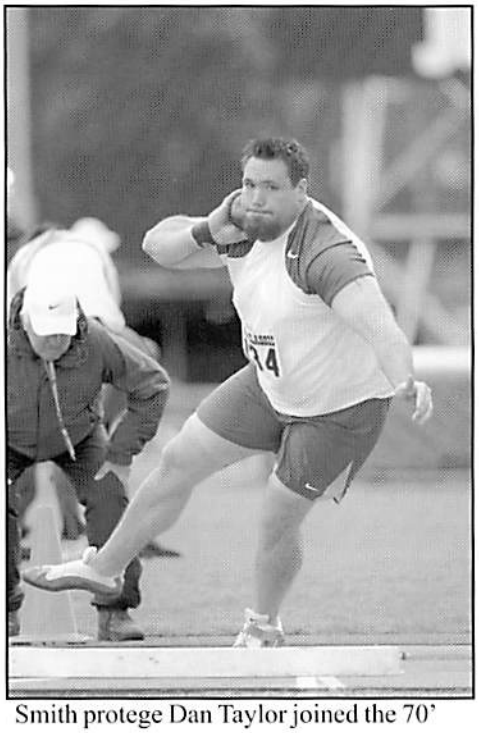
WORKING THE EARTH

By John Smith, Southern Illinois University

Gliders have thrown 75'+ and Spinners have thrown 75'+. There have been more 22 meter efforts in the last ten years with the rotational technique, but the glide technique has produced more World and Olympic Medals in the history of the event. The glide seems to be a technique that holds up better under pressure situations simply because there are fewer technical movements that can go wrong. The rotational technique, on the other hand, seems to produce more 70+ throws and better standing throw to full technique differential. The glide seems to require bigger weight room numbers to produce a 70'+ throw, but is more stable under adverse situations.

Coming from a background as a rotational thrower who glided at one time and thought the glide was an uncomfortable way to throw the shot, I ended up coaching a female athlete (Connie Price-Smith) for 15 years who went from 42 feet to 60 feet in two years and 4.25 feet in the next 13 years while using the short-long glide technique. Connie on average would put 113-115% on standing throws with shots ranging from 4k-12lb and up to 116%-117% on shots that ranged from a 3k-8lb. The technique performed well under many national and world situations.

From this experience I started thinking about taking some of the rotation out of the rotational technique and taking a page out of European methods of developing discus throwers. American throwers fly around the ring and are very rotational with an airborne reverse. European discus throwers have shorter single support phase out of the back and tend to grind the middle longer with good non-reverse leg action. Being connected to the ground seems to hold up very well in high pressure world class situations because the many moveable parts of the discus technique has been reduced down to a more efficient technical model with less technical points to work on, think about and make mistakes on. The technique is easier to teach, maintain and can run on autopilot once many years of repetitions are put in.



Victor Sailer

Smith protege Dan Taylor joined the 70' club in 2006.

The two things that I have learned from teaching the glide are running the ball in a straight line (ball alignment) and strong leg action against the earth that creates a good strike and finish (non-reverse throwing). With this ***linear philosophy in mind***, I started rethinking the rotational technique. Rotational throwing presents many problems when developing an athlete from the beginning, so a training procedure had to be developed to insure that 80-90% of all throws were taken in a correct fashion to develop a technical model that could hold together in high pressure situations, but yet produce more then the 115% of standing throw at all times to justify making that athlete a rotational thrower over a glide style thrower.

I will try to outline a daily training procedure that I used with Dan Taylor to go from 62'8" with the 12lb shot to 69'11¾" with the 16lb shot from Sept 25 of 2000 to March of 2003 (2.5 years), and then achieve a #3 IAAF World Ranking in 2006 with a 70'10½" top throw. I also used the same training on a female thrower, Amarachi Ukabam, who went from 45'8" to 58'11½" in a little over three years time. I am currently developing a 51' high school shot putter (Brenton Siemons), a walk-on at Southern Illinois University who has currently thrown 57'5" with 2.5 years work. Dan is a 6'6", 330lb Northeast Ohio boy with good talent who had almost zero weight-training background coming out of high school. Even though the strength work involved accounted for about half his increases, I will try to stick to the weekly throwing and drill work it took to develop this in such a short time.

Throwing Progression and Drill work:

- **Non-reverse Standing Throw followed by a Reverse Standing throw**- (18lb/15lb, 17lb/14lb, 16/6k for 6-12 throws Men) (12lb/4k, 5k/3.5k, 10lb/3k, 6-12 throws Women). Stands are taken in the order as written. Attention is paid to proper leg action and working the feet to drive the hip upward and forward. I am also looking for a good left side block and a long straight-line strike on the shot over the board. Striking and finishing a throw is very important. Right hip is taught to ***Lift then Turn.***
- **Non-reverse half-turns followed by a Reverse ½ turn throw** ***(Learning to work the earth)***; you use the same balls and throws as the standing throws. You start by placing the right foot in the middle of the ring with the right

toe pointing to the 10 o'clock position if the front of the ring is 12 and the back of the ring is 6 o'clock. Left foot is placed where the left will be at the start of a full throw. ***Head up, belly ahead, shoulders square to the field,*** then the ball of the right foot grinds the earth (the ring) to move the left leg to the front of the ring. It's important that the left leg does not take a circular path but rather a straight line path to the power position similar to someone trying to kick you with the back of your heel. If you keep the thighs squeezed tight, this will also control the left leg in a straight-line path. This is a quicker way to get the left down and also promotes the ball being driven closer to a straight line. While this leg action is going on, the upper body stays back in a locked position while the shot stays almost in the same position while the whole system is turning (ball path is a small circle in the middle of the ring). This is how the ball is kept in straighter ball path alignment during the linear rotational technique. The ball becomes part of the pivot point of the body and puts the thrower in a position to immediately lift on the ball when the left leg makes contact. This movement will end up being a strong vertical attack with a strong left side block and a very long strike over the board. This Drill is deadly important because it can produce 87-90% of the full throw and for this reason a thrower must become very good at this move and make it a high priority. The better the athlete half turns, the greater the potential of the full rotational throw. (***A triple half-turn, turn to the*** **front-** ***turn to the back-turn to the front and throw)*** can be used to teach the half turn if the athlete is having problems staying back and pivoting correctly on the right leg while the left finds the straight line power position. Any miscue will show up and make the athlete feel what is going wrong.

Ø **Non-reverse Giant Step followed by Reversed Giant Step** (***linking the move out of the back to the ½ turn position***) Use the same implements and throws as the last two drills. Once a decent half turn throw is created, then the problem exists on how to get out of the back to arrive into the half turn position. A giant step is simply starting in the normal full throw position (straddling middle). The first move is left (pushing of the left leg, hip and arm) to the left so that 90% of the weight is on the left side as the right foot pushes off and causes the body and the right leg to turn to the top (5 o'clock position) as the left side and arm are pointing directly towards the center of the field (12 o'clock) as the left toe of the left foot is pointing towards the 2-3 o'clock position. This is very similar to a soccer-style kick. Then you slowly drive the inside of the right knee towards the middle of the ring. When contact is made with the ring, the thrower comes to a stop. At this point the thrower should be in a ½ turn position exactly like the half-turn the thrower practices everyday. The thrower then does a half-turn and makes the throw.

Ø **Non-reverse Walking throw followed by a reversed Walking throw-** ***(Slow motion full throw)*** Use the same implements and throws as the last 3 drills. This drill is a giant step without the stopping in the middle. This teaches the right leg to make ground contact then "***Work the Earth***" rather then turning in mid-air then landing. Many rotational throwers that turn in mid air, and wait for the right foot to land, do little with their legs and the throw usually slides out to the right sector line. Even though the right rarely points towards 10 o'clock on a full throw, it should be practiced this way to exaggerate the right leg action and drive in the single support section of the throw. This drill really starts to teach the athlete ball alignment and the sequence of biomechanical events that have to happen using the easier to learn slower speed. Sometimes it's surprising how far you can throw off this drill. 90-94% of full throw can be accomplished with this drill. (***Saying Turn-Step-Turn-Throw***) during the movement is a great way to get the athlete to time up this drill and learn the movements.

Blending Drills:

Ø **Non-reverse walking throw, followed by a reversed full throw-** These throws are taken with normal weight shots, 16lb for men and 4k for women with the walking throw followed by a full throw with a 14.5 or 15lb for men and a 3.5k or 8lb for women for 6-8 throws. This drill is simply training the body into a full speed movement, using the walking throw as its guide. Blending drills are sometimes amazing, even making the athlete feel like the throw is happening with little effort. In essence what you have done is patterned or programmed the nervous system to react a certain way by setting up the system with the drill progression.

Ø **Non-reverse full throws, followed by reversed full throws.** -Same shots and pattern as the preceding drill but you can take as many throws, as you want, until the technique starts to break down.

Chasing Speed:

Ø **Using a lighter implement to make a heavier implement go farther-** With the men at the end of practice, I like taking 6-10 throws with a 14lb shot, being followed by a 16lb or 15lb shot. For the women I like using a 3k followed by an 8lb or an 8lb followed by a 4k. This works because you are simply fooling the nervous system into firing faster on the heavy implement. After a few throws it can be amazing sometimes how close the heavy ball distances can get to the lighter ball distances.

Practice Tricks:

Ø Throw up a hill or over something. I had a ring set up to throw up a hill at Ohio State and a 12 foot high ticket booth to throw over at Southern Illinois. It makes the athlete work the ball up and the right side up without worrying about how far they are going. Dan Taylor spent two summers and falls throwing up the hill with no throws for distance.

Ø Having a hard time with an athlete over-turning? Place a bench in the ring and give them just enough room to run a straight line. If they over-turn, they hit the bench. They only do this once and the coach doesn't have to say you over-turn a million times.

Ø Having problems staying in the ring? Place a bench or 55-gallon garbage can in front of the ring. Athletes start to learn to stay in. Throwing into a net also works well.

ØHaving problems blocking at the front? Sent up a table and two garbage cans on each end and give the athlete a tunnel to throw through. Can't fall away and throw right and can't rotate by the left side and throw to the left.

1999-2004 Fall Training (Dan Taylor):

Ø Shot Practice 3 times a week- throwing a 20, 18, 17 16, 14.5lb 6k. I move an athlete up once they have hit 60 with the heaviest ball. One practice will become a non-reverse full/ reverse full practice to make the full move more precise. Everything else will stay the same.

Ø Discus Practice 3 times a week- Throwing 4k, 3.5k, 3k, 6lb balls and 2.5k, 2.25k and 2k discs. Discus practices are very similar to shot practices. Heavy ball throwing has been added to develop specific strength. Dan creates torque that he is not strong enough to bring through. He has a unique ability to throw a 1k 280 feet.

Ø Hammer practice 2 times a week- One heavy ball practice, one light ball practice 15-20 throws each. He really does not like to practice hammer. But when you have a 451lb hang clean, the ball will go.

Ø Lift twice per week- We do nothing but lift on lifting days and throw on throwing days. One day is a pulling / upper body day and the second day is a squatting / upper body day.

Ø One or Two days off per week- The second day after squatting is always an off day and any other day I see fit if the athletes look like they need a break.

Ø Shot Pr's – 69'11¾" competition, 73'2" with a 14.5lb in practice from a full, 60 feet half-turn with the 18lb, 63 foot half-turn with the 16lb, 66'5½" turn with the 14.5lb. Standing throws, 52 with the 18lb, 56' with the 16lb (meet time) 60' with the 14.5lb. Best meet time standing throw to full throw differential 56'- 69'11¾" (14 feet) the worst has been 10 feet. Dan's average is 12 feet.

Ø Lifting PR's- 451lb hang clean with little drop and done with straps, 480lb bounce bench, 303 hang snatch, 440lb box clean, 650x3 Box squat (Parallel position), Safety Squat 800x3 below parallel position pulling out of the bottom with the handles. Dan does not back squat due to positioning problems.

Ø Athletic ability- 4.8-4.9 40-yard dash and can toma-hawk dunk from a standstill. Dan is very quick for a big man.

Ø An all-around thrower- 193'4" in the discus, 227'8" hammer, 78'10½" in the 35lb weight. It's very important to be an all-around thrower when you are young. The best throwers in history have a good all-around throwing background.

Ø Competition Warm-up- Two standing throws, one half-turn, one full throw, and then compete. Then he opens with an 80% effort unless he feels the urge to go after the first throw.

