

VIEW FROM THE TOP
MIND GAMES
60-SECOND SUMMARY
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DIRECTORY



OLYMPIC COACH

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Message from the MANAGING DIRECTOR

20 YEARS LATER — What has changed in America's Elite Coaches?

TRAINING DESIGN: A Road Map to Success

CYCLING YOUR PERIODIZATION PLAN

THE VEGETARIAN EATING LIFESTYLE

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ON THE COVER

The team is celebrating its victory over top-ranked Brazil on the fifth day of the FIVB World Cup on Nov. 7, 2007.

Players left to right are Logan Tom (#6), Heather Bown (#7), Tayyiba Haneef-Park (#3), Jennifer Joines (#9), Robyn Ah Mow-Santos (#11) and Kim Glass (#10). Photo courtesy of FIVB.

Message from the
**PERFORMANCE
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by
DOUG INGRAM

One of the most successful USA summer sports seasons has ended and a very promising winter season has begun. Our summer teams are in a great position today for next year's Olympic Games. These Games will be spectacular for not only the culture of China, the architecture of the Games structures, the tight competition battle, but it will be the "coming onto the world stage" party for China.

These Games will be unique for the American athletes. It will be the first time since 1972 in Munich that the US will be in the home country of a medal count rival for an Olympic Games. Our athletes and teams have been working hard to secure their "slot" for the Games. There are a number of qualifying competitions, rankings and times that determine who and what sports are eligible to attend that have been occurring this year.



The cover page is a photo of the Women's Volleyball team which has secured their "slot" for the Games at the FIVB Championships. The "thrill of victory" is apparent in the faces and actions of these athletes.

This edition of Olympic Coach hits many topics. We will start with an article comparing Elite coaches from 1988 to those in 2007. Twenty years does make a difference in any profession, but we chronicle those changes in this article.

Periodization (Planning) is a key component for coaches. Two articles, same topic, different insights... we hope that you pick up another idea or two. Dave Shrock's approach the topic with Training Design: A Road Map to Success while Mike and Meg Stone with our own Bill Sands talks about cycling and stages showing a variety of ways to play with intensity and volume.

Krista Austin continues with the second article in a three part series about Rate of Perceived Exertion, Heart Rate and Lactate Training. This article focuses on the practical application of the concepts of Heart Rate Training.

Cheryl Coker of New Mexico State University provided us with a great article on Feedback Traps and how to avoid them.

I would like to take a moment to thank, Sarah Smith, USOC Biomechanist. Sarah has announced her retirement after 22 years of supporting America's athletes and coaches. We will miss her and her talents, but her contribution to the Olympic movement will always be with us. Thanks, Sarah.

We hope that you and your athletes will have a great 2008.

20 Years Later

What has changed in America's Elite Coaches?

by Catherine Sellers- USOC Coaching

In 1988, a special committee on Coaches Education was formed by the USOC with a mission to develop a coherent plan for improving the education of amateur coaches in the United States. One of the first tasks that the committee attack was trying to answer some basic questions such as: Who are America's elite National team coaches? What are the coaching education backgrounds of these individuals? Do these coaches desire additional learning experiences and, if so, what type of coaching educational experiences are desired by these individuals?

In the last quarter of 2007, the USOC once again surveyed America's elite National team coaches. The survey of 2007 closely mirrored many of the questions posed to coaches in 1988. We wanted to understand the demographic background of our coaches to see how the landscape has changed in 20 years.

The technological changes have been immense. In 1988, the survey was conducted in meetings where the coaches were present. The total sampling in 1988 was 130 coaches and or team leaders. For 2007, Survey Monkey and email were used to collect data for the follow-up study, of which 47 coaches (only coaches) responded. The first three tables below show a comparison of the demographic data from 1988 and 2007



| Table 1 - Demographics —Who are these coaches? | | | |
|---|---|---|--|
| Question | 1988 | 2007 | Outcome |
| Age | Age 40.85 Range: 26-75 | Avg. 44.8 Range: 31-77 | Avg. Age and Range has increased |
| Gender | 78% Males 22% Females | 76.6 % Males 23.4% Female | Slight increase in the female coaches |
| Coaching Status | 57.6% Head Coaches 30% Asst. Coaches 12.4% Did not answer | 66.7% Head Coaches 33.3% Asst. Coaches | Larger % of Head Coaches responded |
| Coaching Appt. | 38.4% Olympic Coaches 46.1% Pan-American | 77.3% Olympic Coaches 34.1% Pan-American 15.9% Paralympic | Larger % of Olympic Coaches |

| Table 2 - Experience | | | |
|--|--|---|--|
| Question | 1988 | 2007 | Outcome |
| Experience at Olympic or Pan-Am Games | | 75.6% have previous experience 2.13 Avg. for Olympic experience 1.60 Avg. for Pan-American experience Range: 1-9 Games (Olympic and/or Pan Am) | Just over 1/2 of our Olympic Coach will have 1 prior Game experience (Mode: 17 out of 32) |
| Make a living as a Coach | 61% made a living coaching | 80.9% make a living coaching | Huge increase in the number of professional coaches |
| Do you coach at the University level? | Yes - 36% No - 64% | Yes - 17% No - 83% | More coaches outside the University setting |
| Are you a full-time paid National Coach for your NGB? | Yes - 23% No - 77% | Yes - 58.7% No - 41.3% | Huge increase in professional coaches at the NGB level |
| Years of coaching experience in the sport | 15 years on Avg. Range: 2-38 | 19.87 years of Avg. Range: 4-51 | Significant increase in coaching experience |
| Age Groups that you have coached? | 76.9% (14 and Under) 90% H.S. 99.2% Post Collegiate 33.1% have not coached developing athletes | 70.2% (14 and under) 87.2% H.S. 93.2% Collegiate 100% Post Collegiate 42.6% have not coached developing athletes | Significant decrease in coaches exposed to teaching/coaching developing athletes |
| What level did you compete at? | 37.2% 14 and under 60.5% H.S. 59.7% Collegiate 60.0% Post Collegiate National 47.7% Post Collegiate International 21% Olympic Games | 6.4% Did not compete 38.3% 14 and under 55.3% H.S 51.1% Collegiate 57.5% Post Collegiate National 51.1% Post Collegiate International 14.9% Pan-Am Games 34% Olympic Games | Significant increase in elite level athletes going into coaching |
| Olympic Medalist? | 5% - Yes | 17.4% - Yes | |

Table 3 - Education

| Question | 1988 | 2007 | Outcome |
|--|---|---|---|
| What is the highest degree earned? | 15% HS diploma 6% Junior College 32% Bachelor degree 38% Masters degree 8% Post Masters | 14.8% HS diploma 2.1% Junior College 42.5% Bachelor 36.1% Masters 6.3% Post Masters | Significant increase in the number of coaches with Bachelor degrees |
| Physical Education/ Recreation or Kinesiology Degree? | 36.5% - Yes | 51.9% - Yes | Significant increase in Physical Education backgrounds |
| Coaching Minor? | 17.6% - Yes | 14.0% - Yes | |
| College Course in Coaching? | 43.0% - Yes | 42.6% - Yes | |
| How do you contribute to your knowledge of coaching? | 97% Clinics, lectures or Seminars 95% Books or Coaching Journals 82% Film | 70.5% Clinics, lectures or seminars 15.9% Books or Coaching Journals 13.6% Films/DVD | Most coaches learn additional information on Coaching from attending clinics, lectures or seminars. <i>'07 questions allowed only one selection</i> |

FIVE KEY FINDINGS FROM THE DEMOGRAPHICS SECTION

When comparing the 1988 survey to the 2007 survey, there are five key differences:

1. The elite coaches are older and have more experience (an increase of almost five years of experience).
2. They have been and remain a highly educated group of individuals- 78% in 1988 with College degrees and 84.9% in 2007.
3. More coaches are paid professionals with fewer coaches earning a living in a University Setting (20% more are professional with a 19% reduction of those who are involved at the University level).
4. More elite level athletes (college experience and above) are entering the profession (11% increase).

