Citation:
Tee, JC and Ashford, M and Piggott, D (2018) A tactical periodization approach for rugby union. Strength and Conditioning Journal, 40 (5). ISSN 1533-4295 DOI: https://doi.org/10.1519/SSC.0000000000000390

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A tactical periodization approach to professional rugby union

Tee, J. C.; Ashford, Mike; Piggott, David

Running head: A tactical periodization approach to rugby union

Abstract word count: 81 words

Text-Only Word Count: 4573 words

Number of Figures and Tables: 5 figures and 3 tables

ABSTRACT:

The concept of tactical periodisation has been popularised by a number of successful, high-profile football coaches. More recently, reports have indicated that tactical periodisation approaches are being utilized within elite rugby union. However, few reports currently exist and resources for coaches interested in using a tactical periodisation approach are limited. This article aims to demonstrate how tactical periodisation can be applied in rugby union to help coordinate long-term planning, improve the specificity of training, and prepare players more effectively for competition.

Key words: coaching, preparation, team sport, vertical integration, game model

INTRODUCTION

Tactical periodization (TP) is a holistic approach to the training and preparation of football teams that originated in the work of the Portuguese academic and football coach, Vitor Fradé (31). A key tenet of TP is that training should never separate the physical, tactical, technical and mental elements of preparation (12). In particular, physical preparation should not be isolated and trained independently; it should integrate with the mental, technical and tactical training. As Tamarit (43) suggests, any physical or technical action has a tactical intention.

A number of successful contemporary football coaches - including Jose Mourinho, Andre Villas-Boas, Jose Peseiro and Carlos Queiroz – have reportedly adopted TP methodology (7). Recently, it has emerged that elements of the TP approach have been adopted for the training of international rugby players by Eddie Jones, England's head coach (26). Despite the emergence of a few translated books and papers (e.g. Tamarit (43)), TP has not yet been described in any detail in the English-speaking world. This article therefore aims to introduce the methodology of TP and illustrate its potential adaptation in rugby union, with the help of examples from our own professional practice as coaches and academics.

It is important to acknowledge at the outset that physical and skill development is most successful when it progresses from general to specific, and that skills are best learn in isolation before being linked and combined in complex sport-specific situations (5). As such, the uniform application of TP at all levels of a sport is not recommended. However, for athletes that are already accomplished in the physical and technical skill requirements of their particular sport, TP may offer a number of performance benefits as a result of improved team tactical coordination.

Rugby union is a field-based team sport that consists of intermittent bouts of high-intensity contact (tackles, scrums rucks, mauls) and acceleration/sprint events, interspersed with lower intensity bouts of walking and jogging (14). The prelusory goal of the game is to outscore the opposition by either grounding the ball over the oppositions try line, or kicking the ball between the opposition's goal posts (47). Teams attempt to achieve these goals (and prevent the opposition from achieving

these goals) through tactical maneuvers designed to gain territory and exploit space, and as a result the game is complex and highly unpredictable in nature (35). Every game scenario creates a different ‘tactical context’, which require appropriate combinations of technical, physical and psychological capacities to solve performance problems (34). Effective performers regularly select appropriate actions in response to different game scenarios. This “tactical awareness” is a key discriminator of success within rugby, and as such the solving of tactical problems and the acquisition of tactical abilities must be at the core of all training activities (33).

It is the coach's role to generate a tactical approach that allows players to anticipate opposition actions, identify predictable scenarios, and create a sense of order within this chaotic environment. This is achieved through the systematic planning and execution of training activities that emphasise the tactical principles the players should adopt within each moment of the game. Consequently, this identifies a need for coaches to have a clear idea of the tactical approach their team will adopt. Lara-Bercial and Mallet (29) suggest that 'simplifying complexity', and using simplified models to create a clear vision of success, are a key characteristics of 'serial winning coaches'. In team invasion games, such as football and rugby union, the first step towards developing such a vision involves the creation of a 'game model'.