1999-2004 Indoor Season Training (Dan Taylor):

Monday- heavy lifting, heavy pull, squat and bench with auxiliary exercises. Main pulls are Hang Cleans and Box cleans with half-rack deads or heavy hi pulls. Main Squats are Safety Squats every second week with the in between week being either a heavy Box, Front, Back Squat. Heavy auxiliary for the squat area are half-squats in the rack, leg press, one leg squat and step ups. Main benching is a heavy band bench followed by a camber bar bench or a regular bench followed by heavy 3-4 board bench. Inclines, Seated Overhead, Dumbbell Bench work, Dips, Half-Rack Benches, etc., are some of the heavy auxiliary work for the bench area. Workouts are always finished with ab work. This workout takes about 2.5 hours.

Tuesday-

Shot- 40-45 throws in the normal training sequence.
Weight- 20-25 throws with the 45lb, 40lb, 35lb, and 30lb weights.

Wednesday-

Weight- 15-20 throws with the 40lb, 35lb, and 30lb weights.

Discus- 40-50 throws into the net with 8lb, 3k, 6lb, balls and 2.5k, 2.25k and 2k discus.

Thursday-(Indicator ball day)

Shot- 30-35 throws recording best ½ turn with 18,16,15,14, and full's with the 15lb and 14lb.

Weight- 10-15 throws with the 35lb and the 32.5lb weight. Record the 32.5lb distance.

Friday- (Light and fast lifting)

Men Only, 5 sets of hang or box snatch for 2 reps, 60-70% close grip speed bench for 5

Sets of 2, and 5 sets of Swiss ball squats, high box squats or half-rack squats.

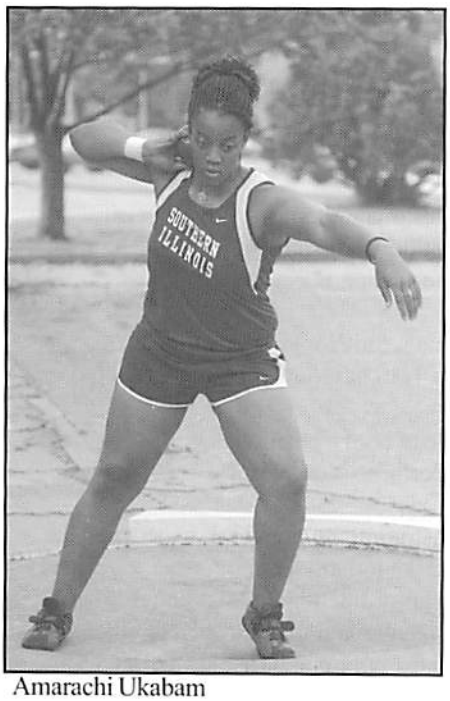
Saturday- (compete)

Sunday- (rest)

2004-2006 Post Collegiate Training (Dan Taylor)

Dan is now a one event athlete and his training has changed. Dan still throws 2-3 times a week but has broken up his 2 day a week off-season lifting into 4 smaller more intense workouts. Dan has added 1-2 days a week of running which consists of 50 yard strides or some stadium stairs.

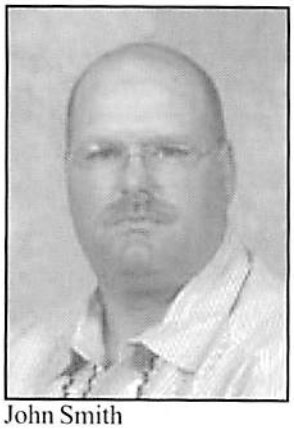
The technical changes Dan has made in the last year involve starting lower and slower in the back of the ring and trying to leave the back with less left side rotation. This is so he can fill more space on the right side of the ring to run the ball in a straighter line to promote a strong linear finish over the board. He also tries to be more patient in the middle of the ring so the body has a chance to change the horizontal drive out of the back to vertical drive



Amarachi Ukabam

in the delivery position. There is now a greater emphasis on the reverse and the flow of the throw through the front of the ring.

The result of these points have moved Dan to third in the world in 2006 and has increased his average European throw to 68'8".


John Smith

The Future

Even though the rotational technique in the past has been a great equalizer for a smaller man to compete with the bigger men in the event, I believe that the evolution of the event is going to favor the bigger men. The seven-foot ring is going to be the biggest obstacle for a big man, but if they can develop a move with good ground contact and leg action and learn to stay back and contained, I can see the same throwing that we saw during the late 80's and early 90's. The long throws will happen, there is no doubt in my mind, but the technique has to be simple and solid enough to survive high-pressure situations. This is what I am trying to create with "Working the Earth", a simple solid move that can put 12-14 feet on a standing throw. Then all that has to be developed is a 20 meter + half-turn and a 60'-plus standing throw. Those qualities can be created with weight room strength and specific strength on the throwing field. The gliders of the late 80's had 65-70 foot stands in their arsenal to throw over 22 meters. A good rotational thrower only needs an 18-19 meter stand to accomplish the same distance. A big man is needed to produce that kind of horsepower without the aid of drugs. We have many shot putters that are world class because of the distance they are pulling off the standing throw. The Europeans have been stubborn to change and seem to be sticking with the glide. I wonder how long it will take them to see what the Americans have seen for the last 20 years. ***LSTJ***

ABC's Of Throwing

by Paul Jensen, Event Coach for Hammer, Welsh Athletics

'Jogging is for people who aren't intelligent enough to watch television'
Victoria Wood (English author; Actor; 1931 -)

Athleticism underpins the whole of our sport and the technical requirements of throwing. There is no substitute for skill and skill itself is developed from Agility, Balance and Coordination – simply the A,B and C of sport.

This isn't new, most of us already know this and for some of that number the older coaches there is, we feel, little to be learned - it was always so. I have a great deal of sympathy for that and that there is perhaps little new in the development of these fundamental skills but they are disappearing at a rate of knots in our softening societies and both sides of the Atlantic. I am now, as a coach., teaching those things I once took for granted and fundamental movement skills are poorer now than when children played in games they organised for themselves.

As societies have become less safe and children no longer play in streets we could expect some losses in these areas, however, as physical education has diminished as an activity in schools and the health and safety lobby has expanded more inactivity has resulted in our young populations. Quite why health and safety are so inexorably linked is perhaps one of societies great mysteries as we have made children safer they have become progressively less fit and move closer and closer to obesity and diabetes, this indicating a poor correlation between health and safety!

All the throws make enormous physical demands on athletes and we expect them to be fit (whatever that means!), strong and capable of learning very complex patterns of movement we later call a technique.

If we speak to coaches of weightlifters they easily illustrate that as an activity and competitive sport they have complex skills and techniques to be learned, they have programmes of Long Term Athletic Development (LTAD) as well. This will indicate for us that we have a very complex problem in that in order to get stronger our throwers have to learn the skill and techniques of another major sport. At the same time the fundamental movement skills of sports incomers is poorer so we need to create some positive changes in how we develop our young athletes When fundamental movement patterns are not assured we need to develop a strategy that will be many things, these although not an inclusive list are thought to be:

Ø *Skills based;*
Ø *Closely related to movement skills;*
Ø *Be thought provoking;*
Ø *Athlete centred;*
Ø *Reinforcing of skills thought to be present;*
Ø *Remediation of lost or undeveloped skills;*
Ø *Fun*

We must not underestimate the last of these because young adults cannot do what some other very children take for granted. Motivation is key here.

Our definitions, what we are looking to improve are:
Agility: To be agile is to have a good range of body movement.
Balance: To be able to hold a position at will.
Coordination: To perform a complex task repetitively.

In this series of illustration, by no means exhaustive the athletes are given tasks to help them improve aspects of agility balance and co-ordination. Quite often the activity cannot isolate one feature and most of the activities indicated here perhaps only emphasise an aspect.

Coits catching
In this activity the athlete has to catch a very light circular rubber hoop (coit) whist standing on a very narrow timber. The upturned school bench shown provides an edge of about 3inches (75mm), it is also about 10ft (3.25m) long. As the exercise continues the coit is thrown a little further away from the catcher to encourage movement and therefore balance along the beam. The inaccuracy of the thrower of the coit also adds interest since where it will go is probably a mystery to both!

Squat
In this exercise a simple balance squat the athlete has to move from standing at full height to a deep squat. Again an upturned bench provides a very narrow foothold so balance is at a premium. To control the centre of mass and move it subtly is also difficult and asks the athlete to be in 'core control'.

Clean and snatch
It isn't very much of a leap from having an athlete complete the skills drill of squat to making the activity a little more closely related to support exercises and some dynamism. The demand of activity such as weightlifting is well known and again the activity, largely used to support throwing, requires a great deal of Agility, Balance and Coordination. Unsurprisingly the first sets of exercises I introduced my group to, the hang clean and hang squat, were so that they would learn the balances required to pull a line of action.


The quantity of weight was considered irrelevant, better was to see how little weight was needed to produce an imbalance if not pulled through the right plane.

The general idea is a very simple one, it is simply to look at the balance points of the event and reinforce those balances at the critical points of the event. My argument is that the sooner a young athlete is aware of when they are balanced during a pattern of movement the sooner they become aware of how well balanced they are during a throw.

Turns

For effective turning coaches look for two principle points:

- The correct action of the left foot in fully turning to aid the travel across the circle;
- The early placement of the right foot used to restart and possibly accelerate the turning sequence.

This is greatly improved if the margins for error are limited and the upturned bench allows for only a very limited turning area and a very limited 'foot down' zone for the right leg. Over a few sessions turning accuracy improved quite dramatically!

In this sequence the thrower is practising turning on two steeplechase barriers tops that are fallen into disrepair. Later the same skill will be performed on the narrower surface of an upturned bench.

As can be seen the drill is establishing the importance of fully turning the left leg and establishing a zone of limited area for the right foot landing. By changing the placement of the beam the coach can encourage a tight fast landing of the right leg also helping to improve turning speed over time.

Delivery

If there is a delivery in the hammer it is dependent on the acceleration of the hips in the throwing phase and the vertical acceleration of the athletes' centre of mass. A fundamental of this movement is that the right leg initiates it and that the thrower is stable when extending vertically.

In this drill a football is thrown away in a similar fashion and the balance enforced by a narrow base.

Other skills –Other drills

Simple hip turns

In this very simple exercise the thrower turns through 180° backward to forward facing to backward facing in sets of about 10. The whole of the idea is to move through the influence of the hip not the shoulders and be balanced and coordinated well enough for an immediate touchdown and reverse.

Jump balance to rest.

Jumping onto a beam is extremely simple. Jumping onto one from a distance in front and staying on it is not. The athlete has to learn to control their inertia, lower their centre of mass and gain balance.

About to fall forward

Fairly stable

The difference between the two stages – doing it becoming physically literate

I believe this group is improving as a consequence of developing skills it might have had from more active play perhaps some ten years ago. Now in a second childhood they are finding these activities fun and very motivating. The drills we have developed together are making them better throwers.

For us it's been a new start looking at fundamental movement patterns and developing movement skills not criticising an athlete because they cannot make a complex movement work when they have no prior learning of such movements.

As an athletics coach I have been privileged to work with a number of excellent coaches. The number of isolation drills I have seen coaches develop over years never ceases to astound me, I am also much more aware now of the role the athlete plays in the development of the coach and the other athletes in a group. Perhaps most important is the awareness that there are no coaching secrets and the more we share the better we all get.

In support of this idea a Powerpoint presentation will be available shortly on www.welshathletics.org where the movement patterns can be seen as video and coaches can more easily make up their minds as to how useful they might be. ***LSTJ***

Predictors of Performance In Elite Discus Throwers

by Tom Fahey, Cal - State University, Chico, Masters Discus Champion

Abstract

This study described the characteristics of 13 elite discus throwers and explored factors that predicted performance. The sample included three former world record holders and four Olympians- all of whom won Olympic medals during their athletic careers. The season best throws at the time these measurements were made ranged from 58.12 to 68.73 m. Best performances were recorded for the bench press (187.9±5.7 kg), dead lift (260.7±33.6 kg), squat (246.5±45.6 kg), power clean (150.7±23.7 kg), clean and jerk (143.0±19.8 kg), push press (133.4±27.0 kg), incline press (145.7±23.7 kg), snatch (107.6±11.1 kg), season best discus throw (63.7± 3.4 m). 50 yard dash (45.72 m; 5.98±0.13 s), standing long jump (2.86±0.14 m), standing discus throw (53.0±3.1 m), and training camp discus throw (57.9± 4.2 m) (mean ±SD). Moderate but significant correlations were revealed between season best throw and bench press ($r=0.61$) and dead lift ($r=0.55$; $P<0.05$). Step-wise multiple regression analysis showed that bench press best predicted season best performance in the discus (Discus throw (m)=0.13 bench press (kg)+40.34). These observations reaffirm the importance of the principle of specificity in motor performance.

