

RAMP warm-ups: more than simply short-term preparation

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INTRODUCTION

One of the greatest challenges facing any coach is time. It is rare to hear of a coach who has sufficient time to dedicate to all the potential areas for performance enhancement. Indeed, even if a coach had all the time he or she required, the amounts of work that they can do will be limited by the athletes' training capacity. Training prescription is therefore always a matter of choice, and coaches are making daily decisions as to how best to allocate the time and athletes' energy available to them. It can be argued that we can do anything, but we can't do everything and that decisions as to training priorities are essential to the work of a strength and conditioning coach.

Towards efficiency and effectiveness

The prioritisation of training naturally requires us to carefully consider two key concepts: that of efficiency and effectiveness. Efficiency can be thought of as the ability to accomplish something with the least waste of time and effort. With efficient training, athletes are able to best achieve their performance goals, within the restrictions of the time and energy available.

Efficiency is an important concept, but it must always be considered in the light of effectiveness. Although training efficiency can be an important goal, if it comes at the cost of effectiveness then it is not truly efficient, as the key objective of any training input will not have been accomplished, and other inputs will then be required to achieve the goal. The converse of course is that training can be effective, without necessarily being efficient, and full evaluation of these training inputs needs to consider the amount of time and energy dedicated to achieving a given goal, and its net effect on the rest of the athlete's training programme.

Athletic development and team sports: the challenge

One of the great challenges of the majority of team sports is the range of fitness parameters that an athlete competing in the sport has to develop. Add to this the technical and tactical requirements of the game, together with an often-crowded competition schedule, and the challenge of effective athletic development becomes even more complicated. Therefore, training systems that are able to address multiple training goals, but at no increased cost in terms of time or energy, become especially valuable. It could be argued that one of the most powerful tools available to a strength and conditioning (S&C) coach, or indeed to a sports coach, is the warm-up. For a S&C coach, this is one of the few areas where they will typically have an important input, if not actually being totally in charge of the process. Consequently, the warm-up provides an important tool via which several training objectives can be accomplished. Although this area has seen significant change in the last 5 to 10 years, it is still

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'To maximise performance we need to ensure that the quality of work performed is always technically correct'

questionable whether its potential as a fundamental part of every training session is being fully exploited.

Taking a new look at warm-up

Although the physiological benefits of an effective warm-up are relatively well-established in terms of both temperature-related and non-temperature-related aspects,^{1,2,3,5,7,11} the use of a warm-up as a key 'training' tool rather than as a purely 'preparational' tool is less well developed. To maximise the potential benefit of warm-up in terms of the overall athletic development of an athlete requires a shift in emphasis and an awareness of the multiple benefits that effective warm-ups can bring to athletic development over the longer term. Figure 1 outlines key considerations which should form the backbone of the planning of an effective warm-up. This shows how effective planning clearly needs to consider the short-term effects of the warm-up, but also how wider considerations can significantly enhance the overall benefits the warm-up can bring in terms of efficiency – and also in terms of benefits relating to longer term athletic development.

Do warm-ups maximise performance in the short term? This is the traditional view of the warm-up as preparation for performance. Here, activities need to be chosen which maximise performance in the upcoming session or competition. Indeed, most research on warm-up looks at the effectiveness of specific interventions on subsequent levels of performance, and recommendations are made based on these changes of performance. Undoubtedly this provides excellent insight into the types of activities that can be included in warm-

up, but this isolated approach needs to be balanced against wider considerations, considerations that can significantly impact upon the overall efficiency and effectiveness of the wider training programme.