5. Most coaches increase their coaching knowledge by attending clinics, lectures and seminars.

DEVELOPMENT OF COACHES

The next series of questions were conducted in two different methods: Likert scales and open-ended questions. The questions were asked to find out how coaches learn, what they study and what they feel is important for an elite level coach to know.

Developing Coaching Style

The number along with the Mean Rating Avg. will be the 1988 survey results while the underlined results (Percentages/Mean Rating Avg.) will be from 2007.

The question was posed to rank the order of the major ways you developed your coaching style- (1=Most important). Table 4 provides the coaches responses:

Table 4 - Rank order of the developing coaching style

| Question | Most Important | 2nd Most Important | 3rd Most Important | 4th Most Important | 5th Most Important |
|---|---|--|---|---|---|
| Model or observed successful coaches | 25.0% | #2 - 1.99 <u>62.5%</u> <u>#1- 1.83</u> | 12.5% | 0.0% | 0.0% |
| Experience | #1- 1.58 <u>62.5%</u> <u>#2- 1.53</u> | 25.0% | 12.5% | 0.0% | 0.0% |
| Thought my style out before I coached | 12.5% | 12.5% | #3- 3.33 <u>37.5%</u> <u>#3- 3.17</u> | 12.5% | 12.5% |
| Based it on coaching classes | 0.0% | 0.0% | 0.0% | #4- 3.75 <u>50.0%</u> <u>#4- 4.38</u> | #5- 4.17 <u>50.0%</u> |
| Based it on coaching books and journals | 0.0% | 0.0% | 37.5% | 37.5% | #4- 3.75 <u>37.5%</u> <u>#5- 4.09</u> |

As you can see, experience overwhelmingly remains the major way that coaches develop a coaching style, followed by modeling or observing successful coaches. Those two methods alone account for over 87% of a coach develops their coaching style.

If this is a tendency for young coaches as well, it raises an important issue for future coach development. Can we only hope

that the young coach has a good coach to learn from or had a good coach as an athlete? The old adage of “you coach how you have been coached” is an area that coaching education may need to address.

The next question— Please indicate your understanding of the body of knowledge in regard to:

Table 5 - Understanding of bodies of knowledge

| Question | Not Knowledgeable | Somewhat Knowledgeable | Moderately Knowledgeable | Very Knowledgeable | Highly Knowledgeable |
|-----------------------------|-------------------|---|---|--|---|
| 1. Skills of your Sport | 0.0% | 2.25 | 0.0% | 21.7% | #1- 4.66 76.1% #1- 4.61 |
| 2. Strategies of your Sport | 0.0% | 0.0% | 2.2% | 30.4% | #2- 4.55 67.4% #2- 4.55 |
| 3. Teaching of Sport Skills | 0.0% | 4.3% | 10.9% | #3- 3.75 43.5% #3-4.21 | 41.3% |
| 4. Sport Psychology | 0.0% | 6.4% | #4- 3.63 38.3% #4- 3.65 | 38.3% | 17.0% |
| Sport Biomechanics | 0.0% | 20.0% | #7- 3.09 35.6% #5- 3.4 | 28.9% | 15.6% |
| Sport Physiology | 0.0% | 19.6% | #5- 3.3 41.3% #6- 3.34 | 23.9% | 15.2% |
| Sports Medicine | 2.2% | 22.2% | #6- 3.21 51.1% #7- 2.91 | 17.8% | 6.7% |
| Sport Law | 22.2% | #8- 2.54/5 48.9% #8- 2.02 | 26.7% | 0,0% | 2.2% |

The most knowledgeable areas in rank order have not changed much in the past twenty years. The top three have remained very stable, which is not to surprising, considering they are the three fundamentals of coaching sport:

1. Skills of your sport
2. Strategies of your sport
3. Teaching of Sport Skills

Sport Psychology remains stable at number 4, but we saw a lot of change of interest with numbers five, six and seven. It is interesting to note the changes in Biomechanics which moved from a seventh most studied in 1988 to fifth in 2007.

The coaches were then asked out of the areas in Table 4, which they most actively study. The response has remained consistent for the top two knowledge areas over the past twenty years: Skills

of your sport and Sport Psychology. Sport Pedagogy (science of teaching skills) was third in 1988 followed by strategies. In the 2007 survey, Strategies, Biomechanics and Physiology are all tied for the third slot. However, the response to this question did not allow a distinction to whether the coach was referring to teaching of Sport skills or Skills of your sport.

In the 2007 survey, the coaches were given the opportunity to provide five open ended answer the question of what they most actively studied. The combined results for all five answers were:

1. Skills- 34 responses;
2. Sport Psychology- 29 responses;
3. Strategies- 22 responses;
4. Biomechanics – 17 responses;
5. Physiology- 15 responses.

2007 SURVEY

The 2007 Survey ask some other key questions of our Elite Level Coaches that were not in the 1988 Survey.

Coaching Problems

When faced with a coaching problem, how do you find an answer?

Talk to the athlete or athletes- 73.9%

Talk to my assistants- 58.7%

Talk to the High Performance Director- 39.1%

Call another elite coach- 76.1%

Call a sport scientist- 32.6%

Think about it on my own- 63.0%

The Elite Coaches could select any or all of the choices above. The ability to contact and talk with another elite level coach is very impressive. The reliance on those who “have been there and done that” is very useful. It is interesting to note where Assistant coaches were in the order of who they would get involved in a problem. Not all of the elite programs have assistant coaches; we do not have a number to confirm how it affects this ranking. It is surprising however, to see that Head Coaches do not rely on their assistants. The hiring practices and experience of assistant coaches may need to be investigated.

Traits or qualities of a successful elite coach

The Elite Coaches were asked to provide in a rank order five traits or qualities that personify a successful coach. The results for the number one response are below:

1. Communication (9)
2. Knowledge (7)
3. Commitment/Dedication (4)

When viewing this question with all five answers, we get a more complete idea of the traits of an Elite level coach.

1. Knowledge becomes number one (22 responses)
2. Communication moves to second (19 responses)
3. Listening (12 responses)
4. Commitment, Dedication, Perseverance drops to fourth (11 responses),
5. Leadership (8 responses)
6. Passion and Open-mindedness/Flexibility/Creativity, Patience and Drive all tied at sixth
7. Respect being seventh.

ADDITIONAL INSIGHTS

The following are twenty insights made by some of the coaches in answer to this question:

1. Ability to instill belief/trust/confidence in athletes
2. Big Vision, balanced by ability to set and adjust goals
3. Care about others more than self
4. Perseverance and a sense of humor
5. Attention to skills development of athletes; tailored to athlete needs
6. Precise training techniques and coaching on a daily basis
7. Ability to filter
8. Problem solving orientation
9. Ability to observe without judgment
10. Desire to improve through knowledge
11. Quality Decision makers under pressure
12. High level of integrity and fairness
13. Ability to multi-task with equal amounts of high energy
14. Knowledgeable and with an ability to transfer knowledge simplistically
15. Focused on the process
16. Creative, open minded to new ideas and approaches
17. Having thick skin
18. Flexible, but decisive
19. Excellent instructional skills, ability to deliver messages
20. Understands critical zone training

Coaching education needs to focus on the three fundamentals of coaching- Skills of the sport, strategies of the sport and teaching the skills of that sport.