(Biol.Sport 19:103-108, 2002)

Key words: Discus – Strength – Athletes – Power - Throwing

Introduction

In 1896, Robert Garrett from the United States won the gold medal in the discus throw in the first Olympics held in Athens, Greece with a throw of 29.13 m. He learned the event only three weeks before travelling to the Games. In 1982, Jurgen Schult from East Germany threw the discus 74.08 m - nearly 45 m farther than Garrett. Schult's world record was the result of a scientifically designed training program, expert coaches, years of hard work, precise technique, and a sophisticated diet and supplement regimen.

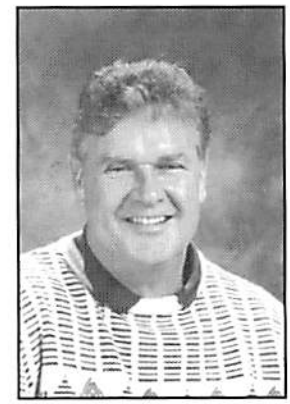
Despite more than 3000 years of competition in the discus, surprisingly few studies have described the factors determining success in the event [1,8-12]. Although coaches and athletes have written more than 600 articles (source: Sports Discus database) on training and throwing techniques, these papers were based largely on empirically derived observations and methods. This study described the characteristics of elite discus throwers who participated in a training camp and explored factors that predicted performance.

Materials and Methods

Table 1

Physical and performance characteristics of subjects (mean ±SD)

	Mean	SD
Age (yr)	27.3	5.7
Height (cm)	191.1	4.1
Weight (kg)	112.1	6.5
Discus (m)	63.7	3.4
Discus, standing (m)	53.0	3.1
Discus, camp (m)	57.9	4.2
Bench press (kg)	187.9	16.8
Dead lift (kg)	260.7	33.6
Squats (kg)	246.5	45.6
Push press (kg)	133.4	27.0
Clean (kg)	150.7	23.7
Clean and Jerk (kg)	143.0	19.8
Snatch (kg)	107.6	11.1
Incline press (kg)	145.7	23.7
45.72 m dash (50 yd; s)	5.98	0.13
Standing Long Jump (m)	2.86	0.14



Fahey

Subjects were 13 elite level male discus throwers who took part in a throwers' camp at the end of the competitive season (Table 1). The sample included 3 former world record holders and 4 Olympians- all of whom won Olympic medals during their athletic careers. All athletes were ranked in the top 50 discus throwers in the world and were in peak condition at the time of the camp. While many of these athletes threw further in later years, season best throws at the time these measurements were made ranged from 58.12 to 68.73 m.

Subjects completed a survey where they listed their best performances in the bench press, dead lift, squat, power clean, clean and jerk, push press, incline press, snatch, and discus throw. At the camp, subjects were tested in the 50 yd dash (45.72 m), standing long jump, standing discus throw, and discus throw.

Means and standard deviations and correlations between variables were reported. Step-wise multiple regression was used to identify factors that best predicted the season best throw. Significant correlations were identified at the 0.05 level of significance.

Results

Fig. 1

The relationship between bench press and season best discus throwing performance; $r=0.61$; Discus performance (m)=40.34+0.13 bench press (kg)

Their great strength, size, and speed characterize elite discus throwers (Table 1). Moderate but significant correlations were revealed between season best throw and bench press (r=0.61) and dead lift (r=0.55) (Figs. 1-2, P< 0.05). The correlation of discus throw with age (r=0.47), and snatch (r=0.52) approached significance. Correlations were not significant between season best throw and standing throw, standing long jump, 50 yd dash, clean, squat, clean and jerk, incline press, and push press (P>0.05). Step-wise multiple regression analysis showed that bench press best predicted lifetime performance in the discus (Discus throw (m)=0.13 bench press (kg)+40.34).

Fig. 2
The relationship between dead lift and discus throwing performance; r=0.55; Discus performance (m)=49.06+0.056 dead lift (kg)

Standing throw was not related to season best discus throw (r=0.26). However, it was significantly related to body weight (r=0.79), standing long jump (r=0.63), bench press (r=0.64), power clean (r=0.56), snatch (r=0.76), push press (r=0.57), and dead lift (r=0.68).

Discussion
The results of this study show that elite discus throwers are strong, fast, and powerful. However, their lifting performances are considerably less than elite level Olympic and power lifters [5]. The athletes tended to be older than elite athletes in most Olympic sports [3-5,8].

Recognizing the limited validity of correlation analysis with 13 subjects, the results show the importance of basic strength in elite level discus throwers. The bench press and dead lift had the highest correlations with performance in the discus throw. Measures associated with power- such as sprinting, jumping, or the Olympic lifts- rendered low and non-significant correlations with discus performance.

Hay and Yu [9] and Yu, et al. [15] in biomechanical analyses of elite discus throwers, showed that the change in speed of the discus during the second double support phase of the technique was the most critical segment of the technique that determined distance thrown. Their data are consistent with the performance characteristics of the elite throwers examined in this study. Developing force during the second double support phase of the discus requires a combination of technique and basic strength. The discus technique is difficult and complex and takes many years to master. The moderate correlation between age and performance supports the critical importance of technique in developing maximum force during the second double support phase of the event. Also, basic strength- as reflected by performance in the bench press and dead lift- is critical to success in the event.

There was a low and non-significant relationship between best standing throw and best discus throw. Conversely, standing throw was highly related to five of the weight lifting tests and to standing long jump. Many athletes spend much time attempting to improve performance in the standing throw. These data would suggest that this emphasis is inappropriate.

This study reaffirms the importance of the principle of specificity. While great strength and speed are common characteristics of elite throwers, they do not discriminate between performance levels. While basic strength- as measured by bench press and dead lift- is important for performance, athletes should be advised to emphasize developing discus technique in their training programs. Basic strength is important for success in the discus. However, these data should not be interpreted to mean that athletes should not use "explosive" training techniques in their program. Strength is related to performance in many sports [2,3,13,14], but explosive training appears to cause the greatest transfer to strength-speed sport performance- in the short run [6,7].
In summary, a study of 13 elite level discus throwers showed only moderate correlations between high tension weight lifts and performance. These observations reaffirm the importance of the principle of specificity in developing motor skills.

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Strength Considerations for Throwers in Track and Field

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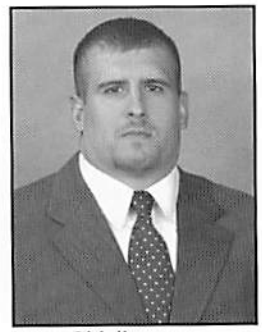
Most periodized training programs for athletes follow a Western or linear model. The Western model manipulates intensity and volume through different mesocycles during the training year (i.e., endurance, hypertrophy, power, strength, and maintenance) (6). However, there is more production when one skillfully combines various training methods, rather than exclusively training one of them separately in a yearly plan (15). One such method we use for our throwers is the Conjugate Sequence System (CSS).

The Conjugate Sequence System

Dyachkov originally looked at the CSS in 1964 when it was known as the "method of combined development of physical qualities and technical mastery" (3). The system initially involves the concurrent training of several different motor abilities, such as speed, strength and endurance over the same period. This concurrent training creates a multi-lateral skill development approach, which gives a young athlete the base framework for the neurological construction of all later developed motor skills. As an athlete matures and specializes in a physical trait, he/she is able to pull from the previous foundation of motor skills. The CSS is used to control and consistently redirect a desired specific training effect. The system simultaneously trains all necessary motor abilities with a constant renewal and re-establishing process, that promotes a steady and permanent adaptation while securing the desired training-effect, hence elevating an athlete's functional potential (12).

Former University of Florida Track and Field Coach Larry Judge (8) states, "Overdevelopment of a given quality at the expense of other important qualities will diminish performance." With a simultaneous, sequential development of specific traits with frequent target-training changes (and non-targeted specific traits are maintained), there's a linear increase in technical skill, strength, and speed. On the other hand, Western periodization (the rotational, unidirectional separation of motor abilities) doesn't have the same effect because too much time is spent on a specific direction while the concurrent development of other traits is ignored. Over time, Western periodization results in deadaptation or a detraining effect, with the level of non-targeted traits diminishing considerably. Also, the Western approach of unidirectional training by rotating means with long intervals allows only one peak per year. On the other hand, a simultaneous, unidirectional system of many targets can be obtained two to three times a year (42). Past work in this area has shown that using this conjugate approach raises the functional potential of an athlete. The athlete's specialized physical preparation (SPP) is significantly greater when combined, than when they're used individually and not sequenced over time (1, 9, 10, 14, 16, 31, 33, 34, 36). The Eastern Europeans structure the CSS is into a yearly program (year-round training) that's divided into 3 or 4 periods.



Ryan Cidzik

The Yearly Plan

The Eastern European classification of periods is different from the Western classification (i.e., in-season and off-season). The first period is the preparatory period (sometimes separated into the general preparatory period and specialized preparatory period). The preparatory period is devoted to all-round physical training. From beginning to end, there's a gradual transition from general to specific training. Exercise volume is decreased but intensity is increased. The goal is to gradually prepare the athlete for competition and emphasize SPP (40). The second is the competitive period. The main goal during this phase is high athletic achievement allowing exercise selection to be more specific to the sport. While the muscles, movements, and physiological demands should be similar to the sports skill, movements shouldn't be too similar to the sports skill. Besides doing the actual skill itself, there is risk of negative interference and a decline in performance (negative transfer) (17). The third is the transitional or post-competitive period. This period is used for active rest where athletes are encouraged to participate in other sports to give them a break from the physical and mental stress from competition. The athletes must remain active during this period. When the training year resumes, the athlete must begin on a higher level than they previously achieved (40). According to Volkov (35) "Sports training is based on three biological principles: the principle of overload, the principle of specificity, and the principle of reversibility of actions." However, strength and conditioning professionals must understand the different methods of strength training and how to implement these into the yearly cycle.

Forms of Strength

According to Zatsiorsky (41), strength can be classified according to methods of achieving maximal muscular tension in one of four ways:

1) The method of maximal effort (max effort method). Lifting a maximal load against a maximal resistance.

2) The method of repeated effort (repetition method). Lifting a non-maximal load to failure to develop maximal force in a fatigued state.

3) The method of submaximal effort (submaximal method). Lifting a non-maximal load an intermediate number of times (not to failure).

4) The method of dynamic effort (dynamic effort method). Lifting a non-maximal load with the greatest speed.

Siff (20) has classified numerous forms of strength that are displayed in athletic activi-

ties. Those being the following: maximal-strength, absolute-strength, explosive-strength, speed-strength, strength-endurance (22), strength-speed (26), concentric-strength, eccentric-strength (24), starting-strength, acceleration-strength (23), and reactive-strength (13).

The Max Effort Method

Zatsiorsky (41) suggests that the max effort method is superior for improving intramuscular and intermuscular coordination, and activating a maximal number of motor units. According to Siff (21), we must distinguish between maximal and absolute strength. Maximal strength is the ability of a muscle group to produce maximal voluntary contraction in response to optimal motivation against an external load. This form is usually displayed in competition. Zatsiorsky (42) defines absolute strength as the greatest force that can be produced by a muscle group under involuntary muscle stimulation. We train our field athletes to develop absolute-strength since it is displayed in most athletic activities, and our training in the weight room is not specifically for competition (as in Olympic lifting or powerlifting). Also, we do not incorporate non-maximal resistances or non-maximal repetitions because only muscle size not muscular strength may be retained with these methods (42). Every time an athlete overcomes a resistance more that what they are accustomed to, they will get stronger. Since the development of strength is primarily due to adaptations in the nerve-muscle relationship (Russians referred to this as the nerve-muscle system), it is the nervous system that must stimulate the muscle to elicit a particular response. One of the reasons why athletes respond so well to a strength program for the first time is because the nervous system is in a state of excitation and responds with a high energy level. However, after a period of time, the nervous system becomes inhibited and further gains will not take place (38). Hence, it is of paramount importance that if one is to continually make gains in strength, the exercises must constantly be changed.
A stronger individual will be able to do more things technically and will achieve higher levels of performance (8). For the training of absolute strength, we utilize the max effort method in the core exercises (bench press and squat) and change the exercises every two weeks. To understand why only two weeks are used, we must look at the neural pathway. When attempting a new exercise for the first time, the nervous system creates a pathway from the brain to the muscle and back to the brain. After an athlete experiences an exercise once or twice, the nervous system makes adaptations to the neural pathway (38). The first week (of a new max effort exercise), we work up to approximately 85-92.5-percent and the second week we achieve a maximum effort (1RM). An example can be seen in Table 1.

