Improvement of Peak Performance in the Pole Vault

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Introduction

The issue of peak performance at the elite level of pole vaulting is many faceted involving physical, technical, and psychological components. The issue of peak performance, stated in the simplest terms, refers to the vaulter performing well under extreme pressure. Many subscribe to the general theory that under the pressure of championship competition one third of the field will not achieve the performance that brought them to the competition, one third of the field will equal the performance, and one third of the field will exceed the performance that they brought into the contest. The following are factors which are beneficial to achieving peak performances.

Consistency

Developing consistency on several levels is paramount to continued development and confidence under competitive pressure. Consistency in the coaching relationship, training and technical methodology, and training environment become increasingly important to maximize performance at the highest level.

The pole vaulter's peak performance years are generally between the ages of the early 20s to the early 30s due to the extreme technical and physical nature of the event. The preceding five to 10 years usually exhibit the formative development of constructing a consistent model of technique. The coach gains understanding of the athlete's strengths and weaknesses both physically and emotionally during this period. This period of time is critical to allow development of understanding of what Vitaly Petrov describes as the "culture of movement" and allows for the introduction and indoctrination of the coaches technical model and terminology to the athlete. Proper progression from fundamental drills to full approach vaulting dictates that for optimal performance the athlete master the approach and pole transition phases to be in successful position at takeoff and during the in-air phases. Emphasis on the sequential nature of the event dictates that performance objectives are minimized until late in the training of the athlete.

The first five years with the American collegiate athlete can be difficult because of poor modeling and technique training previously at the scholastic level. The coach must reshape the athlete's technique while competing in university competitions. Some detrimental habits have been permanently ingrained. The second five year period exhibits more stabilization of technique and understanding of the model by the athlete, producing continued improvement. Continuity of technical goals over these periods is important for continued development. The foregoing could be the reasoning for American athletes progressing to world class results later in their careers.

Consistency in the coaching model and methodology is imperative when trying to teach the intricacies of a difficult technique which is to be executed in an aggressive manner. The communication between the coach and athlete is the link between transferring the coach's model of technique into the athlete's performance. This communication is critical not only in the learning phase, but also during the more mature phases. The communication between the coach and athlete matures as the relationship continues. Feedback becomes more valuable to the coach in interpreting the athletes' understanding of the model as the athlete becomes more adept at understanding the desired model. The coach must have a clear understanding of the goals during the athlete's progression and communicate to the athlete in concise plain language. The great Polish coach of the 1976 and 1980 Olympic Champions, Andrzej Krzesinski, likened the development of the athletes training and technical model to that of charging a battery, long slow input over an extended period to result in a full charge.

Consistent mutual communication is imperative in building trust between the coach and athlete. Trust is built over a lengthy period and results in confidence in execution for the athlete. The ultimate goal is to have the athlete be able to compete independently from the coach. Conversely, it is a fallacy to believe that the athlete can continue to train independently of feedback from the coach. The coach is still needed to objectively supervise and guide training and technique development even if the athlete believes he has developed an understanding of the technical model because his internal feedback may be misleading.

Consistency in the training environment enables the athlete to trust in his preparation and establish a basis for efficient consistent training leading to successful results and confidence. All parameters of training must be considered not just the functional set up of facilities. Relationships with training partners, strength and gymnastics staff, medical staff,

training staff, psychological training, and the professional manager should be built over an extended period and establish confidence in the athlete and cohesiveness of the preparation team. Changes in these separate aspects infuse various input into the training and technical model which may be detrimental if not closely monitored by the coach. Opportunities for changing and conflicting input into the coach's model usually come when the athlete begins to show signs of success.

Competitiveness

Peak performance under pressure is a function of repeated exposure to competitive situations in training and competition. Building a successful training group which combines support with constant competitive challenges will benefit the athlete when dealing with performing at a high level under pressure. Training in a competitive environment allows constant opportunity to challenge the athlete towards improvement. The most talented vaulter is the most challenging to the coach, because although highly self motivated, competition must be provided by the coach to develop the vaulter's performance instincts. There are many examples of competitive intersquad training groups coinciding with positive performances. Recent examples in the United States would include coach Andre Krysinski's Athletics West group including Kory Tarpenning (5.89m) and Tim Bright (5.82m); Coach Rick Attig's University of Kansas group including Scott Huffman (5.97m) and Pat Manson (5.85m); coach Earl Bell's group in Jonesboro, Arkansas, including Jeff Hartwig (6.03m) and Derek Miles (5.82m); and coach Jim Bemiller's group in Knoxville, Tennessee, with Tim Mack (6.01m) and Lawrence Johnson (5.98m). These training groups also usually included several other members in the 5.40m to 5.70m performance range. The competitiveness and consistency of the training group should be monitored and fostered by the coach. Many elite athletes reach a stage were they separate from the group for individual training to accommodate their schedule or other concerns, which is a mistake.