TACTICAL COACHING PRIORITIES

The game model and moments of the game

The available writings on TP stress the importance of a ‘game model’ (2,7,12,31,43) that defines how the coach wants the game to be played. Importantly, the coach must create a game model - it cannot be adopted – and it must be simple enough to represent the game in its entirety, but also be flexible enough for players to be creative (43). A clear game model helps players to have a 'shared mental landscape' for the game and, thus, may enhance team decision-making (39). In football, proponents of TP often design game models around the so-called 'moments of the game' which represent the four main states a team may be in during a match: i) transition into attack, ii) attacking organisation, iii) transition into defence, and iv) defensive organisation (12,43). However, given differences in rules (especially rules around contact) a slightly different 'internal logic' exists in rugby union (20). In rugby union, physical contests for possession occur prior to all phases of play, and the outcomes of

these contests, influence the context within which teams attack and defend. As such, the "contest for possession" becomes the central moment of the game, which influences all others. (Figure 1).

* * * Figure 1 near here * * *

The game model is a similar to the concept of a 'shared mental model' as explored by Richards (38,39). In constructing a game model, coaches specify the main tactical principles that the players should adhere to during each moment of the game (31). The game model allows coaches to communicate a 'system' or 'way of playing' to the playing group.

Development of a game model follows a characteristic process. Initially, it is constructed as the coach's mental model of how the game should be played, or what Richards (38) call the 'Alpha version'. This 'mental model' is developed through their understanding of the game, incorporating knowledge of his or her own players' abilities and limitations, and an understanding of competition demands and opponent's strengths and weaknesses. A mental model constructed in this manner provides a 'performance vision' that allows the coach to communicate the ideal tactical approach in each moment of the game to his or her players (38,39).

The performance vision provides a clear idea of the technical, physical and psychological demands that will be placed on the players in the execution of the game model. This allows technical/tactical and strength and conditioning (S&C) coaches to clearly define the requirements of the chosen style of play, and determine the sport specific skill set required, and hence the curriculum that should be followed (38). In a S&C context, this aligns with the well-documented process of "needs analysis" (32), but increases specificity by considering the team's intended style of play.

Following the creation and articulation of the performance vision, this vision is then shared with the players, where the responsibility for its further development and operationalization becomes collaborative between the players and the coach. This empowers the players to identify key cues and developmental factors in the development of the tactical approach (38). In doing so, the mental model transitions

from being the coach's construct to a 'shared mental model' between coaches and players, or what Richards and colleagues (38) call a 'Beta version'. The shared mental model provides a common framework and principles within which players and coaches have a shared tactical understanding. It must be stressed, that this approach is not intended to constrain behaviour, nor prescribe tactical solutions, but allow players the freedom to be creative and make decisions within a framework of play (38). Fradé (cited in Martins (31)) suggests that tactical solutions to a game should be "born in the player's mind first", stressing the importance of developing tactics between coaches and players collaboratively.

Principles of play

Under the framework of TP, each moment of the game has a characteristic structure that presents the team with a performance problem – how best to achieve the team's tactical goal for that moment of the game within the constraints presented by the opposition. Due to the complex nature of sport, no two moments of play will ever be exactly identical, and it is impossible to practice for every scenario players will experience on the field. To reduce this complexity, teams may apply a set of principles, and sub-principles to guide the tactical responses (31). These principles and sub principles provide a sort of heuristic to guide team responses in the chaotic environment. Consequently, this requires a hierarchy of principles and sub-principles to guide behavior within each moment of the game (Figure 2).