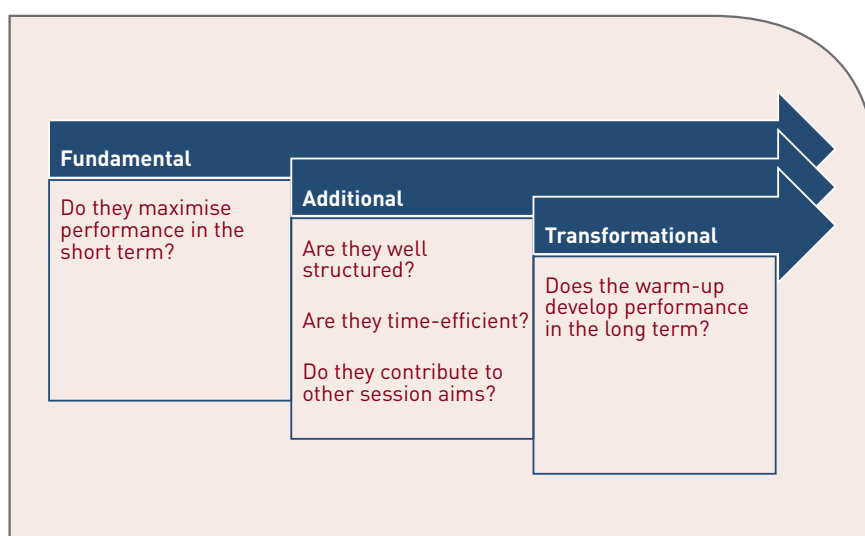
Expanding the thought process is essential if decisions are to be made that balance short-term effects with wider considerations and importantly with longer term athletic development. For example, an intervention may be able to elicit a slightly enhanced performance in a subsequent activity, but the logistical challenges of implementing the approach may mean that the overall warm-up becomes time inefficient, and other activities that provide longer-term benefits are omitted. Other important questions, therefore, need to be addressed in addition to the traditional thought process.

Are the warm-ups well structured? Although the impact of specific interventions has been well documented, what is less well established is the optimal structure of a warm-up, and how effective sequencing can ensure that benefits from one activity can facilitate performance in a subsequent activity. For example, mobility has been shown to be improved by an increase in muscle temperature, and so mobility-based activities may be best preceded by activities that raise body temperature. Similarly, the Treppe effect outlines how muscle contraction force is enhanced by prior muscle activity, with stronger muscle contraction rates (even in response to stimuli of the same strength) with each successive contraction.¹² Effective warm-ups should involve an initially low intensity of exercise and a graded increase in activity intensity up to high intensity effort. Thoughts can then focus upon how best to elicit these effects in combination with other key questions.

Are the warm-ups time-efficient? Although the warm-up is a key part of an overall session, typically the main aim of any given session comes in the main body of the session. In this way, warm-ups should be planned to achieve their key goals in as time and energy-efficient a way as possible. This requires a careful consideration of every activity included in the warm-up and evaluation of whether it contributes to performance, either in the short term, the medium term or long term. This should involve a careful analysis of the efficiency to effectiveness ratio, and its impact upon the subsequent session.

Do they contribute to other session aims? Typically, a well-planned session will

Figure 1. Considerations in warm-up design



have a number of objectives. Effectively planned warm-ups need to look beyond purely physiological preparation, and need to incorporate considerations of skill development, and other key goals of the athlete's programme. In this way, warm-ups can be planned that contribute directly to the activities and the goals of the main session.⁹ This will then provide a seamless transition between the warm-up and the main session. However, although an important consideration, at times this can become a straightjacket and coaches need to be comfortable in both integration and separation of the warm-up from the main session, with the separation aspects being intricately linked to the long-term planning considerations.