Exposure to competition at the national level is an advantage to American athletes. Vying for opportunities to compete internationally is fierce due to the size and population of the country. Most recent success has been spread across the country's regions. For example, Brad Walker (5.96m) is from the Northwest region. Toby Stevenson (6.00m) and Nick Hysong (5.90m) train in the Southwest region. Jeff Hartwig (6.03m) and Derek Miles (5.82m) are based in the Midwest, and Tim Mack (6.01m) and Lawrence Johnson (5.98m)

reside in the Southeast region. Each region has produced Olympic or World Championship Medalists and/or 6m results during the past 10 years. This interregional competitive model produces two clear positive results: First, because there is no pre selection process and the field of competitors is strong, the athlete is exposed to the highest level of competition prior to competing in international championships. They must perform under extreme pressure to be appointed to the National Team. Second, interregional competition ensures that only the most prepared and competitive athletes will be sent to the international competition. The depth of the regional competitors ensures a level of competitiveness. Athletes often comment that the pressure of the Olympic Trials competition is more intense than the Olympic Games themselves. The top four competitors in the U.S. 2004 Olympic Trials vaulted 5.80m or better, matching the depth of the Athens Olympic final in which the top four places reached 5.80m or higher. The interregional competition allows no complacency. Lawrence Johnson is the only vaulter to repeat as an U.S. Olympic team member during the past three Olympic cycles.

Negatively, this strong interregional competition has kept the United States from standardizing a national training and technical model and limits the exchange of information and feedback at the elite level.

Coping Strategies

The athlete must take ownership of his own performance. Most elite athletes do not need to be pushed or prodded to be motivated to perform. They exhibit intrinsic motivation to achieve. Alternatively the coach must remain objective in instilling a sense of self reliance in the athlete and assisting the athlete analyze and develop coping strategies to promote success. The athlete may become distracted by performance objectives after initial success and lose focus regarding the process of achieving a model that will produce continued performance improvements.

The coach should analyze the factors for success, evaluate the collected data or criteria, and plan accordingly to assist the athlete in coping with the preparation to perform in preparing for optimal performance in a desired competition. Factors to consider include the following.

Analysis of the specific environment. The environment of the qualifying meets and championship competition should be carefully scrutinized. Each facility has its own unique

characteristics, equipment, and climate. The coach must analyze how the athletes' strengths and weaknesses can be optimized in these settings. A coach must consider how the athlete's technique may need to be modified to improve performance at the particular venue. Planning for individual characteristics is then incorporated into the athlete's preparation.

Analysis of the competition parameters. Championship competitions will have specific parameters which the coach should factor into the preparation of the athlete. Factors to consider are a) Qualifying rounds that require the athlete to compete on back to back days or with one days rest; b) The size of the anticipated field, and anticipated time between attempts, which can exceed 30 minutes between successive heights, and will change as the competition progresses; c) The anticipated increments and how those relate to the projected winning performance. The coach must consider how the competition parameters will fluctuate over the two to four hours of time the competition will take. Things to consider in this regard include changes in temperature, lighting, or wind. The coach must then use this information to help the athlete cope, adapt, and succeed.

Analysis of previous championship results. For example, analysis of winning performance data of Olympic finals prior to the 2004 Games indicated that the winning vault raised the Olympic record in seven of the 10 Olympiads since the advent of the modern era of fiberglass in 1964. The conclusion is reached that a winning vault in Athens, in all likelihood would exceed the existing Olympic record of 5.92m. Therefore, the winning vault of 5.95m was expected. The coach can use this data to anticipate the goal setting and planning for the athlete.

Analysis of the athlete's competitive performances. Evaluation of the top recent performances gives the coach data to simplify the athlete's performance and plan the championship accordingly to cope with the expectation of performance. For example, two weeks prior to the 2004 United States Trials, Mack achieved results of 5.90m, 5.85m, and 5.80m in three competitions over a 10-day period. The data analysis of pole selection, grip height, standard placement, increment sequence, number of competitive vaults, and rest periods allowed evaluation and preparation to formulate a specific competition plan.

Case Studies

The following is a discussion of how the factors of consistency, competitiveness, and coping strategies can be illustrated in the careers of elite vaulters. The analysis of Sergey

Bubka comes from published reports and competitive results, the analysis of Lawrence Johnson and Timothy Mack also stem from personal observations as their coach for extended periods.

