Performance Coaching: individualization of training programmes

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Introduction

Performance coaching is a process that can be defined as the purposeful improvement of competitive sports performance through a planned programme of preparation and competition (Lyle 1999). The process is both multifaceted and multidisciplinary. As such, it requires input in a variety of different disciplines and from a number of different specialists. When one considers the basic building blocks that are necessary for effective coaching behaviour, it becomes obvious that contributions to an athlete's development may have to be made in a wide variety of areas. Depending on the requirements of a particular sport, these may include inputs in the areas of technique (e.g. biomechanics and skill learning), physiology, psychology, nutrition, theoretical knowledge of the sport, lifestyle management (including time management) and tactics. Any contributions to the process will be complicated by the need for coaches also to address the differences between various factors. These factors include what type of sports (team sport or individual sport), whether children or adults (children should not be treated as mini-adults), and males or females (female athletes may be susceptible to disordered eating habits, amenorrhea and osteoporosis). Obviously, many contributions will need to be highly individualized and may need to be further divided into specific areas for attention such as in strength conditioning, flexibility, aerobic capacity, mental preparation, sport medicine, nutrition, practice organisation and management, and competition planning. For the last of these, the coach in some sports may even have a responsibility for entries, travel and accommodation arrangements. In most sports, laws of the sport, ethics, monitoring techniques, peaking and tapering, detraining, communication and even safe working practice (including prevention of injuries and overtraining) should also be considered. With a process of such complexity coaches need to plan, periodise and individualize the training programme with considerable care. Although coaches may not be responsible personally for providing all of the expertise in each particular area, their overall coaching role and responsibility is to plan and co-ordinate the various contributions to each and every athlete into an effective individualized strategy for enhancing competitive performance.

The relevance of individualizing training to optimise athletic performance is highlighted in the coaching theory and applied literature by reference to a number of important 'principles'. For example, the 'principle of individualization' is one of Bompa's (1999) seven principles of training and the 'principle of individuality' is one of Rushall's (1985a, 1985b) seven principles of coaching. In addition, individualization has been described as an important principle for sports coaching (Hazeldine & McNab 1998), an essential element of the coaching process (Cross 1999) and as a key concept (Lyle 1996). At least five other coaching or training 'principles' may also have relevance for individualization. First, is Howe's (1990) 'primary principle' that suggests that the coach should seek to be a facilitator rather than a director, a strategy that should highlight the idiosyncratic requirements of each and every athlete, and one which may suggest a more democratic approach than is sometimes the case. Second, is Sherman and Sands' (1996) 'principle of consequence' that requires coaches to consider the possible outcomes (e.g. injury, overtraining) that might arise for the individual from a rigorous training programme. Thirdly, Sands and Alexander (1987) have identified coaching principles on the socio-psychological dimension, including one of 'individual needs'. Such approaches support an athlete centred, coach led philosophy. Finally, in addition to the Bompa's (1999) 'principle of individualization', another two of his seven training principles will have an obvious impact on individualization; these are his 'principle of specialization' and 'principle of modelling the training process'. The former reinforces that training needs to reflect the demands of the particular sport and event, and the latter that coaches should direct and organise training sessions so that the objectives, methods and content are similar to those of a competition.

Although the principles identified above may apply to all sports, the majority of the subsequent analysis in this article will be centred on swimming and rugby football as the experience of the authors of this article is principally in these two sports.

What the research and training theory indicates:

Despite the fact that principles such as these exist to guide coach behaviour, many coaching strategies for optimising individualization are compromised by event and sport specific factors. For example, Cross and Wright (2001) identified that British swimming coaches individualize training regularly, but are often constrained from providing optimal individualization. This was because of inadequate training facilities, too wide a range of ability in the squad, lack of sports science back-up and coaches having to look after too many athletes at any one time. For team sports, the difficulties of individualizing training are not dissimilar but may be exacerbated by the need to work on team dynamics, which means that less time is available for individual practice. In fact, even getting all of the players together in order to train as a team is problematical in many team sports (see Cross 1995 for an example in field hockey).