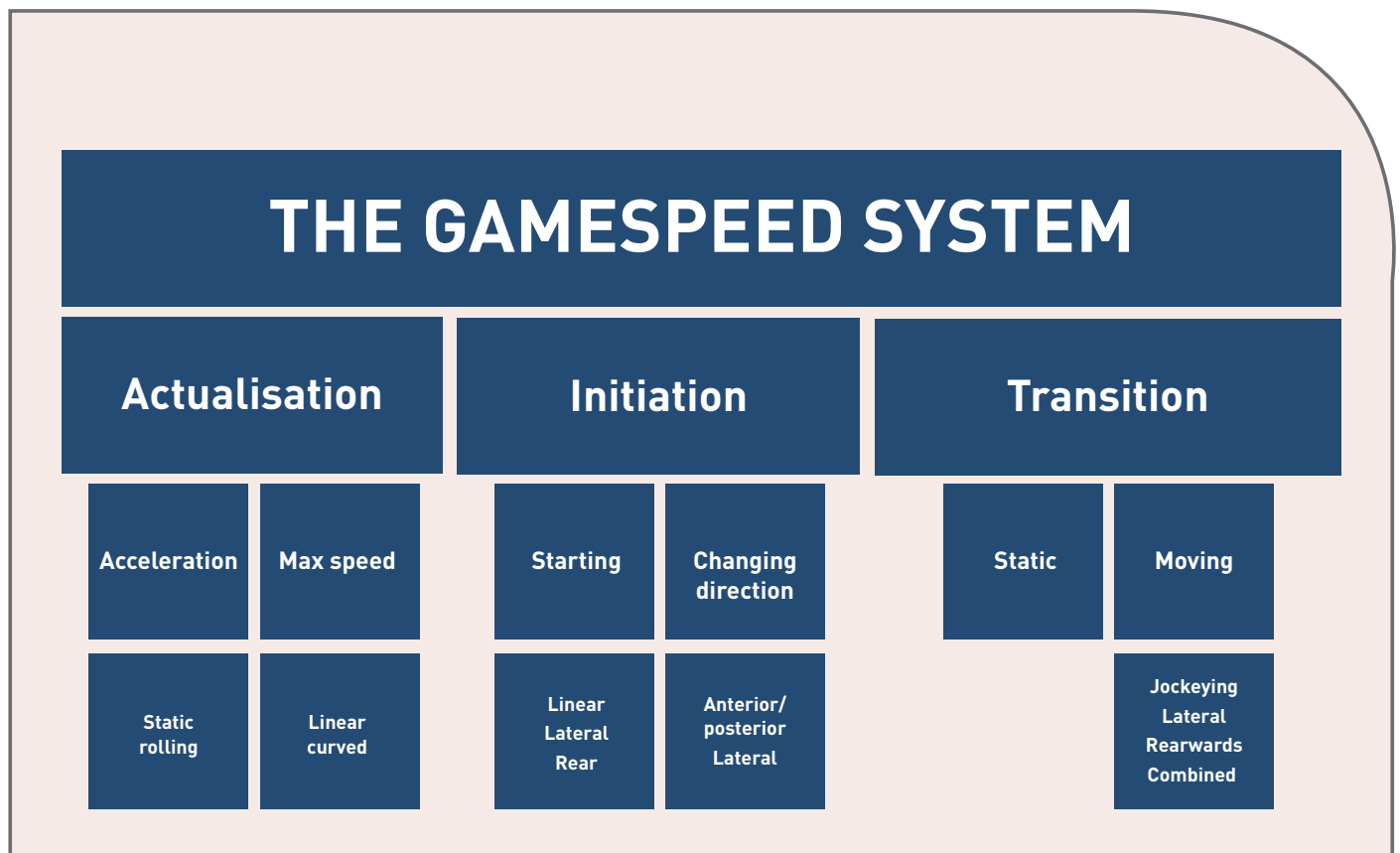
Does the warm-up develop performance in the long term? This question is a major departure from the traditional warm-up thought process. Typically, warm-up planning is built around the first consideration, but incorporating the other three considerations into this planning results in a more efficient and overall effective warm-up. However, incorporating a fifth consideration dramatically changes the planning process of warm-ups and is transformational in terms of big picture thinking. Consideration of whether the warm-up maximises performance in the

long-term takes planning to a different level, as rather than simply thinking about warm-up as a short-term tool for preparation for an upcoming session, it opens up the warm-up as a key tool in overall athletic development. Armed with this form of thinking, activities can be chosen, not simply around the impact on the subsequent session, but importantly on their impact on the athletes' overall athletic development.

So, although two activities could conceivably have the same short-term impact, the use of activity that incorporates movements or skills that can provide gains in the longer term becomes a preferred option. It is here that the concept of separation mentioned earlier is essential, as it allows the development of a capacity that may not be covered in the main session, but which is essential to the athletic development of the athlete, and the warm-up may be the only opportunity to develop this capacity. In this way, the ability to separate the warm-up from the upcoming session becomes a key skill, in addition to the ability to integrate where needed, and the ideal scenario will depend upon the nature of the warm-up, the upcoming session and the overall athletic development picture. Critically, this requires a long-term approach to warm-up planning, and how everything fits into the athletic development jigsaw.

'Does the warm-up develop performance in the long term?'