* * * Figure 2 near here * * *

Planning

Implementing TP requires exceptional planning to 'operationalize' team tactics through the systematic repetition and progression of training goals. Nested planning (1) refers to shaping learning towards a set of macro-associated (long-term) goals, and aligning different areas of learning and development to specified time frames. The different moments of the game and the principles that underpin them mean that a range of learning activities have to be completed in order to meet the set objectives. The coaching plan needs to ensure that sufficient learning opportunities are provided around the principles of play for the various moments of the game. In addition, planning must ensure the necessary development of required technical skills, physical

abilities and mental attributes. As such, planning needs to progress along two temporal levels: i) short-term progression from game to game, that needs to be aligned with ii) medium and long-term progression over the course of the season or multiple seasons. This nested-planning approach allows for performance stabilisation in the short term, ensuring that a team is optimally ready to perform during regular weekly competition, but also emphasises continued long-term player development.

PHYSICAL CONDITIONING WITHIN TACTICAL TRAINING

Although the evidence for TP for improving team-sport performance outcomes is anecdotal at present, similar approaches (38,44,45) have been shown to be beneficial. However, the intermittent, contact nature of rugby union requires players to have well-developed endurance, high-intensity, speed, strength and power capabilities (18). These physical qualities may be best developed through focused, isolated training blocks (23), but the reality is that competition structures necessitate that these qualities are developed concurrently. In particular, high levels of muscular strength and hypertrophy are essential for elite performance in rugby union (18). S&C coaches will be concerned about whether it is possible to illicit the required physical adaptations for performance by foregoing traditional conditioning methods in favour of a TP approach.

It is clear that the necessary strength and hypertrophy required for elite performance cannot be developed solely through on-field conditioning practices. Resistance training methods are indispensible in rugby union (18), and it follows that training can therefore never be wholly tactical in nature. There is however scope within the prescription of resistance training to align training stimulus with on-field activities to improve transfer of physical abilities from the weight room to the field (4). For example, a field session with a focus on acceleration, deceleration and collisions, could be successfully paired with a gym session incorporating heavy sled towing. Further examples of how resistance training could be used to complement tactical training sessions are provided in Table 2.

In contrast to resistance training, tactical training sessions represent an ideal opportunity to develop game-specific speed, physical endurance and repeated high-intensity effort abilities *in situ*. The effectiveness of this approach has been previously

demonstrated (16,19,46). For example, maximal velocity is noted as an important physical quality for rugby union performance (14), but maximal velocity is a difficult quality to improve within a team sport environment (3,24). In this context, training dedicated specifically to improving linear maximal velocity for rugby may be taking time away from tactical development activities. Instead “relative” or “game-specific” speed may be a much more important parameter for performance, and can be trained within a game context (16). Abilities such as changing direction at high speed to avoid a defender, accelerating through contact or maintaining speed while catching a pass are much more likely to have an effect on match performance. These skills are better trained using skill and game-based approaches rather than linear speed drills (10).

In this light, the transfer of physical abilities to game performance will be better for abilities developed through an integrated model of training. It has already been demonstrated that a conditioning games approach is effective for developing endurance fitness in professional rugby players (19). In addition, recent research from has demonstrated that manipulating the constraints in various small-sided games allows coaches to adapt the physiological stresses placed on participants (46). Based on this information, the integrated approach to training advocated by TP may be effective for conditioning rugby union players.

Vertical integration

A key principle of the TP model is the concept of 'horizontal alternation of specificity' (12,43) (direct translation), but is operationally similar to Charlie Francis’ ‘vertical integration’ approach to physical training (15). This describes the manipulation of training activities to emphasize the development of different physical and tactical abilities throughout the training week. Thus, no two days within a given week stress the same physical fitness or tactical component. Training emphasis is switched on a daily basis to ensure balanced physical development, as well as to allow adequate recovery of the physical fitness component stressed during the previous session. TP models for football typically aim to include training days that emphasize strength, endurance, speed and recovery during the training week. The hypothetical structure of typical training weeks under this approach is illustrated in Figure 3.

The differing physical components are emphasized by varying the playing time, playing area, playing numbers and technical and tactical complexity of training activities throughout the week (Table 1). In accordance with the principle of overload, training should aim to exceed the typical match demands of whichever physical quality is being trained on that day. Examples of integrated TP training sessions for football have been provided by Buchheit and colleagues (3). It is important to note that these terms (i.e. 'strength', 'endurance') in the context of TP literature have different meanings to those traditionally used in the strength and conditioning literature. For example, 'strength' training refers to a session where the emphasis is on playing games in small spaces in order to overload acceleration and deceleration demands. Going forward in this text we will attempt to apply some more universally accepted descriptors.