A further distinction needs to be made at this point. Although some individual sports employ specialist event coaches (e.g. different specialists in athletics in the areas of sprints, hurdles, throwing events, jumps etc.), which, in itself, contributes to a more 'individualized' coaching approach, many other sports do not. Swimming is one sport in which a single coach is often in control of all aspects of performance, and responsible for the preparation of all competition strokes and race distances. Exceptions include when athletes are on duty with national teams and when athletes are based at national institutes of sport. In such circumstances, particular coaches will be responsible for certain strokes (backstroke, breaststroke etc.) or particular race distances (1500 metres freestyle, 400 metres individual medley etc.). Obviously, most coaches will have particular areas of expertise, and it is doubtful if one coach can attend adequately to all swimmers in a squad in order to individualize training optimally, given the range of individual strokes and preferred racing distances. One would expect that the same problems might arise in the team sport situation. Although professional team sports will often have, not only a head coach in overall charge, but additional coaches for particular aspects of performance (e.g. a professional rugby team may have a forwards coach, a backs coach and a 'kicks' coach), many amateur sports teams do not. Field hockey, although a team sport, is essentially still an 'amateur' sport and is similar to swimming inasmuch as a single coach is often required to cater to all aspects of performance. This may be detrimental to the potential performance of many of the players and/or to the team and to the ultimate effectiveness of the coaching process itself.

It would seem evident to most coaches that each athlete in their charge is unique. Athletes have different physiological characteristics, technical and tactical abilities, psychological traits and social lifestyles (Rushall and Pyke 1990, Bompa 1999, Cross 1999). Planning individualized training programmes would seem essential in order to cater for individual characteristics and to optimise performance development. Despite this assumption, Rushall (1998) has suggested that individualization is an assumption expounded by many but that there is in fact a paucity of research into the concept.

Savage et al (1981) produced research data that highlighted that all athletes are physiologically unique. They conducted an experiment on a training group of top American collegiate swimmers. Physiological measures such as VO2max, heartrate, ferritin levels and lactate levels at rest and post-exercise were taken during and after 75 days of intensive training. It was discovered that, despite following identical peaking programmes, the individuals in the research sample demonstrated different concomitant physiological and performance profiles. They concluded that, because of the individuality of training responses, in order to produce optimal performances it was essential to apply individual training programmes based on individualized training responses.

Some examples of individualization practices in team sports also exist. For example, Cooke (1990) noted that the England Rugby Union team's physical fitness training has, since 1987, included fitness training programmes based on individual player strengths and weaknesses. However, it is not clear whether this is generally replicated at club level, nor whether it was also based on player-position requirements.

McGowan et al (1990) have reported that some individualization took place in the training of the 1984 United States Olympic volleyball team. This team which took the gold medal, had trained as a group from 1981 and had spent approximately 3,500 training hours (4 hours per day) in its preparation for the Olympic competition. Approximately 30 minutes each day was spent on purely individualized training practices with a further 90 minutes spent on small group practices. As this team won the gold medal, it could be argued that these individualization practices had had a positive effect.

According to Bompa (1999) the coach should analyse athletes' work capacities and personality traits to determine their optimum effort tolerance. Once this is known it should be possible to plan optimum training loads for each individual athlete. To this end, knowing the factors that influence athletes' work capacity should assist coaches to make the right decisions regarding training loads. Important factors are as follows:

- **Individual tolerance of training loads.** Costill et al (1992) have noted that there is a limit to the physiological and anatomical development that can be achieved with training - a factor that they suggest is probably determined by genetics. Athletes are not created with the same ability to

tolerate training. In addition, athletes of similar performance levels often vary in their optimum training loads (Rushall and Pyke 1990). For example, the swimmers Mark Spitz and John Kinsella (both former world record holders on freestyle) are a frequently described example of this factor. Kinsella could tolerate much higher training loads than Spitz but could not match Spitz's competition performances. In rugby, Scott Hastings (a former Scottish rugby international) would be a good example of an athlete who, through individual choice, liked to push himself consistently hard in training.