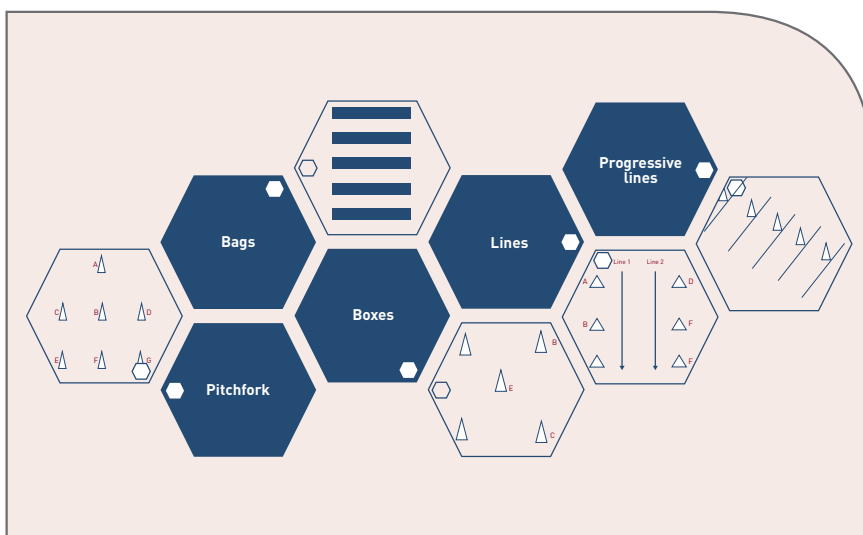
Figure 2. The Gamespeed Target Movement Syllabus



One of the great benefits of thinking longer term in relation to a warm-up is the direct effect it has on skill development. According to Ericsson,⁶ the key determinant of skill development is the quantity of deliberate practice. By including deliberate practice, on key fundamental movement patterns, key locomotor patterns, and key sport skill patterns in each and every warm-up, this provides for an extensive application of deliberate practice, but at no added cost in terms of either time or athlete energy expenditure.⁹ In this way, targeted activities during warm-ups allows these skills to develop in each and every session.¹¹ Although in the short term, this may not appear to make a huge difference, simply 10 minutes spent on skills for two sessions per week results in 80 minutes of skill development each and every month. Over the course of the year, and especially over the course of an athletic career, this amounts to a considerable amount of additional skill development.¹¹

The proviso here is that this work is supported by effective coaching and the emphasis is placed on optimal application of this skill development. Unfortunately, all too often, not enough emphasis is placed on the performance of activities during the warm-up, and often athletes simply go through the motions of the activities and fail to take advantage of the skill development opportunities that accrue. To maximise performance we need to ensure that the quality of work performed is always technically correct, and that we are as assiduous in our coaching during warm-up as we are in the main body of the session. Critically, this also requires that we develop an optimal performance model for all of the movements that we perform in our warm-up.⁹

Figure 3. Sample 'Raise' phase movement set-ups



The RAMP warm-up structure: maximising performance in the short and long term

The RAMP warm-up system⁸ was designed to address all the previous considerations. Its structure maximises performance in the short term, but additionally it provides a sequence by which each activity optimises subsequent activity in a time and energy efficient manner. Similarly, its potentiation phase, whereby carefully selected activities provide a progressive increase in intensity towards a main session, help ensure that the warm-up can assist with the achievement of the main session goals.^{8,9} However, perhaps the main advantage of the effective use of the RAMP system lies in its potential to maximise athletic performance in the long term. By carefully selecting activities that are used in each phase of the RAMP warm-up, with due consideration as to the longer-term impact of the activities, as well as the short-term impact, allows the selection of activities that not only contribute to performance in the current session, but critically to the overall athletic development of the athlete. In this way, the RAMP system is built around specifically targeted activities aimed at enhancing performance in the short, medium and long-term.

RAISE

Athletic performance is enhanced by the achievement of optimal muscle and body temperature.^{1,2,7} The main short-term aim of the raise section of the warm-up is to raise body temperature and other physiological parameters through the use of carefully targeted activities. Although this phase will have key physiological aims, such as increasing muscle elasticity, increasing muscle contraction rates, increasing oxygen delivery and uptake, diverting blood flow, raising body temperature, etc.⁸ what separates it from a traditional general warm-up is that the activities themselves are carefully selected and highly specific to an athlete's goals. In this way, it differs hugely from a general warm-up in which the key aim is to raise physiological parameters and hence the activity chosen is largely arbitrary and the main consideration physiological rather than developmental. In the Raise phase, there still remains a physiological consideration, but the decision-making is based around how to achieve that, while at the same time also optimising long-term skill development. Typically, Raise activities revolve around the development of locomotor movements, the development of skills, or a combination of both.