This also provides us with insight into writing job descriptions for elite level coaches. Who better, than the coach themselves, to tell us what skills that the job needs.

TAKE-AWAYS

1. The greatest influences on the coaching style of future coaches are the current coaches. It is important to have and be good role models.
2. A background of Physical Education is a stronger today than twenty years previous. What will the effects of the reduction in physical education teacher preparation be on the coaching profession? How do we counteract that change for our future coaches?
3. Coaching education needs to focus on the three fundamentals of coaching- Skills of the sport, strategies of the sport and teaching the skills of that sport. It is important that our elite level coaches feel comfortable and highly knowledgeable in teaching sport skills of their sport to their athletes.
4. What are the qualities of an assistant coach? How can we teach the aspects of how to be a good assistant coach?

Training Design

A Road Map to Success

by Dave Shrock, Modesto Junior College

Coaching has been described as the science of total preparation (Plisk & Stone 2003). Effective coaches of all levels rely on systematic training design, or periodization, as a road map to optimal individual or team success (Bompa 1999).

Following these assertions, coaches should be guided by the knowledge of what the crucial tasks are that must be accomplished in the demands of the athlete's event/position and of the sport. Tudor Bompa, an authority on periodization, states 'a coach is only as efficient as his or her organization and planning' (150). Bompa continues by stating that periodization is one of the most important concepts of training and planning, as structured phases of training lead to the highest level of preparation and performance. Training design, or periodization, provides guidance, direction and scope to training; yet needs to be simple, suggestive, and flexible so it can be modified to meet individual circumstances or changing environments.

Will Freeman, in his periodization book entitled *Peak When it Counts* (2001), suggests the three fundamental purposes of periodization: 1) to enable an individual or team to peak at the ideal moment, 2) to achieve optimal training effect from each phase of training, and 3) to make training an objective process. To create the objective process, coaches can measure and test athletes to assess progress towards goals, while at the same time, providing comparisons and objectivity so that the coach can make modifications to workouts, if necessary, and fine-tune progress towards the training objective.

Often when we hear the term periodization, we think of it as a recent phenomenon. On the contrary, periodization began back in the ancient Olympics with Philostratus's training of the athletes. U.S. collegiate athletic teams in the early twentieth century utilized more evolved systematic training, while the Germans in the 1936 Olympics began refining periodization with four year training plans. The concepts were further refined by Eastern bloc state-funded regimes after the Second World War. In 1965, Leonid Matveyev published what has become the classic model for periodization in the West. (Bompa 1999).

PERIODIZATION FOR INDIVIDUALS AND TEAMS

The application of periodization varies between team and individual sports. Considerations of training are determined by the sport's specific requirements, and the discipline demands of each athlete- such as power-speed positions versus endurance based (Olbrecht 2000). Ledger (1998), suggests utilizing the strategy on two levels. While the development of the individual is important to facilitate their positional and individual potential, team development can be addressed with periodization to produce an efficient and cohesive unit. Often, individual and team concerns can overlap and complement each other depending upon their time of season. During the off-season, or preparation phase, individual conditioning and strengthening plans can be utilized to raise the level of fitness and expertise of each player, while during the season, training as a unit should be utilized at every opportunity. An excellent example of combining individual and team related technical training involves the use of game related movements for conditioning. It has been suggested that undulating, non-linear periodization, which will be discussed shortly, best suits team periodization when planning for the year. Variation within microcycles does remain important for team sport players, and this variation of training loads and volume depends



on the training age and experience of each player (Gamble 2006). Studies have determined that the variable summated periodization approach, progressing from extensive to intensive on a three week loading; and a one week restorative, or unloading approach is well adapted to team sports and many individual disciplines (Plisk & Stone 2003).

CREATING AN EFFECTIVE PERIODIZED TRAINING PLAN

Before embarking on setting up any training design or periodized program, the coach needs to determine both long term and intermediate goals or objectives for the individual and the team. Evaluation begins with general considerations such as the physical, physiological, psychological, and technical capabilities of your athletes and team along with specific demands and expectations of the sport, the level at which athletes and team compete, and the time available to train plus prepare for competitions. Considerations should include which competitions are considered developmental, and which competitions, or group of competitions, need the athletes to be at optimal preparation. The evaluation of the athletes includes their training age, level of skill, as well as their occupation and financial support, awareness of nutrition, level of motivation, and support to achieve established goals or objectives.

In the creation of an objective and measurable training plan, routine testing of athletes in controlled sessions or competitions

is important so the development can be measured; including areas that need to be addressed in a holistic approach to training (Bompa 1999; Sellers 2007b; Stone et al 2007).

Once all parameters of the sport and season are identified, along with the attributes of the athlete and team, the coach needs to identify the focal or major competition. From this date, the coach can begin to work backwards, aligning the components outlined below to create a road map or an effective periodized plan.

There are several components to the periodized plan. These periods refer to training with specific and distinct, yet linked goals. By establishing a periodized plan, training loads can be applied in a progressive, cumulative, systematic fashion, with the goal being optimal performance achieved at a specific time.

- 1) **Four year or quadrennium period:** Used in fundamental long range planning which fits well into the Olympic cycle and U.S. scholastic and collegiate systems
- 2) **Annual period:** Culminates with the focal completion identified for that year.
- 3) **Macrocycle:** Term used for phases of preparation and competition leading up to a season or series of focal competitions. Often coaches implement a single, double, or tri-cycle model of periodization depending on the number of seasons, or focal competitions, the athlete or team has in any given annual plan or year.
- 4) **Mesocycle:** Matveyev, in his classic periodization model, utilized natural monthly bio-cycles to construct 'meso' or monthly



periods of four weeks. Within each mesocycle, intensity and volume are gradually increased in each microcycle creating a summated model until the last microcycle, which decreases load and volume for a restorative or stabilizing effect.

- 5) Microcycle:** The building blocks of a mesocycle are the microcycle, normally seven to ten day periods, where load and volume of work are interspersed with recovery.
- 6) Training Session:** Depending on the demands of the athlete or team, and their training age, the coach may incorporate one or several training sessions into a daily routine.
- 7) Training Unit:** The smallest of the periodization units, a unit describes the specific activity prescribed during the training session. It should be noted that sequencing units are important for each session's effectiveness. Well orchestrated programs utilize continuous warm-ups, specific to sport demands, before progressing to motor skill demanding activities while the body is less fatigued, before initiating endurance activities, culminating with a cool down.

Overlapping this periodized approach is the concept of phases that emphasize thematic or training emphasis. The initial phase is called preparation (prep), or conditioning, phase which may last several mesocycles. Athletes in the prep phase address conditioning and fundamental sport skills so that they will be able to adapt to the increasing demands of competitive environments. The preparation phase is usually divided into the general and specific prep phases. In the general prep phase broad, multi-lateral training takes place and then moves into overall strength, flexibility, stamina, and coordination. Building on the general phase, athletes move into the specific preparation phase where the improvement of sport specific skills is emphasized. Training volume is often high during this prep phase to allow conditioning, while intensity is low.

Depending upon the length and complexity of the season, the majority of the competition season is called the competitive phase. The athlete has evolved from the prep phase with stable fitness and the ability to accomplish position and sport specific demands with minimal fatigue. As the competitive phase progresses towards the focal competition, training volume begins to decrease while intensity increased with event and sport specific training emphasized (Bompa 1999; Counsilman & Counsilman 1994; Grosso 2006; Sellers 2007a; Sellers 2007b; Stone et al 2007).