Table 1
Sample Upper-Body ME Exercise

Board Press Variations
Floor Press Variations
Reverse Band Press Variations
Incline Press Variations
Flat Bench Variations

Sample Lower-Body ME Exercises

Low Box Squat Variations
High Box Squat Variations
Safety Squat Bar Squat Variations
Back Squat Variations
Front Squat Variations

Many coaches are concerned that there is an injury risk when attempting 1RM's on a consistent basis. However, research has shown that 1RM tests show no such risk to injury (13). Since there must always be an overload in order to develop strength, the same 1RM achieved previously by the athlete is never used again. Every time we create an overload, the nervous system responds with renewed excitability (38). According to the principle of progressive resistance, workloads must be above those normally encountered for muscle strength to increase (41). However, while increasing one's strength is of paramount importance to a field athlete, to be successful in competition, one must become both stronger and faster.

Power and Explosion

The development of strength is key to power development, which is immensely important to a thrower (32). Explosive-strength (i.e., power) is the ability to produce maximal force in a minimal amount of time. Power (explosiveness) is a combination of speed and strength, where the athlete overcomes a resistance in the shortest time possible. The formula is the following:
Equation 1: Power=Force x Distance/Time, or P=F x d/t.
Since velocity is equal to d/t, power is force x velocity. Throwing field events are considered a power sport since they entail speed and coordination in the skill's execution (39). Explosiveness has the following different forms: explosive/isometric (Olympic lifting), explosive/ballistic (field events), and explosive/reactive/ballistic (tennis or volleyball). In this case, we will focus on explosive/ballistic. This is where maximal force is applied against a relatively small resistance as in the shot put or javelin (30). A prime example of this is speed-strength, which is the ability to quickly execute an unloaded (or relatively small external resistance) in the quickest time possible (22). We also utilize strength-speed exercises, which (in association with speed-strength) produces a very high power output (26).

Olympic Lifting

Olympic lifts (clean and snatch) are utilized in our program to increase our thrower's vertical explosion. We utilize USA Weightlifting principles in the implementation of our Olympic lifting program (5). While there are several variations we use in the clean, there are few in the snatch because of the frequency used. It should be noted that we are not training Olympic lifters; therefore, we do not train like Olympic lifters. For example, we only do full snatches with "light-weights" from 50-percent to 70-percent of their

1RM (we do not do a 1RM test in the snatch, we take 70-percent of the power clean 1RM to determine the snatch 1RM). This is due to the fact that there is excessive stress on the shoulders in the snatch (catch). First and foremost (with the Olympic lifts) we emphasize correct technique; this includes full "triple extension" of the body. If we do not achieve a full extension before the "catch," the benefits of the lift are nullified. We will also do many pull (full extension and explosion with no catch) variations as well. These samples are seen in Table 2.

Table 2
Sample Olympic Lift Variations

Hang Clean Pull, Below-Knee Clean Pull, Clean Pull (floor)
High (Clean) Pull
Muscle Clean, Hang Clean, Below-Knee Clean, Power Clean, Full Power Clean
Hang Snatch Pull, Below-Knee Snatch Pull, Snatch Pull (floor)
Hang Snatch, Below-Knee Snatch, Power Snatch
High (Snatch) Pull

In training for power, one must be able to have a maximal eccentric contraction and then be able to switch it to the concentric as fast as possible. By having maximal eccentric contraction, the tendons and muscles will build-up energy to produce a maximal concentric force. So, the faster we teach our athletes to contract their muscles in training, the farther they will throw in competition. Increasing concentric strength (by rapid shock loading) is due to increased muscle tension created by the myotatic stretch reflex. It's also caused by the explosive release of elastic energy stored in the connective and elastic tissues of the muscle complex during eccentric muscle contraction (39). Strength, external conditions, motor coordination, quickness, reactive ability, ability to relax, stretch-shortening process, and muscle endurance are all factors that determine the speed of movement (25). We develop speed-strength throughout the year by movements classified as dynamic effort (DE).

The Dynamic Effort Method
We do explosive (DE) work in our core lifts as well as our Olympic lifts. On upper-body DE day, we do speed work on the flat bench in a ballistic fashion approximately every week. We accomplish this by variations in intensity, grip width, and accommodative (varied) resistance (bands and chains). There has been much research on ballistics and compensatory acceleration on increasing an athlete's rate of force development (RFD) (7). Using lighter weights doesn't constitute a fast and explosive movement; we must teach or force our athletes to do this. Bands and chains force athletes to explode through the entire movement. By attaching resistance bands to the ends of a barbell, one is able to increase resistance where one is more biomechanically advantageous (4). Among other advantages, bands enhance one's eccentric-strength (actively accelerated powermetrics) because the bands actually pull one down at a faster rate than the speed of gravity (28). Siff (27) suggested that combinations of free weights and elastic bands may be effectively used over several ranges of movement with other major exercises such as the bench press. DE work can be done with any small resistance, or any exercise explosively. For example, other DE work we may do includes various medicine ball throws or "speed pulls" from the Slater Hammel (athletic) position within the power rack. We use the intensity chart suggested by A.S. Prilepin. The chart shows the proper intensity needed to ensure the greatest development in speed and strength.

Siff (29) concluded that for athletes to achieve an optimal RFD, they must train in the intensity range of 50% to 70% of their 1RM. If we look at Newton's Law of Acceleration, force must be produced by added acceleration not by added mass. All of our DE work is done within this range. For DE upper-body work, we do eight sets of three reps in a ballistic fashion. As shown in the above Table 3, this is 24 total reps, which is optimal for the 55-65 repetition range. On DE lower body day, we box squat. We utilize the box squatting techniques suggested by Louie Simmons and Westside Barbell (19). Again, we are not training powerlifters; therefore, we do not train like powerlifters. However, if we want to increase strength and explosion in our core lifts, advice from an experienced and intelligent powerlifter such as Simmons offers a multitude of benefits. Box squats are done with 8-12 sets of two reps with 47 to 65-percent of their 1RM (depending on the accommodative resistance used). Two reps are used instead of three or more reps because any more may cause bicipital tendonitis (18). Also, with all DE work (upper and lower body), we use the interval method (rest interval is controlled between 45-seconds and 60-seconds) to enhance one's strength-endurance. Utilizing the DE program can be seen in Table 4.

Table 4
Sample Six Week DE Upper-Body Cycle

Week 1: Close-Grip DE Bench Press: 8x3@50%+Chains
Week 2: Medium-Grip DE Bench Press: 8x3@50%+Chains
Week 3: Wide-Grip DE Bench Press (inside the "rings"): 8x3@50%+Chains
Week 4: Close-Grip DE Bench Press: 8x3@50%+Blue Band
Week 5: Medium-Grip DE Bench Press: 8x3@50%+Blue Band
Week 6: Wide-Grip DE Bench Press (inside the "rings"): 8x3@50%+Blue Band

Sample Six Week DE Lower-Body Cycle

Week 1: DE Box Squat (feet wide): 8x2@55%+Chains
Week 2: DE Box Squat (feet wide): 8x2@60%+Chains
Week 3: DE Box Squat (feet wide): 8x2@65%+Chains
Week 4: DE Box Squat (feet wide): 8x2@47%+Purple Band
Week 5: DE Box Squat (feet wide): 8x2@50%+Purple Band
Week 6: DE Box Squat (feet wide): 8x2@53%+Purple Band

Core Training

One area that cannot be stressed enough in training a thrower is training the core. Specific to throwers, trunk movements are vital in the body's kinetic chain. The core plays a very important role in the maintenance of stability and balance when performing throwing movements. Core training is the center of all body movements and is a critical factor in maintaining stability and correct anatomical body position (8). We utilize a vast array of core movements and "torso-train like a tornado." Some of these include static sustained contractions, physioball and medicine ball exercises, bar twists, straight-leg variations, and abdominal circuits.

Individualization

Finally, workouts must also be individualized. As strength coaches, we are often hindered by time-constraints with other sports and numerous other external conditions. Bondarchuk (2), who's famous for training world-class hammer throwers, has more than eight periodization schemes for his throwers. Each scheme is based on various physical and psychological differences for each individual athlete. Therefore, to achieve optimal results, everyone cannot be doing the exact same program if optimal competitive success is desired.

Strength coaches must always search for a better way of training their athletes. Too many coaches believe they can use a "cookie-cutter" program (from another coach or school), apply it to theirs, and achieve maximal results. Too often, it's these same coaches who fail to think "outside the box" and help their athletes. Maybe different training methods (exercise variations, periodization, etc.) will work, maybe they won't; but if we never try (or learn) something different, how will we ever know. Our athletes will be deprived of all of the possible benefits of training if we fail to keep an open-mind and evolve on a consistent basis.

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TECHNICAL CONSIDERATIONS IN TEACHING THE JAVELIN

by Casey Thom MSS, CSCS, Rice University

The javelin throwing is perhaps one of the oldest athletic events. The javelin was invented primarily used as a weapon of war. However, there is evidence of the javelin being competitively thrown from as early as the 8th century B.C. In Homer's The Iliad the javelin was one of the events contested during the funeral games (Lombardo, 2000). Over the years throwing competitions became more popular and the javelin found its way into the pentathlon which was contested in the ancient Olympics in Greece. In the early days javelins were wooden.

Javelins used for war were generally heavier than those used for competition. (Sing, 1984). However, over the years there have been many technological advances in the design of the javelin. Modern day javelins are made out of aluminum or graphite. The advances in javelin technology have come so far that rules had to be implemented to keep the javelins from flying out of the stadiums. This was accomplished by moving the center of gravity forward 4 centimeters in the javelin causing it to tip down sooner. Before this change was put in place, men were regularly throwing over 90 meters and the world record was over 100 meters! After the modifications in 1986, men who had thrown 90 meters had trouble breaking 80 meters. However, over the past 18 years, the world record has crept back to almost the same distance it was before the modifications. Jan Zelezny now holds the world record with the new javelin at 98.48 meters (Lawson, 1997).

The javelin, although light (800 grams for men and 600 grams for women), is deceptively hard to throw. Aerodynamics as well as many biomechanical principles must be considered in determining the optimal method of throwing to achieve the greatest distance. This is a very challenging event to coach due to its complexity. This paper will discuss the most important elements of the throw, how these elements are accomplished, and how aerodynamics and biomechanics help to determine the optimal technique, as well as what is the best method of training for the event.

The key objective in javelin throwing is to throw as far as possible without fouling. There are three variables that determine the distance of a throw. These three variables are the height of the throw, angle of release, and velocity at the release. Velocity at release is perhaps the most important factor in javelin throwing. There are not any world class javelin throwers who do not generate tremendous throwing velocities. However, there are also athletes that can produce unbelievable throwing velocities but still fail to achieve great distances due to throwing at a poor angle of release. This goes to show that to reach one's maximum potential in javelin throwing, all three variables must be perfected.

The first variable that we will evaluate is throwing velocity. In order to generate maximum velocity, the thrower must learn to use his or her whole body. Javelin throwing is a whole body activity, and success is not just related to how good an athlete's arm is. According to C. Harmon Brown describes the javelin as a, "...dynamic total body activity..." He goes on to say that it should be described as "whip-and-flail motion" rather than a "throw" (p.249). This makes the technique of the javelin particularly challenging for American youths who were raised playing baseball and football. In both of those sports an athlete can get away with arm throwing; however, in the javelin, to achieve maximum distance, this is not the case.

The long axis of the javelin poses yet another challenge to athletes who have been raised to throw a ball, and have not had to concern themselves about the relation of the object they are throwing to its surroundings. They needed only to be concerned about the angle of the release; whereas, a javelin thrower must also be concerned about the angle of attack. Major differential between the angle of release of the hand and the angle of attack can impose large drag forces on the javelin significantly reducing the throwing velocity. This will be discussed in greater depth later in the paper.

Early practice sessions should be used to familiarize the athlete with the idea that javelin throwing is a total body activity, and also that the athlete must throw "through the point" or keep their angle of attack as close as possible to their angle of release to decrease the amount of drag that is imparted on the javelin. Two-handed medicine ball throwing is an excellent way to teach athletes that javelin is a total body activity, and "sticking" or throwing straight down into the ground is an excellent way to teach athletes how to pull through the point. Sticking will help the athlete become more comfortable with the javelin, and being comfortable with the javelin is one of the prerequisites to success in this event (Naclerio, 1988). An athlete who is uncomfortable is likely to be tense, and that is not conducive to the looseness that an athlete needs to accelerate the javelin to maximal velocities.