In terms of locomotor movement development, the target classifications of the Gamespeed system⁹ provide a virtual movement syllabus that can be used to ensure that all key locomotor patterns utilised in sport are addressed (see Figure 2). Typically, a range of activity set-ups can be utilised, which allow a high-density of movement activity to be achieved in a relatively small area. This set-up allows several athletes to be warmed up at the same time, but critically allows a coach the opportunity to observe as many of these activities as possible. This is especially important in the early stages of skill development where the optimal application of each movement is critical. Figure 3 outlines some commonly used set-ups within the Gamespeed system, with each allowing for a wide range of movements and movement combinations to be achieved.⁹ The set-ups also allow for development of the movement patterns, from discrete through to simple combinations, through to multiple combinations, through to decision-making activities. In this way, progression can be achieved both within each session and importantly over time. Effective combination of the set-ups over a given time period allows for variety, but also can ensure that each movement pattern in the syllabus is covered each week, allowing for considerable practice on these fundamental patterns over time.

The use of skills to achieve the key aims of the raise phase is another important application. Here, movements are combined with the applications of skills, to achieve a high density of skill applications in the given time. The type of Raise activity will typically vary depending upon the context. If the activity is for a given sport, then it is likely that the Raise phase will consist of skills associated with that sport, whereas if it is a multisport set-up then skill application can revolve around a range of basic sports skills such as catching, throwing, kicking, hitting, swinging and jumping. Again, as for the movement patterns, it is important that these activities are performed with excellent technique, and thus it is important that the conditioning coach is armed with the ability to determine effective performance in all of the skills utilised within the warm-up, as well as knowledge about the movement patterns themselves.

ACTIVATE AND MOBILISE

This phase follows on from the Raise phase, as the key physiological benefits achieved during the previous phase contribute to effective performance in the activate and

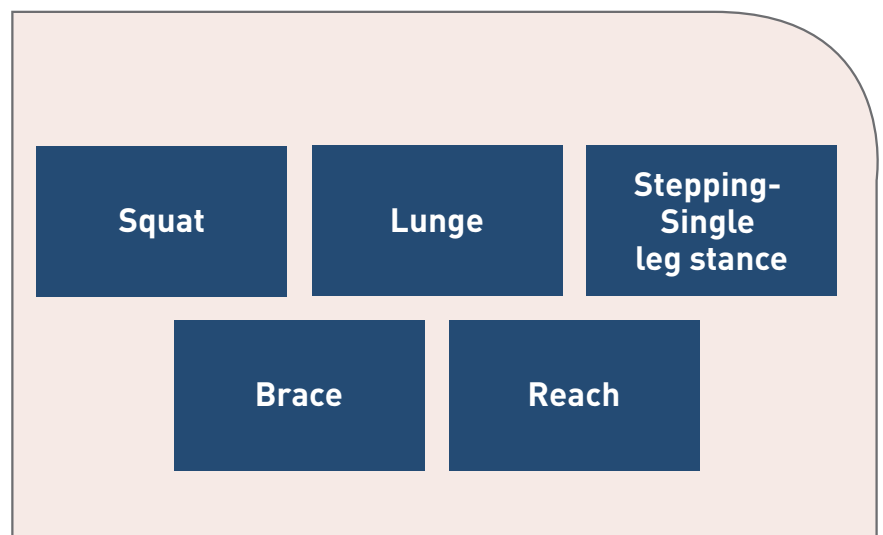
mobilise phase. Although in the short term the aim is to move the body actively through an increased range of motion, in the long term this phase allows extensive practice of key fundamental movement patterns. This combination of long and short term thinking importantly stresses the advantage of dynamic activities over more static activities. The use of dynamic activities has several advantages: first, it maintains the temperature-related benefits of the raise phase; secondly, it moves the body actively through a progressively increasing range of motion; and thirdly, it avoids the potentially negative effects of static stretching on performance.¹¹

Ironically, when viewed from an efficiency and long term effectiveness point of view, the third of these is probably the least important consideration. Viewed from an efficiency point of view, the use of dynamic activities which involve movement around a range of joints, and which also address the key components of mobility – including the ability to control movement via the appropriate development of motor control, stability etc^{4,11} – clearly have advantages.

Similarly, a long-term view allows the phase to be used for the development or maintenance of fundamental movement patterns. A highly popular system of movement assessment over the past few years has been the functional movement screen, which outlines a range of movements which are considered fundamental to effective performance.^{4,11}

Although assessment is important, what is of equal importance – or indeed more – is the ability to address any movement issues through targeted actions. It is here again that the RAMP system is especially important, as

Figure 4. Fundamental mobilisation pattern groups



the activation and mobilisation phase allows the performance of the key fundamental movements required for effective performance in each and every session. Figure 4 shows some key fundamental movement patterns: a selection of an activity from each group allows the movement pattern to be practised, and also ensures that each key joint is mobilised appropriately. Additionally, each movement pattern can be part of a progressive sequence. In this way, challenge can be provided once a basic movement is established. So, for example, a lunge can progress through a static lunge, to a walking lunge, to a lunge with varied directional reaches to a lunge with varying degrees of rotation.