The crescendo of a competitive phase is the taper, or peak, when all components of the cumulative training plan converge to enable optimal performance for a period of time. Tapers are initiated one to three weeks prior to focal competitions and are determined by the training load and level of fatigue on the athlete to that point in the season. Studies on the tapers of swimmers, cyclists, and track athletes identify a performance increase of .05 to 6 percent enabled by increased blood cell volume and muscle glycogen content, giving the athlete greater stamina and energy (Karp 2007; Ledger 1998).

The final phase of periodization is called the transition phase which lasts one to four weeks beginning after the focal competition and allowing athletes to heal injuries and recover from previous training. While the inclination is to immediately stop training after a focal competition, athletes are better served to gradually reduce volume to facilitate recovery. The goal of the transition phase is to maintain some level of fitness while allowing the athlete's body to recover, and the athlete to rejuvenate (Stone, et al 2007).

Training design and periodization have often been compared to cooking with many ingredients, compounded by innumerable factors beyond the coach and athlete's control. The key is to begin with a simple systematic plan and to keep records so that the coach and athlete can review the progression afterwards and make informed assertions and refinements from the training plan. There are many sources available for the novice coach willing to increase their effectiveness by utilizing periodization or training design. Several are listed in the reference section below, and additional resources are available through NGB's or the USOC.

Tudor Bompa declared that periodization is one of the most important concepts in training and performance. By structuring phases and periods which lead to the highest level of speed, strength and endurance in athletic competition, all athletes can succeed at their highest level (Bompa 1999). Negotiating the road to success is most effectively achieved by utilizing the road map of periodization.

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Cycling Your Periodization Plan

By Michael H. Stone and Meg Stone (East Tennessee State) and
William A. Sands (United States Olympic Committee)

The “principle of the cyclic arrangement of load demands” consists of two concepts working simultaneously: 1) cycling and 2) stages (Harre 1982, p. 78). Cycles of training are organized so that work is punctuated with rest and so that athletes progress through a program that systematically varies the training tasks and load.

The overall cycle that each athlete goes through consists of repeating three stages: a) acquisition of athletic form b) stabilization of athletic form and c) temporary loss of athletic form (Harre 1982). Practical experience has shown that athletes do not continue to improve in a progressive linear manner. Athletes require work periods that cause fatigue, and then these work periods are followed by rest and adaptation.

Training load is cycled by increasing load demands followed by decreasing demands. The second concept, stages, is again based on practical experience. Athletes simply cannot work on all of the demands of training and competition at the same time. The demands are too numerous, and available time is too limited. Taken together, these two concepts are united under the modern training approach called periodization.

The concept of periodization has been around at least since the 1920s (Nilsson 1987), and there are at least a dozen models of periodization. Caution should be exercised in their use due to the tendency to infer too much from individual models (Francis and Patterson 1992; Siff 1996a, 1996b; Siff and Verkhoshansky 1993; Verkhoshansky, U. 1981; Verkhoshansky 1977, 1985; Viru 1988, 1990, 1995). Further, most of the models have been tested only cursorily, if at all. Table 1.1 presents a list of several models.

Table 1.1 EXAMPLES OF PERIODIZATION MODELS

| MODEL | COMMENTS |
|----------------------------|--|
| Matveyev | Volume and intensity are reciprocal. |
| Conjugate sequence system | Different training tasks are specifically linked to optimize results |
| Concentrated loading | Part of the conjugate (overlapping sequence system, but also a model unto itself. Period of very high loads followed by relative rest. |
| High Performance- Matveyev | Volume and intensity are reciprocal, but are maintained at much higher loads. |
| Francis | Intensity remains constantly high; volume oscillates |
| Varying intensity | Volume remains constant while intensity oscillates. |
| Oscillatory | Volume and intensity are increased and decreased together in a wavelike pattern. |
| Bondarchuk | Specialized training immediately and throughout the training program. |
| Sleamaker | Primarily for endurance athletes. |
| Clustering | Primarily for relative strength development. |
| Incremental | Volume and intensity are gradually increased. Primarily used by team sports. |
| Instinctive | No formal plan except to proceed based on the “feelings” of the coach, athlete, or both at the moment of training. |
| Professional competitive | Contest-to-contest training with little time for anything but travel to a new competition site and immediate preparation for the subsequent competition. |

PLANNING WITH PERIODIZATION

The most common method of developing a periodization plan is to divide a competitive season into three levels of cycles: a) macrocycles—several months in duration up to a year or slightly more; b) mesocycles— from approximately two to approximately eight weeks in duration; and c) microcycles—usually seven to fourteen days in duration.

The three levels of training organization permit a “divide and conquer” approach to the assignment of training tasks in a definite pattern for a definite period. Unfortunately, various authors have taken considerable liberty in using terms to describe varying durations, contents, and objectives of training within this context.

The three levels of training duration are placed within an overall structure of the training year that consists of a preparatory period, a competitive period, and a transition or rest period.



An athlete requires approximately 22 to 25 weeks to reach peak performance (Verkhoshansky 1985) before a type of fatigue or exhaustion occurs that is poorly understood (Poliquin 1991). Experience has shown that performance generally declines within these times constraints, but the mechanisms of the decline are unknown.

This idea of a limited time for adaptation leads to the concept of multiple periodization, which simply means that the training year is usually divided into two, rarely more, phases consisting of preparatory, competitive and transition periods (Bompa 1990a, 1990b, 1993; Siff and Verkhoshansky 1993; Verkhoshansky 1985). Perhaps unfortunately, many modern training programs force athletes to attempt to peak too often.

DESCRIPTION OF THE PERIODS

The preparatory period is usually divided into general and specific phases. The general preparatory phase is used for broad or multilateral training (Bompa, 1990b). The training tasks are aimed at improving the athlete's overall strength, flexibility, stamina, coordination, and so forth.

The specific preparatory phase more closely resembles the sport and sport-specific tasks. Training during the specific preparatory phase are aimed at improving sport-specific tasks and fitness such as jumping, flexibility and strength in extreme ranges of motion and applying any newly acquired fitness to solving specific sport tasks.

The preparatory period should be relatively longer for inexperienced athletes in order to allow for sufficient development of basic fitness. However, in elite athletes the preparatory period may be relatively short due to frequent competitions and the necessity of elite athletes to remain close to top condition throughout the training year (Francis and Patterson 1992; Siff 1996b; Siff and Verkhoshansky 1993; Zatsiorsky 1995).

The competitive period involves the majority of competitions during the particular season or macrocycle. The fitness of the athlete should be relatively stable during this period, and training focuses on maximizing and stabilizing performance. The preparatory period is linked to the competitive period in that a well-executed preparatory period, with sufficient duration to achieve a high level of fitness at a reasonable pace, allows the athlete to demonstrate more stable performances during the competitive period (Harre 1982; Siff and Verkhoshansky 1993; Verkhoshansky 1985). The idea of performance stability is particularly important for athletes in resistance training, and may differ somewhat from sport to sport. For example, the tactical approach of a pole vaulter is quite different from that of a diver. The pole vaulter may often face performances that he or she has never equaled. This is seen in personal-best records. The pole vaulter may try previously unachieved heights in many competitions throughout a season. The diver should face this type of scenario only in the protected environment of training. The diver must perform what he or she has performed (i.e. dives) hundreds or thousands of times before, but must perform dives precisely in the decisive moment of competition. No byes or failed attempts are allowed in diving. Therefore, the diver seeks to stabilize performance at a level that is consistent with his or her skills, while the pole vaulter must assault and achieve new levels of performance during a competition and can use more than one attempt.