There are four major divisions of the throw. These are the run-up or approach, the withdraw, and the delivery, and the follow through (Schmolinsky, 2004). Each of these divisions aids the athlete in reaching maximal throwing velocity.

The first phase of the throw we will evaluate is the approach. The approach helps the athlete create linear velocity which can later be transferred into the throw. Sing suggests the approach can account for anywhere between 30-40% of the horizontal distance of the throw (1984).

There is general consensus that the run up should be rhythmic and relaxed, allowing the athlete to accelerate into the crossover steps. The approach speed should be such that the thrower is in control at all times. Inexperienced throwers will often run too fast during this stage of the throw and lose control of the javelin. He also suggests that the javelin should be carried in a manner that allows for very little movement. This is to assure the alignment of the javelin. It is very important for a thrower to keep the alignment of the javelin to help to assure a clean strike later in the throw. Babbitt suggests that the thrower should carry the javelin in a plane parallel to the shoulders, and slightly above the forehead to help assure alignment when the javelin is withdrawn (2001). Schmolinsky goes on to further suggest that the javelin should be turned slightly inward, rather than at a right angle. This will allow the athlete to more easily withdraw the javelin in a straight line, helping to ensure smoothness in the run, which will eventually lead to the athlete being able to release without delay (2004).

Gorski suggests that the run-up can take anywhere from 6 to 20 steps. He suggests that less experienced throwers take shorter run-ups, ranging from 4 to 6 steps, and that more experienced throwers should take between 8 and 12 steps. This is due to the fact that the more steps a thrower takes, the more momentum he or she creates. It is the goal of every thrower to create the maximal amount of momentum that they can transfer into the throw. However, due to the complicated nature of the throw, too much momentum may at times be detrimental to throwing distances. Excessive momentum can make it much more difficult to execute the proper throwing mechanics. This is why Gorski advocates a shorter approach for beginning throwers, and a slightly longer approach for experienced throwers who are more likely to be comfortable performing the proper throwing mechanics with more momentum (2003).

After the athlete has generated his or her initial momentum in the run-up, the next step in assuring maximal final velocity of the throw is the transition phase. During the transition phase, the thrower withdraws the javelin and begins to perform cross-over steps. Although these cross-over steps tend to be slightly slower than the linear steps taken in the run-up, they allow the athlete to carry their feet ahead of their center of mass, putting the thrower in a position in which he or she can exert the maximum amount of force on the javelin over the longest period of time, or get a long pull on the javelin, therefore increasing impulse (Ecker, 2002).

Schmolinsky suggests that during the transition phase the athlete draws the javelin back in alignment with the shoulder axis, to help ensure a clean pull. The palm of the throwing hand should face up, and the hips should be at almost a right angle to the direction of the throw. This will allow for them to apply force to the javelin over a longer distance, thereby increasing the amount of impulse generated into the javelin (2004).

Babbitt suggests almost identical considerations for the transition phase; however, he also adds the thrower must be conscious not to drop his or her throwing hand below the throwing shoulder during the transition phase. If this occurs, the thrower will have a tough time regaining the alignment of the javelin and will not be able to strike the javelin smoothly (2001).

Sing suggests that there are three most commonly used transition rhythms. These are either a 3-step, a 5-step, or 7-step rhythm. The number of steps refers to the number of ground contacts that a thrower makes after the initial run-up and before the delivery. Sing suggests that a 5-step rhythm is perhaps the most efficient choice to carry momentum into the throw and generate maximum throwing velocity. He suggests that a 3-step rhythm does not allow enough time for the thrower to settle into the power position, and that athletes who choose a 7-step rhythm must be especially careful not to decelerate into the throw (1984). However, there are two types of throwing styles. Throwers can be classified as either linear or rotational throwers, and as Gorski suggests, a 7-step rhythm is most likely necessary for a rotational thrower (2003).

Benefits of throwing with the linear approach are the increased runway velocity, and greater likelihood of keeping throwing alignment. However, it also restricts the role that the hips and the trunk can play in generating force into the throw, and it increases the chance that the thrower will move to quickly over throwing positions (Gorski, 2003). This style is most appropriate for larger throwers with a limited range of motion (Sing, 1984).

Benefits of the rotational style of throwing include a longer path over which the javelin is accelerated, thereby increasing impulse. The drawback is that it often decreases the runway velocity which can be transferred into the javelin. This style is most advantageous to smaller, quick, and flexible throwers (Sing, 1984). This is also the style used by the current world record holder Jan Zelezny.

The last stride in the transition is known as the penultimate crossover. During this step the athlete should drive the right knee (for right-handed throwers) out and low to maintain horizontal velocity, and should be placed out in front of the thrower's center of gravity to maintain the backward lean, thereby putting the athlete in a position that increases the amount of time the athlete has to apply force on the javelin, and consequentially increasing the amount of impulse the thrower can generate on the javelin. The athlete must be careful not to overdo this and completely kill their runway speed.

The right foot contacting the ground after the penultimate crossover is known as the soft-step. Attig (1981), Gorski

(2003), and Sing (1984) all emphasize the conservation of forward momentum, and the creation of separation during this soft-step. During the soft-step the right leg should contact the ground in a bent position and then immediately collapse and rotate into the left leg which should be in contact with the ground at this point. While the right leg is doing this, the torso should remain slightly behind the right hip with the throwing arm patiently held back in order to create separation and tension that can be utilized in the throw.

Simultaneously the left arm, which should reach out in the direction of the throw, should be rapidly brought in against the left side of the body with the left shoulder remaining as far forward as possible, stretching the chest which will later result in a dynamic contraction (Webb & Sing, 2000).

Once this stretch is created, the right arm can now begin to initiate the throw by rotating the right shoulder, and keeping the armpit facing straight up. Then the arm should be brought directly over the top of the shoulder to assure that the linear forces are not divided. Care should be taken that the arm muscles are used in order from proximal to distal, activating the shoulder followed by the elbow, wrist, and finally fingers. This will help to keep the chain connected and to produce a whip-like finish to the throwing motion. All of these factors combine to help create maximal throwing velocity.

The final consideration in the throwing mechanics is the follow through. This has no impact on the distance of the throw as the javelin has already left the thrower's hand; however, it is essential due to the rules of the javelin, that the thrower stops his or her momentum before going over the foul line. In order to dissipate this momentum, Schmolinsky suggests that the athlete's right foot should be planted transversely to the direction of the throw, landing over a flexed leg. The upper body must lean forward in order to lower the center of gravity thereby increasing stability, and the left leg is moved back in the direction of the throw (2004). Javelin throwers also wear spikes in the heels of their shoes which aid them in creating sufficient friction to dissipate their momentum following the throw.

We should now turn our attention to the role that the angle of release plays in the success of a javelin throw. There are two major aerodynamic forces working on a javelin in flight. These two forces are lift and drag. Lift is the force that keeps the javelin in the air, and drag is the force opposing the javelin's flight. Drag is working against the javelin at angles of flight including zero, but it is the greatest as the angle of attack increases and more of the javelin's surface area is exposed. These two forces act on the javelin in a spot know as the center of pressure. The center of pressure is not fixed but can shift in relation to the center of gravity. When the center of pressure is in front of the center of mass, the javelin has a positive pitching moment and the javelin will remain tip up. When the center of pressure moves behind the center of gravity, the javelin will then have a negative pitching moment and will face down creating negative lift. Having a positive pitching moment helps to create lift; however, if the pitching moment becomes too great, the drag forces imposed on the javelin will become greater than the lift forces and the javelin will stall out and drop dramatically (Sing, 1984).

There has been much debate over what is the ideal angle to throw the javelin. No consensus has made Ecker suggest that between 34-36 degrees is most likely appropriate in calm conditions, but the appropriate angle can shift anywhere from around 30 degrees to around 40 degrees depending on wind conditions. When an athlete is throwing into a headwind, it is beneficial for that athlete to throw with a lower angle of release due to the natural increase in lift, and drag that the javelin will experience. Throwing at a lower angle will expose less of the javelin thereby decreasing the drag, while still enjoying an increase in lift. When throwing with a tailwind, the thrower should throw slightly higher because of the reduction in both drag and lift (2002).

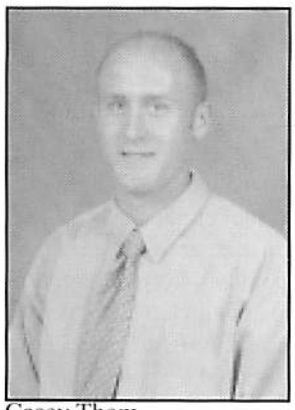
The last factor that determines distance in the javelin throw is the height of release. This is largely determined by the athlete's natural stature. This does give a slight advantage to taller throwers, however throwers of all different statures have enjoyed success in the javelin. Jorma Kinnunen, standing just less than 5'9", broke the world record in the javelin in 1969 throwing over 300 feet with the old javelin (Lawson, 1997).

Finally, when designing training for javelin throwers, the following considerations should be made. Overhead throwing power is primarily generated by leg extension, hip rotation, and trunk flexion (Bartlett et. al, 1989). We can easily see this from the aforementioned technique. Training should be specific to these demands, and the quadriceps, hip flexors, glutes, and abdominals should be the primary areas emphasized to meet these demands (Kaufman, 1999).

Since release velocity is a key factor, and since the speed of release in the javelin can be as high as 30 m/s, neurological speed training is a must in javelin and training for the javelin should not be done at slow speeds (Zatsiorsky, 1995), with the exception of beginners for whom it is sometimes appropriate to have them familiarize themselves with the proper motor patterns for javelin throwing at slower speeds. Taking this into consideration, very little maximum strength work should be done specific to javelin, but training involving ballistic training and plyometrics should be emphasized.

Summaries and Conclusions

From this paper we can see that the main objective in the javelin throw is to throw the javelin as far as possible, while staying under enough control to stop before the foul line.


Casey Thom

There are three variables that determine how far a javelin throw will go. The first and most important is release velocity. The second is release angle, and the third is release height.

There are four major phases of the javelin throw. Each phase, when performed properly, helps to put the athlete in the optimal position to achieve the maximal distance on his or her throw.

The first phase is the run-up. This is where the javelin's initial linear velocity comes from, and it can account for up to 40% of the throwing distance. This portion of the run should be smooth, rhythmic, gradually accelerating to a controllable velocity, and should allow the athlete to maintain javelin alignment.

The second phase is the transition phase. This phase is used to put the athlete in an ideal throwing position to maximize impulse. It generally consists of crossovers using either a 3-step, 5-step, or 7-step rhythm. Care should be taken by the athlete not to decelerate during this phase of the throw.

The third phase is the release. This is initiated off of the penultimate crossover, followed by a soft step on the right leg which transfers the momentum of the throw into a strong left block leg. The javelin should be kept back as long as possible to create the maximum amount of stretch while the left arm blocks, and then the right arm should rotate up keeping the armpit to the sky, and finish the throwing motion overhead.

During the final phase of the throw, the athlete needs to dissipate his or her momentum following the throw in the follow through by planting the right foot transversely, moving the upper body forward to lower the center of gravity, and finally by kicking the left leg back.

Aerodynamic factors such as lift and drag play a big role in the flight of the javelin, and the thrower should throw in such a manner that they maximize lift and limit drag depending on the conditions.