The activation aspect of the phase is integrated with the mobilisation phase and involves controlled movement in each pattern through the required range of motion. In specific scenarios, this phase also allows for targeted activation patterns, although these are not typically included in a normal warm-up. Instead these activities can be used to address

specific issues that athletes may present and here activities can be specifically included into this phase to develop key capacities or to address any identified deficiencies.

POTENTIATE

The Potentiation phase provides one of the most powerful tools for the development of key fitness components and overall athleticism. The *treppe* effect outlines how muscle activity is influenced by previous activity and optimal performance requires a phased increase in intensity of activity. Failure to include a potentiation phase will preclude peak performance and so the potentiation phase needs to be an integral part of any warm-up preparing the athlete for high intensity activity. Importantly, the previous phases will have provided the base upon which to effectively apply a potentiation phase.

However, again the multi-faceted thinking of the RAMP system allows the potentiation phase to be so much more than merely preparation. Phases can

be designed to address a range of capacities, including speed, agility, power, applied movement capacities and applied sport skills. Essentially, the potentiation phase is a progressive sequence of activities that maximise performance in the upcoming session, but also develop targeted skills and abilities that leads to optimal performance in the short, medium and long-term.^{8,11} In essence, the potentiation phase can be a discrete session in itself aimed at developing a specific capacity or theme or phased towards a main session, including activities that will enhance performance both physiologically and skill based in the upcoming session.

Discrete sessions are where the potentiation phase focuses on a key capacity that isn't necessarily related to the upcoming session. So, for example, the potentiation phase can be targeted at the development of maximal speed, which – although important to sports performance – isn't necessarily the focus of the upcoming session. It is here that the long-term development focus of the RAMP system is important, in that capacities that are important over the longer term can be targeted within warm-ups, even if they are not the focus of the current session. Over time, this allows for the development of key components of performance which may or may not be included in the upcoming session but which are crucial for athletic development. Again, the longer term thinking process is essential, allowing for extensive practice and development over time but without additional time or energy expenditure.¹¹

Sessions can also be phased into the main session, so where the main session focuses on defensive skills, the potentiation phase can provide a sequenced and progressive range of activities that develop movements such as jockeying and acceleration, which are crucial to defensive capabilities, moving progressively onto more manipulative and sport-specific applications. This sequencing can move from discrete activities, through a series of combinations, and ultimately into the sport-specific applications the athletes will need to produce in the upcoming session.

Whether the sessions are predominantly discrete or phased, what is crucial for athletic development is that over a given period of time the athlete is exposed to activities that address all of the key movement capacities they require for performance. A powerful way to use the potentiation phase, and to ensure key capacities are developed, is the concept



'Failure to include a potentiation phase will preclude peak performance'

of themed sessions. These themes can be single, combined, sports-generic or sports-specific. Single themed phases are where focus is on one movement capacity, such as acceleration, direction change, jockeying, etc. These are extremely useful when working with development athletes and are also useful when working on fundamental capacities such as acceleration. Combined themes are typically a progression from single phases. Here, movements are combined in typical combinations used in sport such as direction change and acceleration, jockeying and acceleration.

Sport-specific or sports-generic themes are a further progression, where tasks are progressively introduced that address typical sport-generic task requirements or sports-specific task requirements.¹⁰ Here themes such as defensive skills, offensive skills, etc, provide sports-generic task-based themes, and these generic approaches can themselves be broken down into highly sport-specific task themes, such as defensive skills from set pieces.

Typically, the potentiation phase will involve an increase in intensity and can also involve an increase in specificity as it progresses. So, for example, an acceleration theme can initially focus on technical drills followed by accelerations from a standing start, progressing to accelerations from a range of rolling starts, and finishing with accelerations in offensive and/or defensive task based scenarios.