The transition or rest period involves one to four, rarely more, weeks of reduced training load to facilitate recovery from the rigors of previous training both physically and mentally (Bompa 1990a, 1990b; Harre 1982, 1986; Siff and Verkhoshansky 1993). During the transition period the athlete should attempt to maintain fitness while allowing injuries to heal, develop new goals for the next competitive season, evaluate the previous competitive season and basically ensure that the next competitive season begins with a renewed vigor and commitment.

TYPES OF PERIODS

There are a number of different types of periods of training depending on training goals, time of the season and capabilities of the athlete. Macrocycles are usually described based on common sense understanding of the nature of the competitions within the macrocycle. For example, there may be an Olympic preparation type of macrocycle due to the modification of competition schedules to fit properly with the Olympic Games. There may also be a Pan American, national championship, or other types of macrocycles depending on the most important goal of the macrocycle. The second level, mesocycles can be categorized by

the objectives of the mesocycle. Mesocycle-level objectives are relatively similar across macrocycles, which aids in the consistency of their defining characteristics. Mesocycles thus become similar

to inter-changeable planning “parts” that can be used and reused in different macrocycles. Table 1.2 shows a list of mesocycle types and corresponding tasks (Harre 1982).

| TYPE | TYPICAL DURATION | MAIN TASKS |
|-----------------------|---------------------|--|
| General | Almost any duration | General education and training, primarily general preparatory phase; develops basic fitness. |
| Basic Sport Specific | ~ 6 weeks | Improving the functional level of performance in specific skills and fitness; develops specific fitness |
| Preparatory | ~ 6 weeks | Training focused on competitive preparedness; sub maximum to maximum loads to directly enhance fitness and skills for competitive mesocycles. |
| Immediate preparatory | ~2 weeks | Training focused on recovery and peaking for a competition; tapering or testing. |
| Stabilization | ~4 weeks | Perfecting technique and fitness; eliminating technique and fitness errors while stabilizing acquired skills and fitness. Stabilization is the most important. |
| Build up | ~3 weeks | Further buildup of training loads to enhance foundational skills or fitness during a long preparatory period; more general training and conditioning than specific; active recovery from earlier specific and high-load training. |
| Precompetitive | ~6 weeks | Development of the optimum expression of all skill and fitness factors for a specific competition or series of competitions; specific training with individualized loads; focused on bringing all fitness and skill characteristics to their peak. |
| Competitive build up | ~ 3 weeks | Focused on restoring fitness during a long period of competitions. |
| Competitive | ~2- 6 weeks | Special emphasis on a specific competition that occurs during a mesocycle. |
| Recovery | ~1-4 weeks | Specific focus on recovery and rehabilitation. May follow a series of competitions or serve between important competitions such as World Cups. |

The Mesocycles can be linked to form an annual plan (Bompa 1990b), or a specific macrocycle (Harre 1982, 1990; Matveyev 1977).

Microcycles are periods of training lasting from seven to fourteen days. Microcycles are the smallest basic unit of training planning that has strictly applied objectives. The training lesson is a smaller

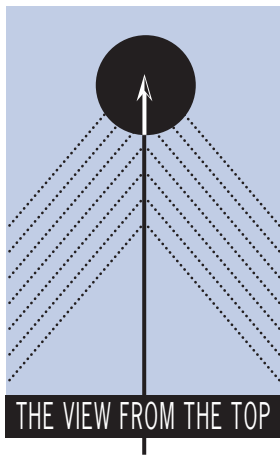
training unit, but the goals of any particular training lesson can be modified based on current circumstances. However, the objectives of the microcycle remain intact so that the subsequent training lessons are adapted to reach the objectives set for the microcycle (Verkhoshansky 1985). Various types of microcycles are shown in Table 1.3 below.

| TYPE | COMMENTS |
|--|---|
| General Preparatory | Main type of microcycle, used mostly at the beginning of the preparatory period. Focusing on developing general fitness and skills. |
| Special preparatory | Greater proportions of specific exercises, used at the end of the preparatory period. Focused on developing sport-specific fitness and skills |
| SUBTYPES OF GENERAL AND SPECIAL MICROCYCLES | |
| Preparatory build-up | Gradual increase in training load across the microcycle. |
| Shock | Sudden and severe increase in training load to shock the athlete, increase fatigue, and force LLTE (long-term lag of training effect). |
| Competition/Camp | Mimics the load that will be faced in a competitive setting lasting several days, resulting in either tapering or high psychological and physiological concentrated loading. |
| SUBTYPES OF THE INTRODUCTORY MICROCYCLE | |
| Tapering | Decrease in training load to enhance recovery and later peak performance |
| Competitive simulation | Increase in training load to “teach” the athlete about the types and magnitudes of stress that will be faced during an upcoming competition. |
| Competitive | Immediate training preparation, travel, site preparation for a contest, warm-up routines, and the competition |
| Recovery | Used after a series of shock microcycles and following a competition or a series of competitions. The primary goal is to rest, recuperate, heal and prepare for the next training or competition. |

As described earlier, the cyclic arrangement of load demands refers to periodization, which is composed of two concepts used simultaneously. The first concept is that of *cycling* the training load by alternating between work and rest. The second concept is that of periods of training with specific, distinct and linked goals. The importance of these periodization concepts lies in the

organized and systematic fashion in which training loads can be applied for the improvement of sport performance.

Excerpted and modified from Principles and Practice of Resistance Training by Michael H. Stone, Meg Stone and William A. Sands; Human Kinetics Champaign, IL. 2007. Reprinted with permission from Human Kinetics.



The View From the Top: Dan Campbell— USA Boxing



At the end of October, USA Boxers Rau'Shee Warren and Demetrius Andrade won gold medals at the 2007 World championships. Luiz Yanez, Gary Russell, Jr. and Raynell Williams secured Olympic berths. This was a huge improvement from the 2005 performance of two bronze medals. Dan Campbell, USA Boxing's National Director of Coaching, has changed the outlook of the USA team.

USA Boxers just experienced their best World Championships in over a decade. What do you attribute the success to?

The success of the boxers this year is the direct result in our partnership with Performance Services. Our Sportsfolio and the Residential Program has been a tremendous asset to our attempt to reach our rightful spot on the top of the medal stand. Our athletes have adjusted to life as an Olympic level athlete, and have proven to the world that we are back.

As the Head Olympic Coach, what are the issues that concern you?

As the Olympic Head Coach my major concern is that the boxers do not self destruct and that they continue to realize that there is work to do to win gold at the biggest event of their lives. They can concentrate on their professional careers after the Olympics, now is not the time.

You were named the National Director of Coaching in 2005 after a long history of producing great young boxers. What are some of the main difference between developing young boxers and Olympic boxers?

It is the same concept because these are the same boxers that I started to develop in the junior division. I believe that we begin to identify top athletes while they are young, and nurture their talent. It is easier for the athletes to adopt the Olympic or International style of boxing, if we start teaching them at a young age. My job as National Coach does not begin and end with the Senior boxers. I believe that to be successful I have to find a way to involve myself and my assistant in Cadet, Junior and women boxing. It is also our responsibility to train the coaches in our approach to Olympic Style Boxing.

What advice would you give to a young coach just starting their career?

Never ever feel as if there is nothing else to learn. When you stop learning, you start failing.

In your opinion, what is the most important asset an athlete must possess to be successful?

An athlete must never feel that he/she is unbeatable. When you become a prima donna, you are on the path to failure.

Who has influenced your coaching philosophy the most?

Being a part of the training of Olympians, where I felt that some of the coaches and some of the boxers did not give their total commitment to training. My motto is: failure is not an option.