Sergey Bubka

Bubka's formative and long time coach, the great Vitaly Petrov, has stated that he prefers to begin training a vaulter at age 14 to 15, and notably started much younger at age 10 with Bubka. Without discounting Bubka's physical gifts, much emphasis should be given to the consistent extended period of time the athlete was developed under the same coach's consistent methodology. Even for the great Bubka, development of the technical model was progressive in nature and appeared to emphasize long term improvement over immediate success. Bubka has stated the championship goal was to be ready at the 1984 Olympic Games at the age of 20. Therefore, consistent, long term goal setting was established for a performance objective 10 years after his initial training. Interestingly, he showed steady progress, vaulting 5.55m as an 18-year-old junior in 1982. Of course, Bubka progressed to championship form earlier, winning the World Championships at 5.70m in 1983, and continuing as planned to set his first world record of 5.85m in May 1984. This steady progression continued as the world record and his personal best was increased almost annually over the next 10 year period. The largest lapse was between July 1988 and May 1991. The observation of results, especially the first 10 years, serves to illustrate that improvement is the product of gradual consistent methodology and training which should not be subverted for quick results achieved through athleticism while accepting deficiencies in technical progress.

Bubka's competitiveness or "fighting spirit" is renowned. Whether it be his record of six World Championship titles, his world record dual in Rome with Thierry Vigneron, regaining the record in a 10 minute span, or his crucial third attempt clearance of 5.90m in Seoul to win the Olympic Championship, examples abound. These qualities are most often born with the athlete and they are developed prior to athletic training. The coach must determine how these qualities can be cultivated to aid in championship performances. Evaluation of Bubka's strategy throughout much of his career shows that he usually chose to attempt three height increments - 5.70m, 5.90m, and a meeting or world record. Analysis of the strategy would indicate that the athlete and coach were estimating between five and 10

jumps of maximum effort. Analysis of the increments could be simplified to - opening height, winning height, and record height, as 5.90m would have a very good chance of medaling or winning. Use of this strategy exhibits a decisive intention to vault at a championship level not the minimum required to outlast your competitors. Appearances indicate that the coach had considered the competitive characteristics and performances of the athlete, previous competition results, and the competition parameters in devising a strategy to be most effective with a limited amount of maximal effort attempts. Analysis of these parameters illustrates how coping strategies could be applied to develop competitive advantage.

Lawrence Johnson

Johnson showed similar progress in development, vaulting 5.35m at age 18 during the scholastic season, equaling Bubka's 5.70m as a college freshman at age 19, and progressing steadily over the next three years to jump 5.98m at age 22. This roughly corresponds to Bubka's personal record of 6.01m at the same age. Johnson's performances were very competitive, setting the U.S. Junior and Collegiate records and winning the U.S. Olympic Trials in 1996 and 2000. His junior mark of 5.70m is No. 2 all time to Maxim Tarasov's mark of 5.80m and his 5.98m vault as a collegiate senior in 1996 was the North American record at the time. He won the indoor World Championships in 2001, silver in the indoor World Championships in 1997 and a silver medal in the 2000 Olympic Games during his post collegiate career.

Unfortunately, Johnson's personal best in the vault remained 5.98m set at the age of 22. It seems inexplicable that no improvement was made between the ages of 22-30. Considering the factors described above, the following observations can be made. Johnson's competitiveness, as Bubka's cannot be questioned, as the results indicate. Therefore, consideration must be given to what other changes occurred. Immediately following the 1996 U.S. Olympic Trials upon ending his collegiate career and turning professional, the consistency of the coaching model, methodology, and training environment was changed. The collegiate model, emphasizing the run and pole transition to takeoff, were replaced by what appeared to be an emphasis on grip height, stiffer poles and actions off the ground. The methodology of training changed based on the completely different background and training philosophy of the new coach. The training group environment was replaced with

individual workouts and the training base was relocated at least twice. No communication between the collegiate and professional coaches took place in the transition period from one model and methodology to the next. The cycle of consistency producing development had been altered.

Some will argue that injuries curtailed Johnson's development. Conversely the argument could be made that the lack of consistency in model and methodology led to inconsistency and injury. An argument can be made the changes and lack of consistency in the technique model, methodology, terminology, training group environment, and accountability of the athlete to the coach, at a critical point in the athlete's career, resulted in diminished progression of improvement. This will never be known, such is the many faceted nature of competitive sport, but the issue is certainly worth considering.

No fault lies with the athlete but more with the coaches and managers who precipitate these changes without careful consideration of the potential drawbacks and benefits. Change is constant, but the change must be managed to promote consistency and improvement. These observations should not be construed as an endorsement of one model over another. That is another discussion for another day. The observation remains that the changing models and methodology were not blended to produce progressive improvement in performance of the athlete during the time in his career when improvement should have been expected.