Applying the concept of vertical integration to rugby training requires consideration of a number of rugby specific factors. Of primary concern is the frequency of physical contact within rugby union. Professional rugby players are involved in multiple contact events during match play (10 to 25 tackles, 7 to 74 rucks/mauls) (13), which significantly increases the overall physical exertion experienced by players (25). Contact training needs to be undertaken regularly during rugby training to improve tackle and ruck efficacy (22) but contact skills training comes at a cost of physical trauma and fatigue (42). For this reason, the positioning of contact training sessions within the training week requires special consideration. It takes at least 48 hours to recover from rugby match play (40), and at least 24 hours to recover from contact training sessions (41). Therefore, we suggest that contact skills training is placed in the middle of the training week to allow for both maximum recovery from the previous match, and to allow full recovery before the next match (Figure 4). The placement of the contact training session 'anchors' the rest of the training week. Rugby players generally have at least two rest days in a seven-day micro-cycle, meaning that they effectively have one less training day per week than footballers. This is similar to the six-day micro-cycle in football (Figure 3b). Suggested training parameters for all vertical integration sessions are provided in Table 2., with explanations in the text below.

In the rugby context, it may be favorable to place a non-contact work capacity session

on Monday (following a Saturday match) for two reasons. First, players do not fully recover during the first 48 hours following match involvement (41), and so should not be exposed to further collisions or high-intensity exertions during this period. Second, the running demands of rugby union match play are relatively low (6), and in the absence of contact rugby players typically run these can be relatively easily achieved during conditioning games (25). This indicates that the aerobic ability required for performance can be maintained through these non-contact work capacity sessions, while simultaneously developing skills and/or tactical awareness. These sessions could be seen as similar to the 'endurance' or 'recovery' sessions advocated in the TP literature

In addition to the positioning of contact training during the week, the 'dose' of contact players are exposed to in training is an important consideration. Analysis of ball-in-play time in rugby union has shown that, on average, the ball is in play for 26 seconds with the longest ball in play phase reported as 113 seconds, and the average ball out-of-play time 59 seconds (36). The mean contact demands of rugby show that players may be exposed to 0.56 contact events per minute (30), but this figure may increase to 0.89 collisions per minute during the longest periods of play (37). Based on this analysis, relative overload can be achieved within a contact skills session by ensuring that work intervals last for 1 to 2 minutes so that players are involved in approximately 1 collision per minute. Contact training sessions rely largely on players both generating momentum through rapid acceleration, and negating other player's momentum during contact phases. The ability to close space quickly and realign effectively are determinants of success for defenders. As such, acceleration and deceleration abilities are naturally stressed through contact focused technical/tactical activities, and these can be further emphasized through the use of small playing areas and evenly matched team sizes (46).

Speed emphasis training in rugby union should look to accentuate both speed of decision making and speed of movement. It is during this session that players should accumulate most of their maximum velocity (V_{Max}) running volume for the week. Analysis of the worst case scenario during international match play has shown that the maximum distance covered in a one minute interval is 184 ± 28 meters (11). This indicates that a mean intensity of 200 m/min during work intervals will satisfy the

overload requirement for speed during these sessions. It is important that players achieve both individual V_{Max} and worst-case scenario mean running intensities at times during this session, though these need not be concurrent.

Because these training sessions take place in the presence of a main emphasis on technical/tactical skill development, there will be a great deal of variation between work intervals. Microtechnology is hugely valuable to the S&C coach in assessing whether the session goals have been achieved, and in providing feed-forward information to further improve subsequent training sessions (9).