- **Genetic factors and individual fitness profiles.** Athletes may have different biomotor abilities (strength, speed, endurance and co-ordination) due to genetic variance in physiological make-up (Simoneau and Bouchard 1998). Research data from 4 studies provided enough evidence for Simoneau and Bouchard to conclude that the considerable variation between athletes in anaerobic performance can, to a large extent, be attributed to genetic factors. For example, they noted that:

  "Important determinants of anaerobic performance such as fibre type proportion and glycolytic enzyme capacity of skeletal muscle are also influenced by genetic factors, and variation in these and other relevant characteristics can be partly responsible for high and low anaerobic performance phenotype and training potential." p19

  Rushall and Pyke (1990) proposed that genetic factors determine that some athletes have a greater potential for maximum strength compared to others. Those who have a higher proportion of fast-twitch fibres in muscles gain more from strength training than those with more slow-twitch fibres. This is because fast-twitch fibres create higher degrees of tension during resistance training leading to significant increases in muscle size (hypertrophy). A similar finding was reported in an experiment by Esbjiornsson et al (1993) involving muscle biopsies. Anaerobic performance was found to be directly correlated to the quantity of fast-twitch fibres in muscles. In planning an athlete's programme a coach must have knowledge of the strengths and weaknesses of an athlete's fitness profile. In a team situation such as rugby this will lead to many individual differences, with some players needing to work more on strength, some on speed and others on endurance and flexibility.

- **Biological and chronological age.** This has a very important bearing on optimal training loads. The growing child and adolescent can be divided into prepubertal, pubertal and postpubertal stages. In each stage the young athlete will have different physiological characteristics and, as such, training loads must be planned very carefully and in accordance with current knowledge of the growing athlete (Wilmore and Costill 1994). It is important that coaches recognise that biological age is more relevant for planning training loads than is chronological age (Hagger 1999). Personal experience as a player has confirmed that age is an important factor in planning rugby training programmes. Certainly from post puberty through to around 28 years of age it seemed that higher volumes and intensities of training could be tolerated compared with the period from 29-33. This was evident also with other professionals at the time. Alan Tait (a Scottish rugby international in his 30s) for example, had a much-reduced programme in terms of volume and intensity compared with younger players. His continued selection for Scotland at this time and his high standard of performance at international level may indicate that individualizing his training programme in this way had had extremely positive effects.

- **Recovery rate from training and competition.** The time required to recover from a training stimulus varies greatly between athletes (Keen 1995). Some athletes require longer recovery periods than others do and this can often be the experience for more mature athletes. (Rushall and Pyke 1990). It is very important that coaches be aware of the rate of recovery of each of their athletes so that supercompensation can be achieved. The cycle of training stimulus, fatigue, compensation and supercompensation ensures that the athlete will have demonstrated higher levels of training adaptation and a higher homeostasis level (Bompa 1999). Through close monitoring, coaches can determine individual differences in the recovery rate of their athletes (Pyne 1999).

- **Environmental tolerance.** Response to the physical environment can have wide variations between athletes (Rushall and Pyke 1990). Athletes with a greater percentage body fat will be more prone to overheating in warm conditions, but will be better insulated against the cold. It is also the case that some athletes are much more sensitive to the effects of altitude and polluted environments than others. The coach must therefore be able to modify training programmes in accordance with the athlete's tolerance to environmental conditions. Numerous examples exist to

demonstrate this. For example, in swimming some swimmers will be adversely affected in training because of water temperature changes. In our experience, older swimmers are more affected than younger ones when the temperature rises. In contrast, young swimmers are more affected when the temperature drops.

- **Lifestyle.** Athletes all lead different and varied lifestyles. A training group of rugby players or swimmers may include schoolchildren, students, manual workers, office workers and full-time professional athletes. Obviously, each of these occupations will have its own stress levels and coaches need to be aware that the athlete's lifestyle may conflict with and even exacerbate the stress caused by rigorous training loads (Rushall and Pyke 1990). As Collins (1999: 26) noted 'Athletes don't exist in a vacuum; rather they are susceptible (as we all are) to social pressures.' Life stresses can vary from day-to-day and can often be greater at certain times of the year. For example, at examination times or at deadlines for the financial year or the completion of a work related task. The lifestyle of elite athletes has been recognised as a crucial training consideration in many countries. Following Australia's example, the UK Sports Institute initiated the Athlete Career and Education Programme (ACE UK) in 1999. It aims to create the correct environment for elite athletes to succeed by allowing them to focus on their performance development without distractions (Anderson 1999). Interestingly, one of its objectives is to help athletes look beyond their sporting careers and to consider incorporating educational courses into their lifestyle. The ACE UK programme administrators are aware that support for athletes must be individualized. Some athletes, for example, find the transition to full-time training through lottery funding to be difficult. Deirdrie Anderson (1999: 31), national manager of ACE UK, highlighted the potential problem when she stated that 'Some people don't fit easily into the institutionalised one-dimensional approach.' Each athlete is an individual with unique needs and preferences and the ACE programme recognises that athletes who are happy with their lifestyle have a greater chance of success in elite competition. For some, total dedication to full-time training status may be their preference, for others, a less intensive programme with perhaps an educational course may add a 'second dimension' to their lifestyle. This may be more suitable for those who find full-time training monotonous with subsequent loss of enthusiasm and appetite for their sport. This was very common in 1996 among Scottish rugby players when they became full-time professionals for the first time.