Finally, training for javelin should be specific to both the body areas involved in throwing the javelin, and also the speed of movement required in the javelin. ***LSTJ***

THE ROLE OF THE LEFT SIDE IN THE THROW

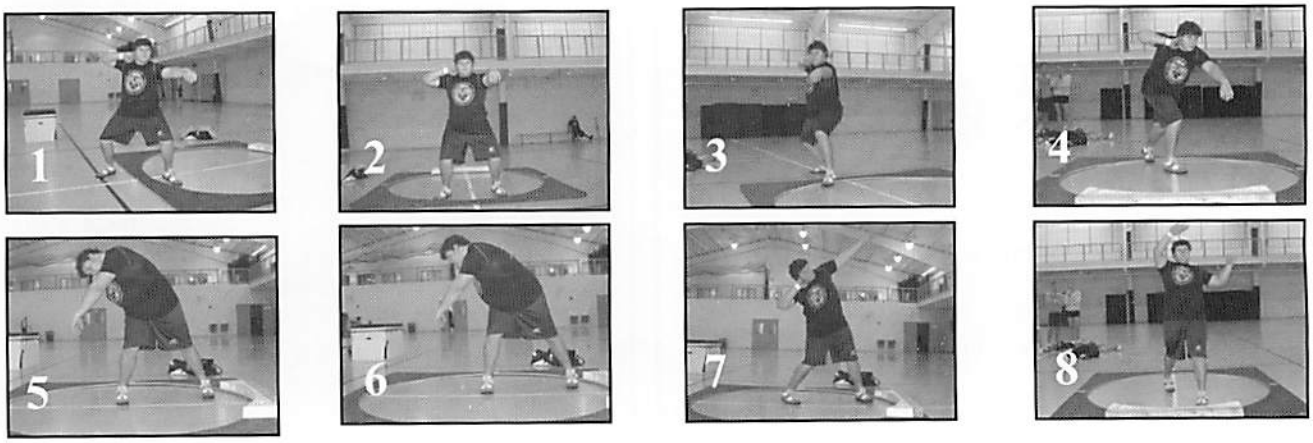
by Mike Hambrick, Long & Strong West/Big Throws, N. Allegheny Throws

The first time that you give a person a shot put, javelin, or a discus to throw, they wind up and let it go with passion and aggression. It is usually a futile effort that is totally one-sided. I have noticed, however, the better and more experienced the athlete, the more they use the non-throwing side of their body as part of the throwing effort. Athletes from sports with similar motions, such as volleyball and baseball, tend to know how to use their non-throwing or hitting side to stabilize their active side. A pitcher's glove hand many times is held in the same blocking motion at release as a javelin or discus thrower. A volleyball player's spiking or serving motion mimics the release point of the javelin thrower. We many times recruit these athletes because of their prior experience with left side concepts. I would like to talk about a much-neglected area of throwing technique and possibly introduce some new ways of looking at how the block is crucial in proper throwing technique.

As a high school throws coach, I see many throwers perform what I call a one-sided throw. They land in the center of the ring and just start pushing until they release the shot or discus and flail out of the front of the circle. That is usually when I say, "Don't you have a left arm?" The athlete looks at me with a puzzled expression and says, "Yeah," as their left arm is pinned to their side. It is critical that we teach our athletes the importance of the left arm and leg in the transfer of power from the body to the implement.

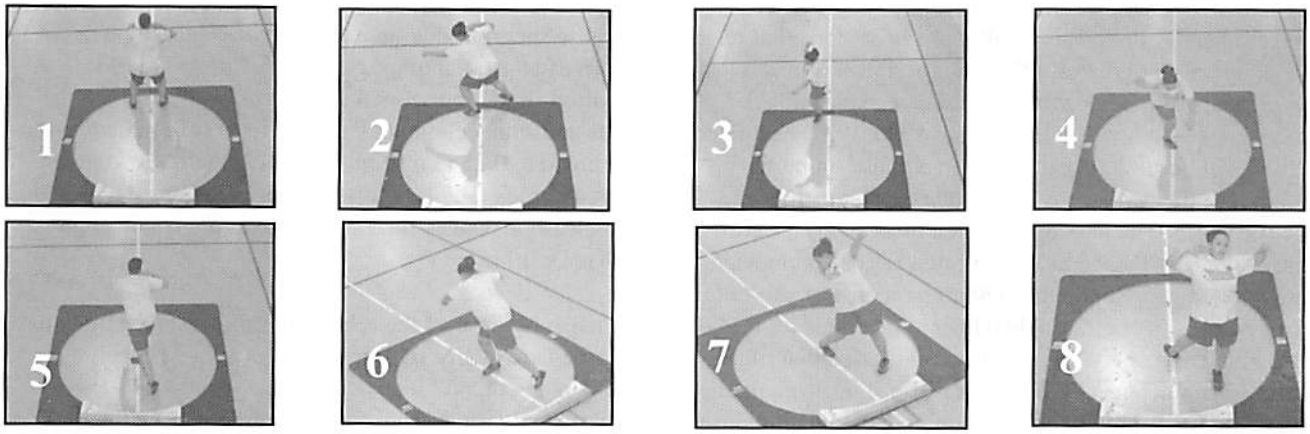
We will examine the action of the left arm, explain the turn and block action of the left foot/leg, and synthesize the complete left side function in the successful throw. A big factor in teaching young throwers the importance of the non-throwing arm is in expressing the concept of the plane. Have your athletes stand with their arms outstretched to the side at shoulder height and explain that this is the plane that the arms and shoulders work through in the throwing motion. The plane tilts but does not break. As the thrower leaves the back of the circle and transitions through to the double support stage of the throw, the left side acts as a mechanism for storing torque. The spinner or glider in the shot put and the discus thrower should all keep the left arm extended and relaxed to keep from opening up the upper body too soon. As the thrower turns the right foot in the direction of the throw, the left arm should remain pointed to the rear of the circle. As the lower body continues to rotate toward the direction of the throw, the left side remains passive. When the right foot/knee/hip are pointing in the direction of the throw, the left arm should clear in a circular motion toward the front of the circle. It should continue to clear wide until it is pointing in a linear direction aligned with the right foot, knee, and hip. This is a very important stage in the throw because if the thrower arrives at this stage with everything aligned, the chances of a successful throw dramatically increase.

The left leg also plays a major role in the block. Upon the implementation of the double support stage, the left foot should touch down pointing toward the center dot in the circle. Many throwers attempt to land the left foot in an open position pointing in the direction of the throw. They feel that they can get their lower body moving quicker and be more torqued. This may be possible for elite throwers and those that utilize the jump turn technique, but it usually results in throws that are released early and off to the right. If you are subscribing to the turn and drive theory of throwing, the left foot must rotate with the right foot to allow linear push in the direction of the throw. The left leg should also be slightly flexed and not have much weight on it. As the lower body is rotated, the left foot should rotate until pointing toward right-center in the sector. As the right side begins the push and lift phase, the left leg acts as a brace and straightens. The left heel drops down and stops the rotation of the left leg. The bracing effect continues up the left side into the upper leg, hip, abdomen, and shoulder until it gets to the left arm. The



thrower's goal needs to be to attempt to totally stop the left side from rotating so that the right side has resistance to push linearly as hard as possible. This is what coaches call 'hitting the wall with the left side.' When looking at the position of the thrower in the front of the circle in both shot putting and discus throwing, the thrower should have their shoulders square to the direction of the throw (parallel to the center line). The attempt should be made to release the implement with the shoulders relatively level and square to the front of the circle. This concept is taught by many but not explained in enough detail to the athletes. The left arm is critical in this process. The wide clearing sweep works best with a relaxed, but straight arm. I like to teach my athletes to keep their hand open until the linear push phase begins. They then clench their fist and attempt to stop the rotation of the left side. The finish position of the left arm should be with the left hand slightly above the shoulder and the elbow against the side. This enables the athlete to push into this resisted left side and to drive the right side directly to the front of the circle.

A great tool for young and advanced throwers is to mimic the perfect release position and then trace the throw back to the power position. This creates awareness as to how the thrower achieved the good release position. A point to stress to your throwers is that it takes great strength to have an effective block. The left side of the body must be strong enough to redirect the rotation and drive into linear force. A weak block is ineffective in focusing the energy through the right side and into the throw. The focus should be on the full body lifts and the thrower must also train each side independently. Weight training must focus on strengthening the complete body. A good block allows the thrower to unload the forces that have been stored up in the quest for the personal best throw. This is why we do what we do. ***LSTJ***



Examining The Flight Of The Shot Put

By Michael Young, U.S.M.A. & Human Performance Consulting

Flight of the shot

When the implement is released, its horizontal displacement is dependent on its initial velocity, release angle, and release height. Among these parameters, the most important is the release velocity as the horizontal displacement of the projectile is proportional to the release velocity squared. The horizontal displacement of a projectile is represented by the following equation:

$$L = \frac{V_0^2}{g} \cos \alpha_0 \left(\sin \alpha_0 + \sqrt{\sin^2 \alpha_0 + \frac{2gh_0}{V_0^2}}\right)$$

Where V_0 = release velocity; $\acute{a}_0$ = release angle and h_0 = release height. From this equation, it is obvious that release velocity has the greatest impact on performance as it has a quadratic relationship with the distance achieved. Although, two studies (Smith & Snow, 1990, 1992) examined elite level decathletes putting the shot and found no relationship between any of the release parameters and performance. The data upon which these analyses are based appears flawed as the reported release parameters are not comparable to other research on elite or sub-elite shot putters. In contrast, Alexander and colleagues (1996) examined university level athletes and found that of the release parameters, only velocity was a significant predictor of distance. Given the equation above, this relationship seems far more plausible.

Parameter Observations

The release parameters (Figure 1) of highly skilled shot putters have been the subject of much research. Previous research (Ariel et al., 2004; Luthanen, 1998; McCoy et al., 1984b; Tsirakos et al., 1995) has indicated that a release velocity in excess of 13.5 m/s is necessary for a 21 m throw and 13 m/s for a 19 m throw (distances which typically win medals in international competition for male and female throwers respectively). Release heights for elite level athletes are typically between 2 and 2.2 m (Alexander et al., 1996; Dessureault, 1976, 1978; Luthanen, 1998; McCoy, 1992a, 1992b; McCoy et al., 1984a, 1984b; McCoy & Koprowski, 1989; McCoy et al., 1989; Stepanek, 1990; Tsirakos et al., 1995) although Ariel and colleagues (2004) observed release heights in excess of 2.3 m among elite male athletes. However, the results of this research are questionable as other studies examining the same athletes observed considerably lower release heights (Young, 2004). As for release angle, it appears the large majority of both elite and sub-elite level performers release the implement at an angle considerably lower than 40° from the horizontal (e.g., Ariel et al., 2004; Bartonietz & Felder, 1993; Cureton, 1939; Lindsay, 1994; Luthanen, 1998; Maheras, 1995; McCoy, 1992a, 1992b; McCoy et al., 1984a, 1984b; McCoy & Koprowski, 1989; McCoy et al., 1989) although some have observed release angles greater than 40° (Ariel et al., 2004; Marhold, 1974; Smith & Snow, 1990, 1992; Stepanek et al., 1986; Tsirakos et al., 1995).

Figure 1: Graphical representation of release parameters contributing to the total distance of the throw. The total distance is equal to the sum of the horizontal distance relative to the toe board (d1) and the projected distance (d2).

A fourth release condition, which is rarely considered, is the horizontal release distance with respect to the toe board. Greater horizontal release distances are beneficial because they provide an advantageous release point relative to the point of measurement. Lindsay (1994) reported similar horizontal release distances for both the glide and spin techniques (ranging from 0.10 m behind the toe board to 0.25 m in front of the toe board). In contrast, Kerssenbrock (1974) reported significantly greater horizontal release distances for athletes using the spin technique (0.4 m vs. 0.1 m).

Perhaps, because of the relatively short distance thrown and the lack of any significant aerodynamic properties of the implement, previous research has indicated that air resistance does not have a significant effect on the flight of the shot (de Mestre, 1990; de Mestre et al., 1998; Hubbard, 1988; Hubbard et al., 2001; Linthorne, 2001a, 2001b; Maheras, 1995; Tutevich, 1969 as cited in Lanka, 2000). It should be noted that Mizera and Horváth (2002) found that environmental factors such as air resistance, wind, air pressure and temperature, altitude, and ground obliquity can have an effect on the distance of the throw which can be actually be substantially larger than the smallest increases in world record performances acknowledged by the IAAF (2003).

Release condition relationships

All of the release parameters are affected by various factors ranging from interrelationships to anthropometry. Beyond the obvious ability of a given athlete to apply force to the implement, the release velocity appears to also be dependent on other factors as well. For example, several researchers have indicated that release velocity and angle are dependent on one another in an inverse relationship (de Mestre, 1990; de Mestre et al., 1998; Hubbard, 2000; Hubbard et al., 2001; Linthorne, 2001a; 2001b; Maheras, 1995; McWatt, 1982). That is, as release angle increases, release velocity decreases. In fact, Hubbard and colleagues (2001) examined two collegiate level throwers and found that maximal attainable release velocity decreases with

increasing release angle at about 1.7 (m/s)/rad. Their data also indicated that maximal attainable release speed decreases with increasing release height at 0.8 (m/s)/m. This relationship is likely more a function of the relationship between release angle and release height (as release angle increases so does release height) than it is anything directly associated with release height.