Utilising a TP structure emphasises consistency of training prescription across multiple competition weeks. This ensures that players receive adequate (hopefully optimal) stimulation each week for each of the important physiological parameters for performance. In the long-term this is likely to produce consistency in physical performance, avoiding undesirable peaks and troughs during the season.

SESSION TO SESSION IMPLEMENTATION

The principle of 'conditioned practices' can be used for the planning of individual training sessions within the larger training plan (12). Effective conditioned practices rely on the coach shaping training around the targeted principles of play, and associated key behaviours. It is suggested that this should be split into two dimensions: i) the tactical/technical dimension (motor behaviours, cognitive functioning) and ii) the physiological dimension (physical load) (12). Appreciating these two factors will allow coaches to manipulate the levels of intensity to ensure the tactical ‘vision’ of the principle is met. In Kerr's (28) study of the All Blacks, for example, coaches and players confessed that tactical elements such as decision-making, physical intensity and the number of randomized situations incorporated within training, all far exceeded the demands of an elite international rugby match. This highlighted the overall goal of their training: for training to be harder than the game.

The holistic nature of TP means that a number of demands can be increased to affect session demands. Coaches can manipulate the levels of cognitive load, technical skills, tactical understanding, physical stress, anxiety and complexity of movements

depending on the desired goal. Tan, Chow and Davids (44) theorised four pedagogical principles that can allow for learning to occur: i) tactical complexity, ii) representation, iii) exaggeration and iv) tactical transfer. Coaches can apply these principles to challenge their players to understand the moment of the game (as informed by principles of play) targeted within that session.

To give a practical example, consider a team that needs to develop their ability to defend whilst positioned dangerously close to their try line. Multiple technical, tactical, physical and mental demands are placed on the players in this situation e.g. tackle technique, aggression, determination, physical conditioning, repeated high-intensity effort ability, the shape and understanding within the defensive line, effective communication between players, etc. For a team to achieve its goals of i) not conceding points and ii) regaining possession they will need to be effective in all of these areas. The principle of 'representation' implies that the practice should represent the information-movement coupling of that in a game (43). In this instance a coach should ensure that the attacking team are simulating a representative tactically informed attack close to the ruck situation and that the defensive response is appropriate. The coach may vary the tactical complexity of practice depending on what needs to be achieved. In this instance the game could be made simpler with smaller numbers (5 vs. 5), and a relatively small pitch (15m x 10m). In order to align this session with the vertically integrated physical development plan, this particular session would be placed within the 'contact, acceleration, deceleration' emphasis day of the weekly micro cycle. Set and rep times would be manipulated to achieve relative physical overload.

Manipulating the physical and tactical constraints this way requires players to make more tackles in a certain time frame than they would in a competitive match (8,35). Similarly, manipulating the rules and behaviours of the participants will 'exaggerate' the importance of certain techniques and actions, once again increasing both the physical and cognitive load. In addition, due to the psychological nature of 'danger' in almost conceding, coaches can use certain behaviours such as scolding and hustling to replicate the psychological context of a game (21). Training should always represent the true nature of the game, yet principles of 'tactical complexity' and 'exaggeration' can be applied to help achieve the tactical goal (44). A sample session plan for a

training session incorporating the above session is provided in Table 3.

Collaboration between technical tactical and S&C coach

It may be advantageous for rugby union teams to adopt a TP approach to training because of the demonstrable advantages in terms of training specificity. Application of this approach maximizes time spent in game situation activities that will likely have a positive influence on on-field performance. However, consideration needs to be given to the nature of the relationship between technical/tactical and S&C coach (Figure 5). There is significant overlap both in the skills required and areas of responsibility for planning. As such, the relationship between these two professionals needs to be collaborative and transactional both in the long- and short-term. Constant communication will be required to allow for the program to be agile enough to respond to arising match-to-match needs, while still maintaining focus on long-term team development.