Timothy Mack

The 2004 Olympic Champion began inauspiciously with a scholastic personal record of 4.11m at the age of 18. He entered the University of Tennessee at the age of 21 in the fall of 1993 with a personal record of 5.30m. He steadily progressed to 5.60m by age 23. He has shown a continual steady progression as he improved his personal best to 5.70m at age 25, and 5.81m at age 27. Mack vaulted a personal best of 6.01m in 2004 at the age of 31. Mack's athleticism early in this period would not compare to Johnson or Bubka. Yet, he has steadily improved his athleticism and technical model to rank favorably with the elite in the event. His personal best of 6.01m equals the sixth best performer of all time.

Mack showed early signs of competitiveness, winning the U. S. Junior Olympics in 1991, the NCCAA (National Christian College Athletic Association) championships in 1993 and the NCAA indoor vault title in 1995 (5.60m), although his early personal bests were well

behind Bubka and Johnson. His continual development resulted in winning the Goodwill Games in 2001 (5.80m) and finishing in the top 10 in the 2001 and 2003 World Championships. Through his consistent improvement he has attained record setting performances at the elite level setting the Olympic record of 5.95m in a gold medal winning performance in Athens and setting the World Athletics Final's record of 6.01m to attain the top World Ranking for 2004. Mack lost only once between the July 11, 2004, U.S. Olympic Trials (5.90m) and the season ending World Athletic Final (6.01m) held September 18, 2004. This season was a dominant example of elite peak performance.

Several observations can be made regarding the consistency of Mack's development. Mack went through the traditional U.S. scholastic and junior college programs prior to entering the university level. He began a structured training program under Coach Ralph Spry who had a successful training group with other vaulters in the 5.0m to 5.50m range at Malone College. He transferred to the University of Tennessee which included a group of vaulters who ranged in performance from 5.0m to 5.98m. He made the decision to remain in this training group after completing his collegiate career. Therefore, for the period of August 1993 to September 2004 he had trained under the same coach and technical model. The training environment was consistent and the training group was competitive. Mack was not the best collegiate vaulter of the training group in Knoxville. Johnson (5.98m) was part of this group for four years. Other members of the training group included Russell Johnson (5.65m), Rich Fulford (5.60m), and Rocky Danners (5.51m), and all had comparable collegiate bests during this time period. All members of this group, including Mack, were elite collegiate vaulters achieving All America status.

The transition from collegiate competitor to the international level is difficult under the American system. Most of the time employment opportunities and completion of study require relocation and many choose not to continue the event past the university level because of the limited support structure for emerging elite athletes. Mack successfully made the transition to elite competitor by maintaining consistency in his training model and environment. He improved gradually both technically and physically. This is comparable, although at a much later age, to Bubka's consistent decade of training prior to achieving championship results. The stability of the technical and training models built trust and confidence in performance resulting in gradual improvement of his personal record. Of course, components were added and modified during this period, but they were

accomplished in a stable environment where trust in relationships, communication styles, and philosophy allowed changes to be blended into the program without sacrificing continuity and improvement. Therefore, observations indicate the consistency and competitive environment were beneficial to continued performance improvements.

Mack's coping strategies were evident in the 2004 Olympic Final. His performance evidenced a high degree of analysis of his own competitive performances and analysis of the previous championship results.

He exhibited a strict competition pre-vault routine between each vault which indicated he had formulated a performance routine that best fit him and prevented extraneous factors from interfering with his performance. Although trailing most of the competition, he was able to remain focused on the process rather than the outcome and achieve a personal best on his third attempt clearance at the Olympic record height.

He had also analyzed the height increments and predetermined to pass 5.85m. Some may have questioned this strategy considering only four competitors remained and the yearly bests of the competitors remaining. This height had been eliminated prior to the competition based on the analysis of his competitive performances and the previous championship results, increment sequence, maximum number of anticipated competition vaults and anticipated recovery periods, with the goal of jumping at least 5.95m to win.

Implications

The foregoing discussion and examples illustrate that promoting factors of consistency, competition, and coping strategies appear to result in continued improvements in peak performance. These practices could be beneficial for athletes as they develop over an extended period as is required in the pole vault. Coaches should be aware of these factors to increase technical proficiency and peak performance earlier and with continued success. Care should be taken to blend the philosophies of the scholastic level with more elite levels. Thus continued progress will be made with sound methodology during the early stages of development to avoid relearning and the ingraining of fundamentally poor habits, which will take longer periods to correct at later stages. Improvements in the system will involve better coordination between coaches and administrators at all levels to establish a fundamentally sound, common approach.

Outdoor Personal Best Performances with Age

All Heights in Meters

Age	Sergey Bubka	Tim Mack	Lawrence Johnson
18	5.55	4.11	5.35
19	5.70	5.00	5.70
20	5.94	5.30	5.83
21	6.00	5.51	5.83
22	6.01	5.60	5.98
23	6.03	5.65	5.98
25	6.06	5.70	5.98
27	6.10	5.81	5.98
29	6.13	5.85	5.98
31	6.14	6.01	5.98

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