While some authors (Dyson, 1986; Grigalka, 1974 as cited in Lanka, 2000; Savidge, 1970) have speculated that height is relatively constant and cannot be changed, this is only partially true. The primary determinant of release height is an athlete's anthropometry, specifically their height and the length of their throwing arm (Alexander et al., 1996; Hay, 1993, Marhold, 1974; McCoy et al., 1984b; Pyka & Otrando, 1991; Stepanek et al., 1986). In this regard, release height may be more unchangeable than the other release parameters. There are, however, other factors that can produce small but observable changes in release height. For instance, the position of the thrower at the moment of release affects release height. For example, if all else is equal, a thrower who propelled themselves into the air just prior to release would have a greater release height than one who remained in contact with the ground at release. Similarly, an athlete can increase release height simply by increasing their release angle and keeping all other body positions constant (Hubbard et al., 2001).

Release angle is largely influenced by the position of the athlete's trunk and throwing arm. Both the inclination of an athlete's trunk in the sagittal plane and the angle of throwing arm extension relative to the trunk affect the release angle. As indicated above, release angle has an inverse relationship with release velocity. In addition to this relationship, changes in release angle will also produce changes in release height and horizontal release distance. Horizontal release distance is primarily determined by the athlete's body and arm position as well as the athlete's anthropometry (Hay, 1993). Hubbard and colleagues (2001) reported that horizontal release distance decreases with increasing release angle at about 1.7 m/rad and increases with increasing release height at about 1.3 m/m.

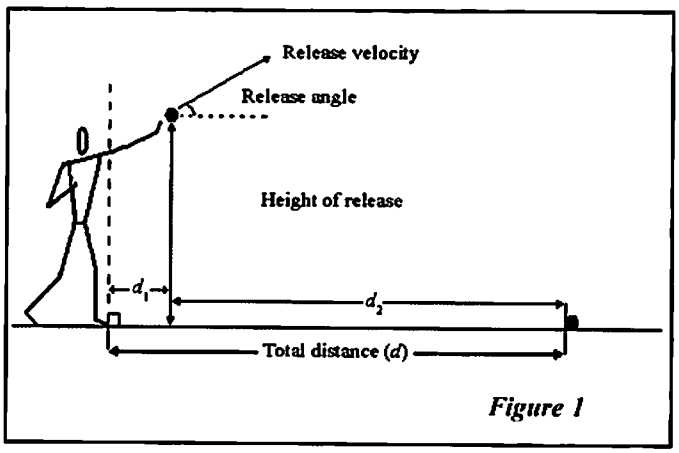


Figure 1

Optimization of initial release parameters

In an attempt to further projectile motion theory and perhaps also enhance performance of shot put athletes, much research has attempted to optimize the release parameters of the shot put. Projectile motion theory focuses on the release parameters, which result in the projection of an object or body, the flight patterns of projected objects or bodies, and the interaction between the release parameters. In the case of the shot put, most projectile motion research has focused on determining the release angle that would maximize the projected distance. There is no shortage of authors who suggest that the angle of release should be greater than 41° (e.g., Bangerter, 1983; Bashian et al., 1982; Bosen, 1966; Burghes et al., 1982; Furlong, 1973; Sharpley, 1964; Townend, 1984; Trowbridge & Paish, 1981; Ward, 1970, 1985; Young, 1985). These recommendations are supported by several researchers (Bose, 1983; Hooper, 1979; Lichtenberg & Willis, 1978; Muhoray & Balzarini, 1982; Trowbridge, 1980) who determined optimal release angles using the projectile motion equation given above.

Despite the overwhelming number of recommendations, large discrepancies have been observed between the predicted optimal values and values observed in elite (Bartonietz & Borgstrom, 1995; Bartonietz & Felder, 1993; Luthanen, 1998; McCoy, 1992a, 1992b; McCoy et al., 1984a, 1984b; McCoy & Koprowski, 1989; McCoy et al., 1989; Tsirakos et al., 1995) and sub-elite (Dessureault, 1976, 1978) shot putters. This has led some authors to speculate that release angles should be lower than those determined using the projectile motion equation (Hubbard, 1988; Ward, 1975). Recent research supports this viewpoint. For instance, Linthorne (2001a, 2001b) examined university level shot putters and developed a model that related measurements to anthropometric and strength characteristics of the athlete. Results indicated that release velocity and angle are not independent and that the optimal release angle is considerably lower (32-38°) than that determined using the projectile motion equation. Similar findings have been reported by other investigators for throwers using both the glide (de Mestre, 1990; de Mestre et al., 1998; Hubbard, 2000; Hubbard et al., 2001; Maheras, 1995; McWatt, 1982) and spin technique (Luthanen, 1998). Two mechanisms explaining this phenomenon have been proposed. First, as projection angle increases the performance is opposed by a greater effect of gravity (Hay, 1993; Linthorne, 2001a; Zatsiorsky & Matveev as cited in Zatsiorsky et al., 1981). This is due to the fact that the force of gravity acts perpendicular to the ground and as the release angle increases, more force must be used to overcome the effect of gravity. Second, the structure of the human body may not be able to produce equal force (and as a result velocities) in every position (Linthorne, 2001a). On the latter point, it should be noted that this phenomenon may be due

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in part to a thrower's exercise selection in weight training rather than any anatomical limitations (McCoy et al., 1984b).

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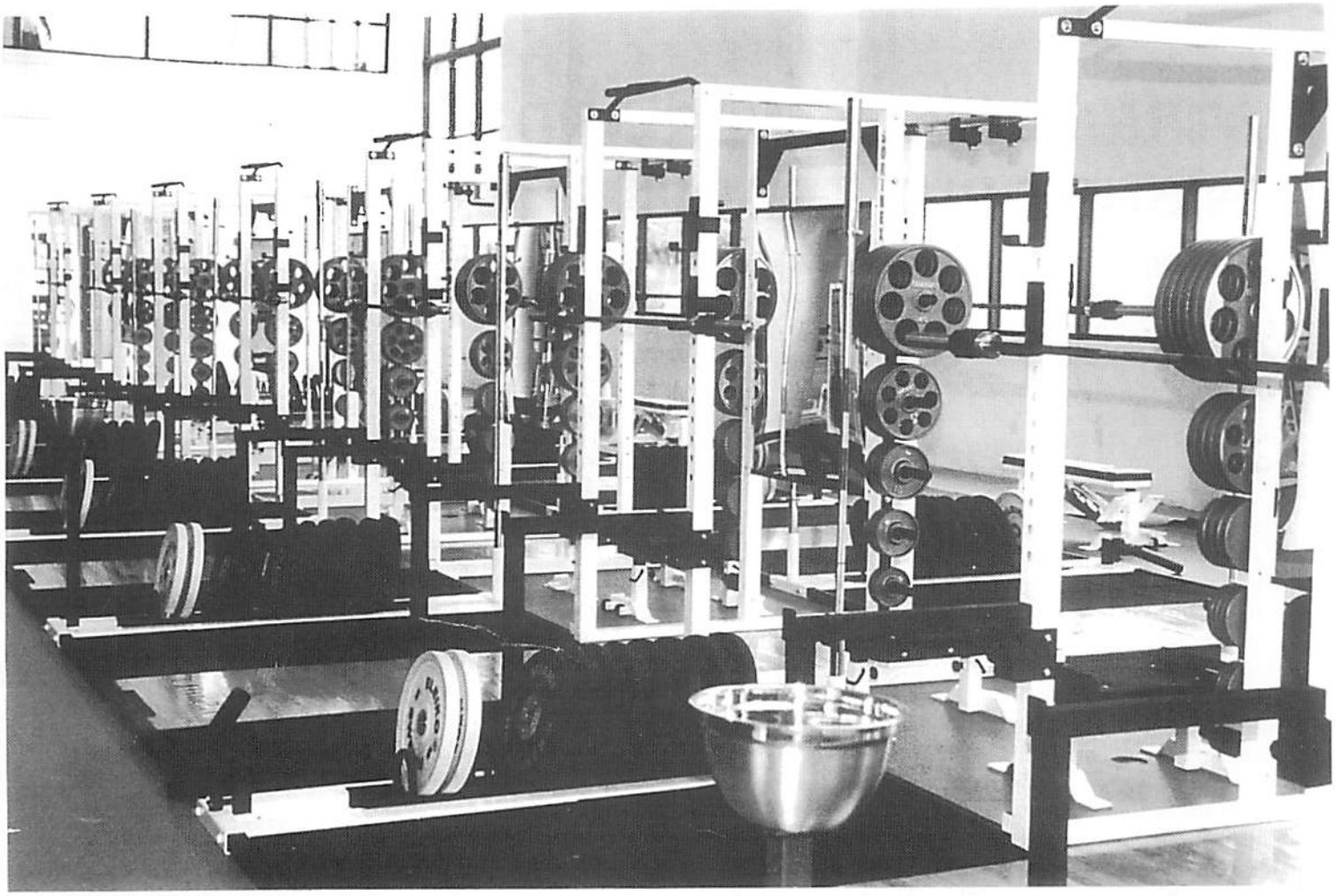

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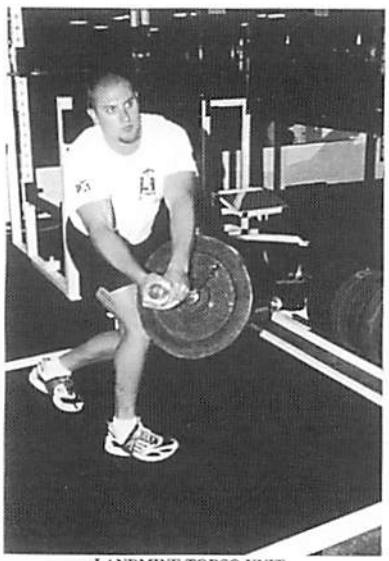

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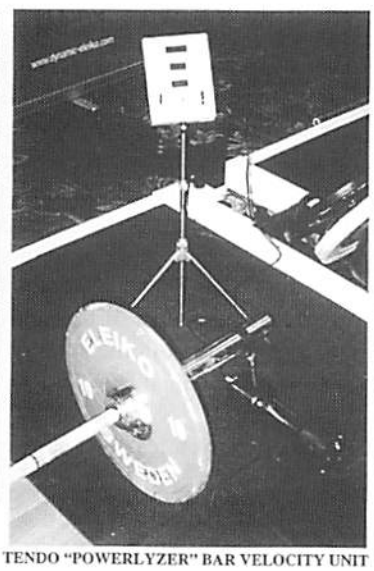

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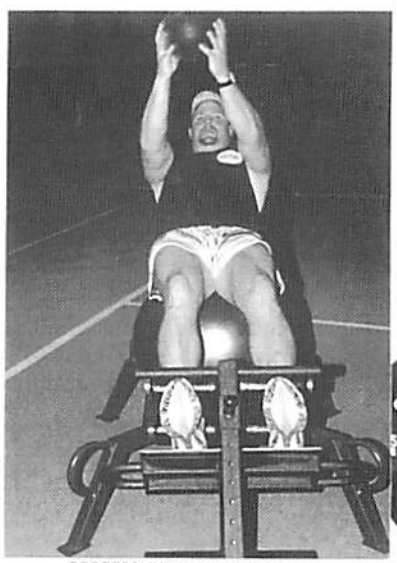

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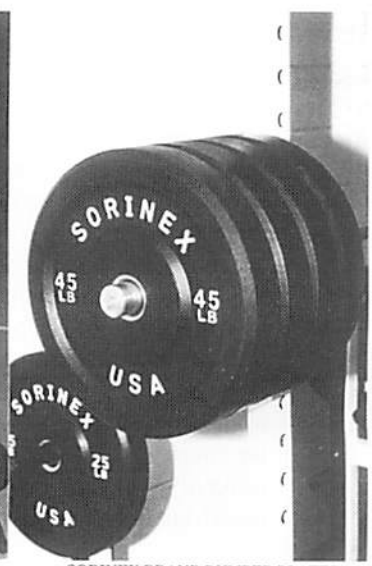

SORINEX BRAND BUMPER PLATES

STRENGTH, POWER AND SPEED IN SHOT PUT TRAINING

By Bogdan Poprawski, Ph.D.

Dr. Poprawski, Director of the Sport High Performance Institute in Toronto,Canada, presents his views on strength and power development for the shot put,created, tested and modeled in the laboratories of the Pozan Sport Institute in Poland and practically applied in coaching at the Canadian High Performance Centre for Track and Field.