In practical terms, this interaction will necessitate weekly planning meetings between the technical/tactical and S&C coach where the training program for the week will be discussed and described. Following analysis of the previous game performance and consideration of the long-term program goals, the technical tactical coach will decide on a number of training outcomes for the week. The S&C coach will provide a broad weekly training template that takes into account the principles of vertical integration for the purposes of maintaining or developing physical qualities over the course of the week's microcycle. The technical/tactical and S&C coach should then collaborate to decide which activities might best address the goals for the week, and where these activities would be best placed in the schedule. During this process the S&C coach would likely assist the technical tactical coach in manipulating the constraints of activity design (pitch dimensions, numbers of attackers and defenders, work and rest period timings etc.) to align with the physical training outcomes desired.

Following this planning phase, both technical/tactical and S&C coaches must critically assess all activities to determine whether they have achieved the desired outcomes. The technical/tactical coach may assess this based on improved understanding or tactical coordination of the players, or the ability to execute tactical movements under pressure. The S&C coach will utilize objective (GPS, video) or

subjective measures (session RPE) to gauge whether the activity achieved the desired levels of physical exertion. Based on these observations, both coaches should reflect and discuss how training activities can be further improved. It is imagined that over time the coaches will develop a library of activities that they trust to develop the holistic training goals described, and that manipulations of these activities will form the basis of future training sessions.

CONCLUSION

The idea of TP has been made popular recently by a number of high-profile football coaches and, with Eddie Jones' recent work, appears to be making its way into rugby union. However, very few reports of TP currently exist and only scant material is available for coaches interested in application. In this article we have therefore tried to show how TP can be applied in rugby union to help coordinate long-term planning, improve the relevance and efficiency (specificity) of training, and prepare players more effectively for competition.

Coaches should create their own game model, simplifying the complexity of the game, specifying the key moments and main tactical principles and subprinciples by which they want their team to play. Nested plans can be organised around these principles with the tactical demands driving the inclusion of relevant and complementary technical, physical and psychological skills. When coaches have a clear vision for how they want their team to play, designing weekly and monthly plans that are balanced according to the demands of their vision, becomes relatively simple. At the level of a session, TP reminds us of the sanctity of the 'unbreakable entirety' of the game (43). This concept provides pedagogical principles for the creation of activities and situations that anchor every action to the game model and associated principles of play.

Despite the potential value we have attempted to illustrate in this article, the efficacy of TP as a coaching methodology is no better than anecdotal at present. It remains unclear how TP may best be applied in rugby union, and to what extent it might lead to playing success. Indeed, a number of basic questions await empirical scrutiny: Does TP lead to improved team decision-making? Is physical training more effective when integrated with tactical training in a TP approach, and how is this best

achieved? How long does it take to embed a TP approach with a squad? How far can a TP approach be adopted with junior players, or with limited resources?

Similar methodologies, such as those developed by Richards (38), have demonstrated some initial empirical success in team sports (football, hockey and netball). In addition, many of the pedagogical principles informing TP are derived from better tested theories such as Teaching Games for Understanding (44) and constraints and non-linear pedagogy (45). So, whilst there are some indications that TP may be a fruitful approach, some path-breaking coaches will need to take a risk, apply the ideas outlined here, and generate and share some evidence before we truly know the value of TP to rugby union coaches.

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Table captions

Table 1 – Football specific tactical periodization emphasizing different physical stresses in training (adapted from Oliveira 2007).

Table 2 – Rugby specific TP model emphasizing horizontal alternation of different physical stresses throughout the training week.

Table 3 - Sample session plan focused on defensive organization, illustrating the incorporation of tactical periodization principles into session planning.

Figure Captions

Figure 1 – Moments of the game for rugby union

Figure 2 – Game model for rugby union demonstrating principles of play for each moment of the game

Figure 3 – Typical structure of a tactical periodization training plan for football for (a.) a 6-day turnaround, and (b.) a 5-day turnaround.

Figure 4 – Proposed structure of a tactical periodization training week for rugby.

Figure 5 – Roles of technical / tactical and strength and conditioning coaches in collaborative planning for tactical periodization.