By optimal application of the potentiation phase, a significant volume of speed, agility and plyometric work can be carried out, which both prepare the athlete for the upcoming session, but significantly enhance the long-term athletic development of the athlete. Where this phase is used as preparation for performance it becomes a highly efficient way of ensuring a minimal volume of speed and agility training is

incorporated into an athlete's training programme. However, extending the potentiation phase is a powerful tool and a highly efficient way of including additional dedicated time for speed and agility development, where rather than have a dedicated session at a different time, the warm-up is extended to have a dedicated period of 10-15 minutes focused on speed and agility development prior to a timetabled session.⁹

Being at the start of the session, athletes are non fatigued and the RAMP has optimally prepared the athlete for high intensity performance. Here, the extension of the potentiation phase by 10 – 15 minutes allows for an optimal volume of high intensity speed and agility training to be carried out. Again the focus can be on a single theme or most commonly is of a progressive nature as outlined above.

Summary

The RAMP system is built around training effectiveness and efficiency. Its sequential nature ensures that each phase optimises performance in the subsequent phase. However, perhaps the most powerful advantage of the system is how it switches focus from mainly short-term considerations to a combination of short-term and long-term. By switching to a long-term focus, it allows activities to be selected that achieve the short-term focus but which also contribute to the long-term athletic development of the athlete. In this way, a significant amount of time can be devoted to the development of movements and locomotor skills, and also to the development of key capacities such as speed, agility and power. Critically, this is achieved without a significant increase in training time, maximising efficiency and ensuring an effective application of training.

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UKSCA and Rugby Football League Coach Education Programme



BACKGROUND TO THE PROGRAMME

A high level of interest in the UKSCA was registered among both professional and community coaches in rugby league: they were interested in both achieving accreditation and also in further learning courses in the areas of physical preparation. However, many of the rugby league coaches cited a lack of time, available budget or accessibility to courses as reasons for not actively pursuing UKSCA accreditation and education opportunities.

As a governing body, the RFL therefore decided to collaborate with the UKSCA to develop a programme to assist rugby league coaches, while insisting that certain professional standards were adhered to by practising coaches at club level. The key aim of the UKSCA/RFL Coach Education Programme was to facilitate accessible professional development for rugby league-based conditioning coaches in line with UKSCA competencies. This is

'As a former player, I fully understand the need for support from the best coaches in athlete physical preparation. Investing in our coaches with the best possible content is vital for the future of the game. By working with the UKSCA we can ensure both coach and athlete development whilst ensuring best practice in player welfare.'

Kevin Sinfield, MBE
RFL Rugby Director

a game-wide strategy, both to increase the quality of these coaches and also their delivery at all levels of club rugby league, thus potentially producing more world class players at England level.

THE MODEL

An accessible collaboration, delivered at regional training centres:

- Specific: Nine three-hour sessions of learning per core component, from plyometric agility speed, programming, weightlifting, and pre-accreditation preparation (total of 30 hours)
- Accessible: Evenings from 18.00-21.00, running for four consecutive months on the first three Mondays of each month
- Cost-effective: Subsidised rate per person, with minimal travel costs for coaches. Individuals pay for UKSCA accreditation at the standard rate/through standard channels
- Bespoke: Course content and focus areas customised by experienced tutors and RFL input, to maximise the participants' development
- Led by two UKSCA tutors (24 course places) or one UKSCA tutor (12 course places)
- The pilot-targeted current practising club or sport based S&C coaches with applied industry experience.

SAMPLE COURSE CONTENT

- Week 1:** Introduction and case study
Week 2: Weightlifting for sports performance
Week 3: Plyometrics, agility and speed

Week 4: Weightlifting for sports performance

Week 5: Plyometrics, agility and speed

Week 6: Case study progression

Week 7: Assessment preparation and individualised content.

NEXT STEPS

The initial cohort of coaches – having been through the education programme – is now looking to progress to UKSCA accreditation. To support this, the programme is expanding to run some evening assessment preparation sessions with small groups of coaches, led by a UKSCA tutor/assessor. Due to the nature of the UKSCA's competency-based assessment, the aim of these sessions is not to guarantee a 'pass' at the assessment, but rather to work with coaches to enable them to determine their own readiness for the assessment and to help to develop personal development plans where required.

Providing and accessing impactful, industry recognised CPD is a challenge for all governing bodies and coaches. The partnership with the UKSCA has provided RL coaches with an accessible pathway to high quality personal development which compliments their applied skill sets. The unique nature and value of this model with direct transfer to player preparation cannot be understated.'

Richard Hunwicks
RFL head of human performance