THE

VEGETARIAN

EATING LIFESTYLE

Vegetarian eating is widespread among athletes these days and it is important for the coach to realize a few of the effects that this eating plan may have on your athletes.

The term vegetarianism is used loosely with many athletes from those who do not eat red meat to those who do not eat any animal products at all. I encounter many athletes who claim to be vegetarian when in fact they are not because they may not fully understand the different classifications associated with vegetarianism. Before we jump too far into the vegetarian way of life, here are some of the more common categories of vegetarian diets:

- **Lacto-vegetarian:** no animal foods except for milk and milk products (yogurt, cheese, cottage cheese)
- **Lacto-ovo-vegetarian:** no animal foods except for eggs, milk and milk products.
- **Vegan:** no animal foods at all.

I have met some athletes who fall into a couple of the different categories, who constantly bounce around from one to another and those who also eat fish but no other meats. It doesn't really matter what type of vegetarian plan an athlete follows whether it be for ethical, moral, health or performance reasons. What is important is how this can effect your athlete's health and performance based on the training load you provide them throughout the year.

EFFECTS OF VEGETARIANISM

Optimal performance comes with good health. Athletes who follow any type of vegetarian eating program seem to have a lower risk of developing diseases such as diabetes and heart disease in later years of life. Unfortunately, much of the scientific research is focused on health effects of vegetarianism and not specifically on performance. However, it is easy to infer that vegetarian eating plans could lead to increased performance since carbohydrates are

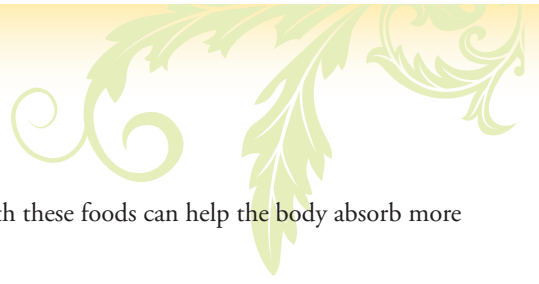
plentiful and carbohydrates are the body's main source of energy during moderate to high intensity training.

Of course, there are some challenges when it comes to following a vegetarian eating plan. Protein sources are present but the athlete must make more of a concerted effort to find protein food sources based on what type of vegetarianism they follow. It is easy to find a piece of chicken or glass of milk but when an athlete chooses not to eat those food items or travels internationally where these products may not be available, the hunt for protein is more challenging. Here is a list of non-meat options that you can provide your athletes that will provide a good balance between protein and carbohydrate:

- Soy milk
- Tofu
- Edamame
- Quinoa (a grain that is relatively in protein)
- Walnuts, almonds
- Kidney and black beans
- Tempeh
- Hummus
- Peanut, soynut or almond butter

For athletes thinking of adopting a vegetarian lifestyle, it is easier if you recommend they progress from minimizing animal product consumption to avoiding it altogether over a period of time. I personally believe in following this natural progression for most athletes because it is easier to learn about substitute foods and truly maintain being a vegetarian without completing voiding the diet of animal products in one day. Keep in mind the following dietary concerns as your athlete progresses from being an animal product consumer to a vegetarian since it will almost always have an impact on their performance.

1. Total energy. Most vegetarian diets are high in carbohydrate rich foods such as fruits, vegetables and grains and have a lot of fiber which are very filling. This could result in an athlete not eating enough calories to support their training. I have worked



with many vegan athletes who had problems maintaining their weight. Good strategies to ensure they are receiving enough calories to support their energy expenditure include eating nuts, peanut butter, soy products and meat substitutes.

2. Protein. Vegetarian athletes who do not eat any type of meat or dairy foods could have low protein intakes. It is well known that athletes need to eat protein to remain in macronutrient balance but they also require a higher protein level depending on their strength program, level of fitness and demands of their individual sport. Higher non-meat protein foods include nuts, tofu, hummus, soy milk and some whole-grain based cereals.

3. Iron. Vegetarian athletes are at greater risk for having low iron stores because the most absorbable type of iron (heme iron) is only found in animal products. Non-heme iron, found in plant sources, contains iron but in lower amounts and is not as absorbable. Iron is needed to help the muscles get oxygen and low amounts of iron could cause fatigue and poor performance. Female athletes more than males are affected because of the monthly blood loss from menstruation and while it is more common in female endurance athletes, iron deficiency happens in all types of athletes (including males) from strength/power, acrobat/combat, team and endurance sports. Including non-animal sources of iron including spinach, broccoli, almonds, oatmeal and iron fortified cereals will help the athlete maintain their iron stores. Drinking orange juice, or another source of

vitamin C, with these foods can help the body absorb more iron.

4. Calcium. For those vegetarian athletes who do not drink milk or any dairy foods, calcium will be low. Calcium is very important for healthy bones and also muscle contractions. Alternate sources of calcium rich foods include calcium-fortified cereals, tofu, soy milk and green leafy vegetables.

5. Vitamin B12. There is no active form of this vitamin in any plant foods and because vitamin B12 is involved in the breakdown of foods to energy, low amounts can be detrimental for performance. Pure vegan athletes are at risk of developing anemia from deficiency of this vitamin and this can lead to fatigue. Fortified foods are the top choice to include in an athlete's eating program and include whole grain cereals and soy products.

Athletes who follow any type of vegetarian eating program can still perform at a high level.

Athletes who follow any type of vegetarian eating program can still perform at a high level. In order to be successful, athletes must become more educated about plant-based food options and choose many varieties and options of fruits, vegetables, nuts, legumes, soy products and meat alternatives. It will take some planning in the initial stages of adopting a vegetarian lifestyle but it becomes much easier after the athlete gets over the initial learning curve.

Bob Seebohar, MS, RD, CSSD, CSCS is a Sport Dietitian for the US Olympic Committee.



Curried sweet potato quinoa

Serves 4

Ingredients:

- 1Tbs Olive oil
- 1 ea Sweet potato, diced (skin on)
- ¼ cup Onion, diced
- 1 ea Granny smith apple, diced
- 1Tbs Curry powder
- 1 cup Quinoa
- 2 cups Vegetable broth
- 1 cup Frozen peas
- ½ cup Cashews, chopped

Preparation:

1. In a sauce pan, sauté onion and sweet potato in olive oil until onion begins to soften (about 3 minutes).
2. Add apples, curry powder and quinoa. Continue to cook stirring often for 2 minutes.
3. Add broth, cover and bring to a simmer.
4. Cook at a low simmer for 20 minutes.
5. Add frozen peas, cashews. Stir and cook uncovered additional 2 minutes.
6. Remove from heat, cover and let stand for 5 minutes.

Nutrition per serving:

Calories: 375; Total fat: 14g Saturated fat: 2g; Protein: 10g; Carbohydrates: 54g; Fiber: 8g; Sodium: 450mg

Kitchen Tips:

1. Quinoa is a gluten free grain grown primarily in the Colorado Rockies that was actually known to the Incas as “the mother grain”
2. Quinoa is richer in high quality protein than any other grain. It is rich in the amino acids: lysine, cystine, and methionine as well as niacin, B-6, calcium, magnesium and iron.