Much like the man who walks to work each day by the same route, yet is so intent on making his destination on time that he is unaware of the great works of art he passes during the course of his route, coaches are often guilty of the same myopic vision and ignore what is right before their eyes. In our effort to help our athletes achieve greater and greater results, we sometimes ignore the common sense approaches to training, which with hindsight seem embarrassingly obvious.

Take the use of weight training in the development of shot putters. Everyone involved in the sport would agree that weight training is necessary and you would find almost universal acceptance that the main exercises used by shot putters are:

bench press — snatch — power clean — squat.

It is equally true that the same coaches and athletes would agree that the most successful shot putter is the person who can extend the putting motion to the maximum length and, more importantly, perform this motion as fast as possible, without altering or shortening the motion.

Where we have missed the boat, so to speak, is in our failure to combine these two theories so that we are making the maximum use of our training sessions. Just like our poor fellow on his way to work, we have missed what was right before our eyes.

The mass of a shot is constant, so instead of striving for heavier and heavier lifts in the weight room, why don't we "play" with using a constant weight and concentrate on increasing our speed during the exercises.

When our athletes lift, we use their results as a practical way of monitoring changes in basic strength and so we do periodic testing of performance in the four main areas of lifting. However, many coaches have learned that improvement in the amount of weight lifted by an athlete does not always mean there has been a corresponding increase in the strength of the athletes. The increase could be the result of improved lifting technique. This is the trouble with using standard measurements such as amount of weight on the bar. We do not know the intensity with which the exercise was performed. Simply speaking, we do not know the power created by the athlete when they perform these exercises.

Biomechanics tells us that power is:

$$\text{work/time or } \frac{\text{weight of the bar x distance}}{\text{time required to perform the task}}$$

this gives us a measure in watts.

The real question in this instance is whether or not we need to know the power generated during training sessions in order to improve the distance an athlete achieves in competition? The answer would appear to be yes, since a shot putter must develop power during the throw -

$$\frac{\text{16lb x distance of putting motion}}{\text{time required to perform the task}}$$

We theorized that the same should be true in our training sessions in order to achieve maximum distance during competition. In our testing program we did careful testing and monitoring of the strength training process with the intent of measuring speed and power (see research material).

For our experiments we chose a group of 10 well-trained shot putters, selected on the theory that, as top-level throwers, any increase in performance would be more likely related to their training programs rather than any major improvement in their throwing technique.

Among the athletes:

- Ø Edward Sarul, later a world champion
- Ø Helmut Krueger, later 21 m +
- Ø Janusz Gassowski, later 21m+

All tests were conducted in a drug-free environment. During the course of the experiment, we isolated the test results of the best thrower (Sarul, 19.80m) and compared his results with the average of the remaining athletes in the test group. We did not do direct testing of the traditional strength exercises i.e., bench press, snatch, clean and squat. This was because of limited time and it was felt that the actual testing would fatigue the athletes and could affect the end results of the study. Instead we conducted interviews with both the athletes and their coaches and established personal best figures for the various lifts.

We did, however, test the following under laboratory conditions:

1. Maximum strength in isometric conditions
2. Speed of the bar during snatch exercise (S = 1.35m).
3. Power of legs, Kaleman test using PSM-2 device.
4. Velocity of bar in squat (S = 0.5m)
5. Power of legs in three consecutive squats using PSM-1 device.

Table 1. Overall data

Test	E. Sarul	Throwers Group	Difference %
1. Results (m)	19.80	17.36	14.6
2. Age (years)	21	21.5	
3. Weight (kg)	112.7	108.1	
4. Bench press (kg)	145	143	1.4
5. Snatch (kg)	110	102	7.87
6. Power clean (kg)	140	133	5.26
7. Squat (kg)	200	185.5	7.82
8. Maximum strength — isometric (kg)	257	243	2.88
9. Power of legs — Kalamen test (Watts)	2239	2060	8.69

As you can see from the data, Sarul had a minimal edge in his bench press and maximum strength results. Yet, he registered a 14.6% difference in his personal best throw. Since his results in the standard exercises were very similar to his peers and their technical abilities were also similar, the difference in their results must have some from some other source.

Table 2. Velocity of the bar in snatch exercise (m/s).

	20 kg	40 kg	60 kg	80 kg
E. Sarul	5.04	4.10	3.48	2.62
Shot Putters	4.84	3.74	2.97	2.14
Difference %	4.13	8.78	17.17	22.43

Where we can see a major difference is in the results of the tests which were oriented towards speed and power, rather than sheer brute strength. Here we see that Sarul registered far superior results. In each test he was far ahead of his peers. In the snatch his velocity ranged from 4.13% faster than the average to a 22.43% difference as the weight on the bar increased. In the squat his velocity ranged from 8.48% better to 25.71%, while in the leg power tests, he was 12.28% to 27.3% better than his peers.

Table 3. Velocity of the bar in squat exercise (upwards motion only) (m/s).

	20 kg	40 kg	60 kg	80 kg	100 kg	120 kg	140 kg
E. Sarul	3.07	2.25	1.82	1.56	1.46	1.17	0.86
Shot Putters	2.83	2.19	1.80	1.44	1.24	1.00	0.70
Difference %	8.48	2.74	1.11	8.33	17.74	17.00	25.71

The results of this experiment obviously contradicted the school of thought that more weight is automatically better. Rather, what we recommend to the coaches and athletes is that instead of striving for increased weights during their training, they should be spending time extending the distance of the bar (translocation of bar) in lifting. In this case we suggested they use weights that are smaller than their usual maximum and sub-maximum and concentrate on speed. The athletes still used the same exercises coaches recommend for the shot i.e., pulls, pulljerks and squats, except now they changed the focus of these exercises. One athlete who, we heard later, used this advice was Sarul and his coach A. Daszkiewicz, as they made great use of speed-power work.

Table 4. Power of legs in 3 consecutive squats (Watts)

	20 kg	40 kg	60 kg	80 kg	100 kg	120 kg	140 kg
E. Sarul	3396	3370	3083	2949	2830	2670	2481
Shot Putters	3559	3175	2976	2656	2436	2245	1950
Difference %	12.28	6.14	3.60	11.03	15.76	18.93	27.23

I should point out that our research was supplemented by biomechanical and physiological testing, as well as analysis of multi-year training programs. So, where does that leave the coach who is interested in improving the performance of his athletes? Our first recommendation would be to ignore the traditional theory that more weight is automatically better. The bench press, while still an important exercise, does not seem to be a major indicator of throwing potential. The most important lifts then are the snatches, cleans, continuous clean and jerk and squats.This is a point of view also advocated by Mac Wilkins, Al Feuerbach and W. Komar (2,4).

The weight on the bar when you are striving for maximum power should reach 50-75% of maximum strength (personal best) of each athlete. The emphasis in these exercises should be on translocation of a bar and speed. There are many variations of these premises depending on the athlete. For example, my coaching experience has taught me that stronger and slower athletes should use weights in the upper end of the scale mentioned above in order to achieve the same power as their "weaker" or faster peers.

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Bogdan Poprawski

2006 USATF Masters Weight Pentathlon Championships

UNDER THE BIG SKY

By Lane C. Dowell

The eternal quest for the big one bonds most throwers. Along the pathway to this elusive goal one encounters interesting characters and is lead to many unique venues. Even though the passion still burns as one crosses into the realm of Master's track and field, the big one becomes more of a dream and the topic for the revelry of campfire conversation.

This last August the USATF Master's Weight Pentathlon was contested beneath the umbrella of Montana's Big Sky near Wilsall which is nestled in the slope of the eastern Rocky Mountains near Glacier Park. Sixty-one veterans possessing varying degrees of mastery of the weapons of war gathered at Sager Ranch, the home of fellow competitor, meet director, and local veterinarian, the colorful Dr. Bob Sager (see LSTJ, January, 2004).

The Long and Strong Throwers Journal spent some time with Dr. Bob discussing the prep work necessary to host this national championship and the competition.

LSTJ: *What goals did you have hosting this meet?*

Dr. Bob: We held the championships in 1996 at Montana State University, but it has been my dream since I started in Masters T&F 17 years ago to stage such a competition at the ranch. It is important to give back to something that one enjoys and provide a good competition for my fellow athletes and dear friends. It also gave me a great opportunity to learn more about what makes a good ring and proper cage construction. I feel our venue may serve as a site for future thrower's clinics and camps for those of all ages. This meet was a good for my soul and an opportunity for me to recruit new Masters throwers.

LSTJ: *What is so special about Master's competitions?*

Dr. Bob: All types of throwers seem to be involved...never-wases...has-beens...former Olympians. Egos have been "checked at the door" years ago. We share a passion for throwing and the camaraderie has lead to the development of many great friendships.

LSTJ: *What challenges did you face in staging the meet at your ranch?*

Dr. Bob: We started the initial prep work in May of this year and it took much longer than I had anticipated. We had to build five throwing sites and two cages. This involved the moving of over 4400 cubic yards of soil, re-seeding the area with grass, and the movement of irrigation pipes after a hard day's work. Living many miles from those who would provide materials and labor, didn't make it any easier.

The budget for the meet was $6,500 and involved well over 330 man hours of hard labor. Couple that with all the volunteer efforts, another 300 plus hours, and you are looking at about 700 hours spent to stage the championships. Had it not been for fellow throwers and dear friends like George Mathews, Bob Cahners, Ray Feick, and others, I could not have gotten it done.

LSTJ: *Would you do it again?*

Dr. Bob: In a heartbeat. We hope to host in a couple of more years, if the cows will cooperate and not destroy the facilities.

LSTJ: *As you reflect on the venture, what were some of the highlights?*

Dr. Bob: Betty Jarvis, W-91, was awarded the outstanding athlete who reflects passion, enthusiasm, sportsmanship, and athleticism of a Masters thrower.

We fed 110 and had a super time telling spinning tales of past competitions and enjoying the camaraderie at the post meet social barbeque. Twelve new athletes took part in their first weight pentathlon. This may have been the largest field ever for this championship meet. Nineteen of the 61 competitors were women.

Many said they never threw in such a inspirational place with the 12,000 foot-high mountains in the distance. God smiled on us with bright clear skies, 85 degrees, 10% humidity, and a great discus wind. We did not go in the hole. In fact, the meet turned a small profit, which will go back to improving the sport.

LSTJ: *Did the throwers seem to appreciate the meet and your efforts?*

Dr. Bob: Perhaps Master's veteran thrower, Dick Hotchkiss, said it best, "It was a wonderful experience we all had at your homestead the past weekend. I know what a huge job it was for you and what a weight it was on those who were your support group.

"Opening one's home up to a hundred people of different socio-economic backgrounds demands a bunch of grit and self-assuredness. I am so glad you took it on. As always, my hand goes out to you.

"It all went like clockwork and everyone I talked with had a great time. You are to be commended for the fine job that you did.

"Montana is truly the most beautiful place on Earth. If I could retire, you would have a new neighbor." ***LSTJ***

LONG & STRONG THROWERS CLUB

Mid-Atlantic USATF Member Club

Dear Prospective Member,

The Long & Strong Throwers Club (LSTC) is very excited to announce some changes in membership benefits for 2007. To date we have offered our updated tee-shirt each year for the annual dues of $25. In 2007, LSTC is going to take it to the next level!

In 2007 LSTC annual membership dues will be doubled to $50. However the benefits will be increased exponentially! 2007 members will receive:

1. 2007 LSTC tee-shirt
2. 2007 subscription to the Long & Strong Throwers Journal (or 1 year extension to existing subscriptions)
3. 40% discount on selected adidas gear, including adidas throwing shoes
4. 10% discount on M-F Athletic purchases
5. 50% discounted NTCA 2007 National Throws Coaches Association (NTCA) membership ($25)

Omce you join, you'll get the details by email or post. You'll recoup your dues (and more) in no time!

Who should join? To carry the Long & Strong name, members should demonstrate (1) a sincere love for the throwing events, and (2) good sportsmanship. Kickin' butt in the circle, on the runway or behind the trig is a bonus!

For information about the club, please visit our website at http://www.longandstrong.com.

Yours in throwing,

Glenn A. Thompson
Minister of Propaganda

----------**Detach Here**----------

LONG & STRONG THROWERS CLUB

2007 Membership Application

Name_____
Street Address_____
City_____ State____ Zip Code_____
Phone Number_____
E-mail Address_____
Events_____ T-Shirt Size _____

***Please enclose a check for $50 payable to:**
Long & Strong Throwers Club,
c/o Warren Taylor,
315 Sylvan Retreat,
Columbia, PA 17512

Do you have any special skills or resources you can make available to the club?

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