One of the most prevalent issues discussed in the training theory literature is how coaches can optimise performance and prevent overtraining (Maglischo 1993, Keen 1995, Bompa 1999, Pyne 1999, Cross and Lyle 1999, Marion 2000). The paradigm 'stress-overload-adaptation' is a fundamental concept of coaching science (Keen 1995). Bompa (1999) described this concept as a training stimulus with appropriate stressing of homeostasis resulting in adaptations in the form of structural and physiological changes within the body. Through training 'overload' a new higher level of homeostasis should be established with subsequent potential for the athlete to tolerate an even higher level of training stimulus. The training stimulus and adaptation cycle therefore must be planned in accordance with each athlete's unique homeostasis (Denison 1995). An optimal training programme is one that provides the right amount of stress at appropriate times in the training programme. The logic is that too light a loading will not maximise an athlete's performance, but that too much may push the athlete into an overtrained state. Individualized training programmes are thus a critical factor in the prevention of overtraining (Maglischo 1993, Budgett 2000).

Bompa (1999) acknowledges the role of mental preparation for athletes but proposes that the best form of mental strength comes through the confidence which is gained through engaging in an optimal training programme of physical, technical and tactical factors. There is no doubt that the mind and body are inextricably linked (Karseras, 2000). Indeed, much of the coaching literature testifies that coaches should plan to develop the mental strength of their elite athletes (Collins 1999, Schinke 1999, Karseras 2000). Individuality is probably the most critical consideration in this type of planning. There is no generic mental training programme appropriate to all athletes. However, many coaches and psychologists still use blanket, recipe-like approaches with their athletes (Collins 1999). Schinke (1999: 22) describes the need for individualization in this area:

"...athletes are not a homogeneous group of people with identical needs, securities, and insecurities. In essence, a repertoire or 'toolkit' of mental training techniques cannot be considered the definitive intervention for all athletes. ... Regardless of whether we are coaches, sports psychologists, or any other type of support staff member for that matter, our interventions need to take into account the individual differences or heterogeneity of each performance and each situation."

Collins (1999) gives a good example of individualization when he discusses the need for coaches to adopt different strategies for the effects of anxiety on different individuals. Engaged in a Sport England

project to gain insight into 'In-Event Anxiety', Collins concluded that different strategies of motivation and coaching are required for different types of individual at different times. Put simply, he advocated that high-anxious athletes need motivation (gee-ing up) in low pressure situations where low-anxious athletes are being successful. When in high pressure situations the low-anxious seem to get motivated, while the high-anxious need encouragement and refocusing. The important implication is that 'anxiety is very individualized, it is socially influenced and is dynamically changing all the time' (Collins 1999: 27). Coaches should therefore, assess the individual anxiety traits of their athletes and constantly monitor its fluctuating nature.

Conclusion

Individualization has been shown to be a critical concept in planning optimal athlete training programmes. Athletes are unique individuals with different physiological characteristics, tolerances to environmental and training loads, rates of recovery from training stimuli, lifestyles and social pressures, psychological traits and training and competition goals. This applies across all sports and across all ages. Consequently, tailoring the coaching process to the needs of individual athletes and taking into consideration age and maturity, degree of previous training and experience and current level of skill, should assist in the achievement of challenging but realistic individual performance goals.

Despite coaches recognising the need for an individualized approach, and the coaching theory literature identifying various principles to support it, several constraints can and often do militate against an optimal effect. However, the importance of adopting an event specific approach for individual sports such as swimming, and a player-position specific approach for team sports such as rugby football have been highlighted as possibly helpful.

Finally, it was suggested that the chances of an athlete becoming overtrained may be reduced by using an individualized approach.

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