Created by: Adam Korzun, MS, RD, LDN



Sweet corn bisque with crispy tofu

Serves 4

Crispy Tofu Ingredients:

- 1 block Tofu, drained, pressed and diced
- 2Tbs Cornstarch
- Salt and pepper and chili powder to taste (about 1 tsp of each)

Preparation:

1. Preheat oven to 400 F.
2. Season cornstarch with salt and pepper to taste.
3. Toss tofu in seasoned cornstarch until well coated.
4. Arrange tofu on a foil lined, and sprayed baking pan.
5. Bake for 30-40 minutes or until crispy (stirring once)

Sweet corn bisque Ingredients:

- 1Tbs Olive oil
- 1 cup Onion, diced
- 2 ea Red bliss potato, diced (small w/ skin on)
- 2 cup Frozen corn, thawed
- 1 tsp Garlic, minced
- 3Tbs Flour
- 1Tbs Thyme (dried or fresh)
- 4 cup Vegetable broth (low sodium)
- 2 cup Soymilk
- Pepper to taste

Preparation:

1. In a large sauce pan, saute onion and potato in olive oil until onion begins to soften (about 3 minutes).
2. Add corn and garlic and continue to sauté additional 5 minutes.
3. Add thyme and slowly stir in flour until well incorporated (a pseudo roux).
4. Slowly add stock, stir constantly to prevent lumps.
5. Once all stock in added, bring to a simmer and cook until potatoes are soft (about 30 minutes)
6. Remove from heat, and let cool about 5 minutes.
7. Add soy milk to cool, and then puree soup in a blender.
8. Add puree soup back to pan, season with pepper and return to heat.
9. Return soup to simmer and then serve (Portion soup into bowls and top with crispy tofu)

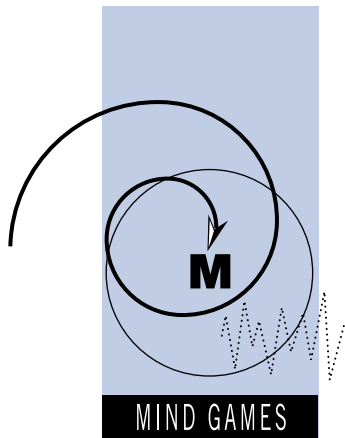
Nutrition per serving:

Calories: 425; Total fat: 16g Saturated fat: 2g; Protein: 28g; Carbohydrates: 49g; Fiber: 8g; Sodium: 580mg

Kitchen Tips:

1. Tofu is often considered a “super-food” because it is a complete protein; providing all 8 of the essential amino acids. Tofu is available in several textures, ranging from silken to extra firm. The firm is great for baking, grilling or sautéing while the silken can be pureed to make vegan mayo, desserts and even smoothies.
2. The cornstarch will actually draw the water out of the tofu during the baking process and creates a crispy outside crust similar to deep fat frying, but without adding any of the fat!

Created by: Adam Korzun, MS, RD, LDN



Feedback Traps

by Cheryl Coker, Ph.D (New Mexico State University)

The importance of providing athletes feedback regarding their performance is without question. Unfortunately, a number of feedback traps exist that coaches can fall into. These traps reduce feedback effectiveness or worse, create unintentional consequences that can hinder performance. Here are five common feedback traps that should be avoided:

TRAP #1 - MORE IS NOT BETTER!

Feedback serves many purposes. It can reinforce a behavior, provide information about the correctness of a performance attempt, explain why an error occurred, prescribe how to fix an error and motivate athletes to continue working towards their goals. Accordingly, feedback facilitates skill development and performance. It stands to reason then that one might think that the more frequently feedback is given, the greater the gains in learning and performance. This however, is not the case and in fact, can be detrimental.

If feedback is given too often, athletes become accustomed to receiving it and can develop an overdependence on the coach. When this occurs, they are no longer actively engaged in processing and assessing response produced sensory information but instead simply wait for the coach to tell them what happened and how to fix it. The danger with this strategy is that the athlete is no longer forced to develop necessary problem solving skills to develop their own error detection and correction mechanisms. In other words, athletes will not learn how to ascertain the specific cause of an error nor will they be able to determine the adjustments necessary for its correction. Instead, prompt athletes to evaluate their performance prior to providing feedback. This strategy promotes reflective thinking that leads to superior learning.

TRAP #2 - OFFERING FEEDBACK TOO QUICKLY

When feedback is provided too quickly, the athlete is not given the opportunity to attend to and process response produced sensory information. As discussed above, this inhibits the athlete's development of important error detection and correction mechanisms. Asking athletes to assess their performance before telling them what you observed is, again, a superior strategy for skill development.

TRAP #3 - GIVING TOO MUCH INFORMATION

Long, extensive feedback overloads athletes with too much information and can cause confusion and frustration. Likewise, attempting to correct multiple errors at a time can overwhelm and challenge an athlete's attentional capacity. Focus on one correction at a time and follow the KISS principle: keep it short and simple.

TRAP #4 - INTERFERING WITH AUTOMATIC PROCESSING

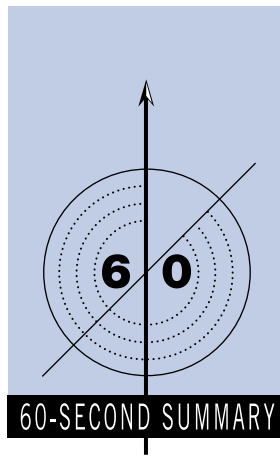
When athletes reach elite levels, their movements are performed automatically with little or no conscious effort. Coaches, however, can disrupt these processes when the feedback they provide causes the athlete to consciously focus on a technical element of a normally automatically performed movement. To illustrate, try to determine your natural stride length as you walk several meters. It should be apparent that consciously focusing on a skill that you usually give little thought to changes the internal rhythm of the movement. Consequently, in competition, feedback should support the adoption of a non-awareness strategy. In other words, athletes should not be focusing on the technical execution of the skill while performing it but allow the movement to occur naturally.

TRAP #5 - MISDIRECTING ATTENTIONAL FOCUS

Choose your words carefully when conveying information. Coaches often times unintentionally misdirect an athlete's attentional focus by the way they phrase their feedback messages. By telling an athlete not to worry about hitting the hurdle, you have actually planted that thought in the athlete's mind. Similarly, if you tell a goalkeeper not to let the opponent intimidate them, you have changed the athlete's focus from concentrating on blocking the shot to recalling past failures against that opponent.

CONCLUSION

Through feedback, coaches communicate to their athletes' information to enhance skill development and performance. To ensure feedback effectiveness however, coaches should recognize and avoid the five feedback traps presented above.



The Heart Rate Response to Exercise: Applications to Monitoring Training

by Krista Austin, Ph.D. USOC Laboratory Manager

This is the second in a three part series about RPE and Heart Rates.

Today, heart rate monitors have become one of the most commonly utilized tools to assess exercise intensity in the training setting. This is primarily due to the ease of monitoring and the immediate feedback which is provided to the coach and athlete. Most find the greatest benefit of monitoring heart rate to be the ability to immediately alter training intensity when necessary.

Heart rate can be defined as the number of times that the heart contracts per minute in order to sustain blood supply to the



working body. It is an objective measure of the cardiovascular demand placed on the body. For our purposes, the cardiovascular system will be defined as the heart and blood vessels which carry nutrients and oxygen to the working tissues (muscles, organs) of the body and removes carbon dioxide and waste.

A wide range of exercise intensities and modes can be monitored through the measurement of heart rate. This includes sub-maximal exercise, where a steady state heart rate is desired, to repeated bouts of high intensity exercise in which heart rate is rapidly increased and decreased repeatedly for short or long durations. Therefore, whenever interpreting the heart rate response, it must be viewed based on the objective(s) of the training session.

INTERPRETING HEART RATE

A very stable heart rate pattern can be determined during exercise. A decrease or increase in heart rate for a given training intensity can indicate an improved or decreased tolerance to the training session. In order to properly assess the training session, heart rate should be monitored during the exercise and recovery period. During the recovery period, the time needed to return to a heart rate associated with the “recovery zone” (often defined as less than 120 beats per minute) should also be noted. Improvements in the time to return to this recovery zone can also indicate that adaptations to training have taken place. Lastly, when assessing heart rate, variables such as hydration level, weather (temperature, humidity) and stress can all greatly affect the heart’s response and should be taken into account.

MONITORING THE RESPONSE TO STEADY STATE EXERCISE

Heart rate is most commonly assessed in endurance sports or for an aerobic training session where a steady state heart rate and/or pace are desired for greater than three minutes. When performing a steady state training session, work must be maintained for at least three minutes in order to obtain a heart rate that is truly reflective of the cardiovascular system and the training demand. When the duration of an exercise bout is shorter than three minutes, the heart rate response is not complete due to a lag in response time by the cardiovascular system. Training plans for most aerobic training programs are based on intensity and the intensity is described by heart rate being divided into training zones. Training zones can be set based on percentages of the maximum heart rate as described below:

| Zone | Goal | % of Max Heart Rate |
|------|--------------------|---------------------|
| 1 | Recovery/Long Slow | 50-70% |
| 2 | Endurance | 70-75% |
| 3 | Steady State | 75-80% |
| 4 | Tempo/Threshold | 80-90% |
| 4 | VO2max Intervals | 90-95% |
| 5 | Sprint/Power | 95-100% |

When training works, it results in a reduced heart rate at a given work intensity. As a result, higher workloads are then feasible in a given training zone. However when a higher heart rate is demonstrated, this means the athlete is not adapting to the training program, environmental conditions, or can be a sign of illness or poor recovery from a previous training bout.

MONITORING THE RESPONSE TO REPEATED BOUTS OF HIGH INTENSITY EXERCISE

Whether training for repeated bursts of speed as might be required in team sport or an individual sport with speed components, the ability to explode and recover quickly over and over again is critical to success in these sports. They require a very high level of fitness, often termed anaerobic endurance. Anaerobic endurance athletes can repeatedly sustain bursts of 20-40 seconds in duration while also executing a very technical skill. Heart rate can be monitored in these sport situations for average heart rate, peak heart rate, how quickly the heart rate returns to baseline following a burst in play, and whether over time the athlete can actually maintain a lower heart rate for the same training session or game play. The more rapidly a high heart rate can return to recovery levels, the more fit the athlete is at the level play being performed. In the same sense, when swimmers, runners, triathletes and other individual sport athletes perform interval or sprint sessions, the highest heart rate obtained for each repetition and the time needed to return to recovery levels is indicative of adaptation to the training load. A favorable response to a training bout that is repeated over a four week training block is reported in the table below. It can be noted that adaptation has occurred based on a reduction in recovery heart rate at one minute following the repetition and a lower heart rate for each repetition. In addition, the rating of perceived exertion (RPE) by the athlete was lower following the four week training period:

| Week (bpm) | Repetition RPE | HR (bpm) | RPE (6-20) | Recovery HR (bpm) @ 1min |
|------------|----------------|----------|------------|--------------------------|
| 1 | 1 | 151 | 12.5 | 136 |
| | 2 | 156 | 12.5 | 143 |
| | 3 | 157 | 13.0 | 147 |
| 2 | 1 | 150 | 12.5 | 120 |
| | 2 | 155 | 12.5 | 128 |
| | 3 | 157 | 13.0 | 132 |
| 3 | 1 | 146 | 12.0 | 118 |
| | 2 | 150 | 12.5 | 125 |
| | 3 | 152 | 12.5 | 128 |
| 4 | 1 | 145 | 11.5 | 118 |
| | 2 | 148 | 12.0 | 122 |
| | 3 | 150 | 12.5 | 125 |

*Notice the recovery HR reduction from week 1 to week 4.

HEART RATE AND RATE OF PERCEIVED EXERTION (RPE)

While heart rate is an excellent objective measure of adaptation to a training stimulus, the impact of training or the training load, is also dependent on the athlete's perception and awareness of how they are completing the session. Thus, it is also appropriate to include a subjective measure of the training session. With so much technology in today's world, we often forget to simply ask the athlete how a training session felt. When training and everything else in life is going well, the athlete can perceive a stimulus appropriately or even easier than it is intended to be. Conversely, when training or other aspects of life, such as social influences, school, weather or illness are not optimal, perception of the training stimulus can be much harder than the actual cardiovascular demand.

Researchers Foster and Snyder at the University of Wisconsin, LaCrosse found that the RPE and heart rate response to a workload display a positive relationship that share the same pattern during training. In general, aerobic training results in a lower heart rate and RPE for a given workload. Despite improvements in cardiovascular fitness, this relationship does not change. However, it has also been noted by Martin and Andersen at the Australian Institute of Sport that heart rate alone does not regulate RPE. It has been shown that a number of psychological (mood state, stress) and physiological (breathing rate, muscular recovery rate) variables often influence the perception of effort associated with a training bout. They have also reported that the HR-RPE relationship changes when athletes undergo periods of intense training intended to apply an overload (also known as overreaching). During a period of overreaching, higher RPEs are reported for a given heart rate. Thus, the same heart rate early in a period of intense training will be associated with higher RPEs later on in the overreaching period. However, those athletes who experience higher RPEs for lower heart rates are more likely to have better performances in response to a taper. For a short period in a cycle (i.e. 3-6 weeks), when intentionally aiming to overreach, an altered RPE to heart rate relationship appears to be beneficial to the athlete's overall goals of improving performance. However, if the relationship is sustained or is not intended, it can serve as an indicator that something else is occurring with an athlete and needs to be addressed or at least taken into consideration when planning the training program. Always remember that your athlete can tell you more than you think about their body's performance!



USOC DIRECTORY FOR THE COACHING RESOURCES STAFF

HOT OFF THE PRESS

P.L.A.Y.S Conference

Pipeline Leadership for America's Youth Sports Conference will be held in Colorado Springs on April 16-19th. This conference is designed for those passionate about improving youth sport programs. The lineup of speakers for the conference is outstanding and you will not want to miss this conference if you are involved in youth sport. For more information on this conference: athleteservices@usoc.org

FIRST AID for COACHES

USOC and the American Red Cross have teamed up to provide safety training course "First Aid for Coaches". The course is an on-line course and covers just about any safety issue that a coach might encounter. The cost of the course is \$45.00. To sign up for the course or find more information go to: www.redcrossonlinetraining.org.

Learner Guide

From our friends in Scotland and the UK comes a Learner Guide on Periodization.

<http://www2.sfeu.ac.uk/images/periodisationoftraining/print-Page.htm>

This is an excellent resource to help you through periodization concepts.

The Canadian Athletics Coaching Centre

Another great resource on Periodization with articles by some of the World's leading experts- Viru, Matveyev, Bondarchuck Verk-hoshansky and others..

<http://www.athleticscoaching.ca/?pid=7&spid=34>

Periodization Breakdown?

Article by Mel Siff - http://www.performbetter.com/catalog/matrix-arch/OnePiecePage.asp_Q_PageID_E_82_A_PageName_E_ArticleSiffPeriodization

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OLYMPIC COACH E-MAGAZINE

The U.S. Olympic Committee Performance Services Division reminds you that our quarterly magazine, OLYMPIC COACH, is now available electronically as the OLYMPIC COACH E-MAGAZINE.

This quarterly publication designed for coaches at all levels can now come to you via e-mail. The quarterly e-mail provides a summary of each article in the magazine with a link that takes you directly to the full-length article. The best news is that OLYMPIC COACH E-MAGAZINE is available to all coaches and other interested individuals free of charge.

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